2º parcial

Tema 2 fotofisiología

La energía es necesaria para los organismos porque la utilizan para la síntesis de sus componentes.

Las plantas verdes la captan y la transforman en ð química, usada por los organismos vivos. Esto es la fotosíntesis q tiene lugar en los cloroplastos q tienen moléculas capaces de captar la ð y también todos los sistemas enzimáticos y cofactores necesarios para ensamblar es C inorgánico y otros elementos para formar la materia de los organismos.

La maquinaria eszimática esta en las hojas q son los órganos capacitados para captar la radiación, el CO2 atmosférico y al mismo modo están diseñados para evitar las perdidas de agua por la transpiración.

La fotosíntesis se da en dos fases: luminosa y oscura. Esto implica las reacciones en las q la ð luminosa mediante procesos de oxidorreducción por transferencia de e− se acumula en forma de ATP y poder reductor (NADPH) q lo reducen a carbohidratos.

El propósito de la fotosíntesis es un proceso mediante el q se aporta C inorgánico para aumentar la biomasa y se aporta ð para mantener esa biomasa.

La ð almacenada en azucares es liberada a través de la respiración.

La productividad depende del balance entre la fotosíntesis y la respiración teniendo en cuenta la distribución de compuestos de la fotosíntesis en los diferentes compartimentos celulares.

Hay plantas q han conseguido mediante variaciones fisiológicas adaptarse a distintos hábitat específicos.

La luz solar aporta ð para las plantas e información.

Desde un punto de vista energético, la energía solar mantiene la Tª para sintetizar los componentes celulares.

También la tiene como señal de las características del ambiente y la planta es capaz de regular sus movimientos. Desarrollar distintos procesos en la diferenciación, regula la floración, etc.

Todos estos aspectos se analizan mediante la fotobiología.

La fotosíntesis es una liberación de O2 y almacenamiento de poder reductor en compuestos azucarados. E un proceso de oxidorreducción.

El agua se oxida u los compuestos oxidados (CO2, sulfato, nitrato) se reducen.

Desde el punto de vista global aporta el imput energético necesario para la vida.

Biología de la radiación

Es el estudio de la radiación sobre los procesos biológicos.

Hay q distinguir entre radiaciones beneficiosas y nocivas. Solo una pequeña banda de radiación del visible es beneficiosa. **(Hoja 1 Fig. 1)** En el Sol se produce la fusión de 4H dando He y emisión de gran cantidad de ð

dándose un aumento de Tª. Esta ð se trasloca a un[Author ID1: at Tue Aug 28 19:41:00 2001]una[Author ID1: at Tue Aug 28 19:41:00 2001] velocidad de 3*108m/sg y la naturaleza espectral es la expresada en la figura. De toda la radiación solo una pequeña parte de la energía es captada por la planta y utilizada par[Author ID1: at Fri Aug 31 02:32:00 2001]para[Author ID1: at Fri Aug 31 02:32:00 2001] llevar a cabo los procesos fotosintéticos.

(Hoja 2 Fig. 8.1) Respecto a la naturaleza de la radiación se propuso q la luz participa de características de onda y de partícula. La onda se caracteriza por una longitud q equivale a la distancia q existe entre dos picos de la onda, q se desplaza en la atm. Su frecuencia representa el numero de crestas q pasan ante un observador durante un periodo de tiempo determinado.

$$c = \lambda(long.onda) \quad \nu(frecuencia)$$

Una radiación electromagnética es también un[Author ID1: at Tue Aug 28 19:41:00 2001]una[Author ID1: at Tue Aug 28 19:41:00 2001] partícula denominada fotón, no
se puede fraccionar para excitar dos moléculas distintas.

Solo existen diferencias energéticas entre distintos niveles dentro de la partícula.

Para pasar de un nivel energético a otro la energía solo puede ser aportada por un fotón.

La energía de un fotón depende de la frecuencia y de la constante de Planck.

$$\varepsilon = h \quad \nu(frecuencia)$$
$$h = 6.62 \quad 10^{-3}\ j/sg$$

Cuanto mayor es la longitud de onda menos energético es el fotón.

De toda la radiación solo la comprendida entre 200 − 900 nm es la utilizada por los organismos fotosintéticos.

Tres tipos de radiaciones:

- −−>Radiaciones de longitud de onda corta:[Author ID1: at Thu Aug 30 16:37:00 2001] X, el fotón provoca perdidas electrónicas, ruptura de moléculas (radicales libres) y puede provocar la muerte celular.
- −−>Radiaciones de longitud de onda larga:[Author ID1: at Thu Aug 30 16:37:00 2001] radar, microondas. Son menos energéticas produciendo cambios rotacionales y vibracionales q provocan cambios en la Tª, traduciéndose en calor.
- −−>Visible:[Author ID1: at Thu Aug 30 16:37:00 2001] por debajo del ultravioleta cercano y por arriba del infrarrojo cercano. Se excitan las moléculas mandando los e− a un orbital mas[Author ID1: at Tue Aug 28 19:42:00 2001]más[Author ID1: at Tue Aug 28 19:42:00 2001] externo. La excitación puede producir cambios químicos en las moléculas adyacentes con la transferencia de energía entre ellas.

Entre 200 nm y 900 nm es la radiación usada [Author ID1: at Thu Aug 30 16:55:00 2001]por los organismos fotosintéticos.[Author ID1: at Thu Aug 30 16:56:00 2001]

−−>Entre 400[Author ID1: at Thu Aug 30 16:38:00 2001][Author ID1: at Thu Aug 30 16:39:00 2001] nm y 700 nm [Author ID1: at Thu Aug 30 16:38:00 2001]es la radiación fotosintéticamente activa, q es la absorbida por las plantas superiores[Author ID1: at Thu Aug 30 16:39:00 2001]−−>[Author ID1: at Thu Aug 30 16:38:00 2001][Author ID1: at Thu Aug 30 16:38:00 2001]

En los sistemas biológicos las moléculas q absorben radiación son los pigmentos.

Se observa fluorescencia a partir de las moléculas de clorofila a y b, pero no a partir de carotenoides y xantofilas.

Fosforescencia :[Author ID1: at Thu Aug 30 16:40:00 2001] vida[Author ID1: at Thu Aug 30 18:11:00 2001] media[Author ID1: at Thu Aug 30 18:12:00 2001] de entre 10[Author ID1: at Thu Aug 30 18:11:00 2001]−4[Author ID1: at Thu Aug 30 18:12:00 2001] a 1 sg.,[Author ID1: at Thu Aug 30 18:12:00 2001] [Author ID1: at Thu Aug 30 16:40:00 2001]reemisión[Author ID1: at Thu Aug 30 16:44:00 2001] de la [Author ID1: at Thu Aug 30 16:40:00 2001]energía[Author ID1: at Thu Aug 30 16:44:00 2001] a una [Author ID1: at Thu Aug 30 16:40:00 2001]longitud[Author ID1: at Thu Aug 30 16:41:00 2001] [Author ID1: at Thu Aug 30 16:40:00 2001]de onda [Author ID1: at Thu Aug 30 16:41:00 2001]más[Author ID1: at Thu Aug 30 21:45:00 2001] larga. Se observa fluorescencia cuando la [Author ID1: at Thu Aug 30 16:41:00 2001]energía[Author ID1: at Thu Aug 30 16:44:00 2001] q se aplica [Author ID1: at Thu Aug 30 16:41:00 2001]−−>sobrepasa[Author ID1: at Thu Aug 30 16:41:00 2001][Author ID1: at Thu Aug 30 16:43:00 2001] [Author ID1: at Thu Aug 30 16:41:00 2001]el punto de saturación de la [Author ID1: at Thu Aug 30 16:42:00 2001]fotosíntesis[Author ID1: at Thu Aug 30 16:44:00 2001], cuando disminuye la [CO[Author ID1: at Thu Aug 30 16:42:00 2001]2[Author ID1: at Thu Aug 30 16:42:00 2001]][Author ID1: at Thu Aug 30 16:42:00 2001], cuando se ilumina con luz blanca, radiación absorbida por [Author ID1: at Thu Aug 30 16:44:00 2001]carotenoides[Author ID1: at Thu Aug 30 16:45:00 2001] [Author ID1: at Thu Aug 30 16:44:00 2001]o con radiación absorbida por ficobilinas.[Author ID1: at Thu Aug 30 16:45:00 2001]−−>[Author ID1: at Thu Aug 30 16:42:00 2001]

Procesos fisiológicos en plantas

- **700 − 800 (rojo lejano)**

Incremento altura, alargamiento entrenudos, fitocromo (rojo lejano 730 nm se inactiva), absorción bacterioclorofilas.

- **610 − 700 nm (rojo)**

Máxima actividad fotosintética, máxima absorción clorofilas (cloro. A 663 nm, cloro. B 644 nm), fitocromo (rojo 660 nm se activa).

- **510 − 610 nm (verde − amarillo)**

Mínima fotosíntesis, mínimo fotomorfogénesis (desarrollo estructural), absorción ficobilinas en algas rojas y cianofíceas.

- **400 − 500 nm (azul)**

Máxima fotosíntesis, máxima absorción clorofilas (cloro. A 420 nm, cloro. B 430 nm), absorción carotenoides (flavoprotei[Author ID1: at Sat Sep 8 18:49:00 2001]í[Author ID1: at Sat Sep 8 18:49:00 2001]nas y fitocromo), respuestas morfogenéticas (criptocromo), fototropismo.

- **280− 400 nm (UV cercano)**

Engrosamiento hojas, crecimiento compacto y enano (roseta), quemaduras solares.

- **menor de 280 nm (UV corto)**

Radiaciones mutagénicas letales.

Muchas de las respuestas desde la germinación a la floración están mediadas por el fitocromo. Están implicados en la germinación, reverdecimiento,[Author ID1: at Sat Sep 1 20:42:00 2001] adaptación del aparato fotosintético a la luz o sombra.

Son complejos diméricos formados por un cromóforo y una proteína unida al cromóforo.

Hay dos máximos de absorción a 660 y 730 nm.

Cuando el fitocromo es capaz de absorber radiación a 660 nm, el cromóforo tiene configuración Cis inactiva (forma Pr). Cuando recibe la radiación se activa y pasa a la forma Pfr. Cuando absorbe radiación de 730 nm pasa a la forma inactiva Pr.

Los espectros de absorción se solapan, es decir, hay una coexistencia de los dos tipos. Cuando recibe radiación de 660 nm el 88% esta activo y el 3% inactivo.

Durante el día la mayor parte esta activa. Por la tarde tiende a inactivarse. El fitocromo tiene un receptor lo q conlleva la aparición de 2os mensajeros q activan proteinkinasa q fosforilan proteínas q activan genes en el núcleo.

La inactivación es por procesos de proteolisis mediado por la colaboración de un[Author ID1: at Tue Aug 28 19:42:00 2001]una[Author ID1: at Tue Aug 28 19:42:00 2001] pequeña proteína denominada ubiquinona, q participa en procesos de degradación de proteínas. Actúa como un[Author ID1: at Tue Aug 28 19:43:00 2001]una[Author ID1: at Tue Aug 28 19:43:00 2001] especie de marcaje, va acompañada con gasto de ATP la unión de la ubiquinona a la proteína a degradar.

Tema 3 fotosíntesis

Las plantas verdes captan la energía solar transformándola en energía química mediante la fotosíntesis. En este proceso el agua y el CO2 se combinan para transformarlo en azucares simples y O2. estos[Author ID1: at Tue Aug 28 19:43:00 2001]Estos[Author ID1: at Tue Aug 28 19:43:00 2001] azucares se transforman en lípidos, proteínas, ac. nucleicos, etc.

El proceso global se divide en 2 fases o 3 etapas:

- fase[Author ID1: at Tue Aug 28 19:43:00 2001]Fase[Author ID1: at Tue Aug 28 19:43:00 2001] luminosa: 2 etapas
- fase[Author ID1: at Tue Aug 28 19:43:00 2001]Fase[Author ID1: at Tue Aug 28 19:43:00 2001] oscura: 1 etapa

Primera etapa: captación de la radiación, absorción de luz y retención de la energía luminosa. Son los procesos fotosintéticos primarios.

Segunda etapa: (Hoja 10 Fig. 1.1) la energía captada es convertida en energía química en forma de NADPH y ATP. Se crea un gradiente electroquímico de proteínas q se usa para la síntesis de ATP. Son los procesos fotoquímicos.

Tercera etapa: proceso de estabilización y almacenamiento de la energía. Son procesos biológicos en los q se utiliza la energía almacenada para reducir el CO2 en azucares.

En el sentido estricto es reducción y oxidación de CO2.

La liberación de la energía de la fotosíntesis se realiza por el proceso contrario q es la respiración. Se da la oxidación de los azucares. Ambos procesos comparten características:

- implican transporte de e− y fosforilación acoplada
- se dan en orgánulos (cloroplastos y mitocondrias)

[Author ID1: at Thu Aug 30 14:53:00 2001][Author ID1: at Thu Aug 30 14:52:00 2001]

Experimento de Engelman (Hoja 12)[Author ID1: at Thu Aug 30 14:54:00 2001]

−−>Muestra la[Author ID1: at Thu Aug 30 14:54:00 2001][Author ID1: at Thu Aug 30 14:54:00 2001] [Author ID1: at Thu Aug 30 14:54:00 2001]relación[Author ID1: at Thu Aug 30 14:55:00 2001] entre el O[Author ID1: at Thu Aug 30 14:54:00 2001]2[Author ID1: at Thu Aug 30 14:55:00 2001] y el cloroplasto. [Author ID1: at Thu Aug 30 14:54:00 2001]Relación entre el CO[Author ID1: at Thu Aug 30 14:55:00 2001]2[Author ID1: at Thu Aug 30 14:55:00 2001] y las características de la luz.[Author ID1: at Thu Aug 30 14:55:00 2001]−−>[Author ID1: at Thu Aug 30 14:54:00 2001]

Mide el desprendimiento de O2 en el cloroplasto. Realiza el experimento con Chlorella en tres situaciones. En oscuridad y aplicaba focos de luz blanca, en el interior tení[Author ID1: at Thu Aug 30 14:53:00 2001]i[Author ID1: at Thu Aug 30 14:53:00 2001]a bacterias q se desarrollaban má[Author ID1: at Thu Aug 30 14:53:00 2001]a[Author ID1: at Thu Aug 30 14:53:00 2001]s con luz. Estas se concentraban en zonas donde se aplicaba la luz. Si iluminaba todo el medio la distribución era homogénea en el cloroplasto. Si iluminaba el medio con focos de luz roja y verde se daba acumulación en puntos del cloroplasto donde esta iluminado con luz roja. La luz verde no causa desprendimiento de O2.

En el siglo XIX se establece la ecuación de ala fotosíntesis:

CO2 + Agua + Luz + Planta verde === Materia orgánica + O2

Desde el punto de vista bioquímico los primeros experimentos para determinar las primeras etapas de la fotosíntesis se llevaron a cabo con bacterias no fotosintéticas q utilizaban el CO2 como fuente de C. Cuando se utilizaban bacterias fotosintéticas estas utilizaban la energía radiante. Son anaerobias, la fuente reductora de H[Author ID1: at Fri Aug 31 11:53:00 2001]H+[Author ID1: at Fri Aug 31 11:53:00 2001] era SH2 y continuaban:

CO2 + 2Sh2 === CH2O + H2O + 2s

Había q determinar el origen del O2 Van Niel observó q lo q se liberaba en la fotosíntesis en las bacterias verde azuladas era el donador de H[Author ID1: at Fri Aug 31 11:53:00 2001]H+[Author ID1: at Fri Aug 31 11:53:00 2001]. Se liberaba el O2 proveniente del agua.

Todos los análisis nos llevan a q las plantas usan la energía de la luz para oxidar el agua dando un agente reductor q posteriormente se usa para convertir el CO2 en CH− y se produce un oxidante q en realidad es un producto de desecho (O2) desprendido a la atmósfera.

El desprendimiento de O2 forma parte de la fase luminosa y es independiente de la fase oscura.

El proceso luminoso es un proceso de oxidorreducción donde los e− derivados de la fotosíntesis del agua son cedidos al CO2.

La transferencia no es directa. Existen intermediarios q canalizan la transferencia del agua al CO2.

En 1905 Blackman analizaba la respuesta de desprendimiento de O2 en función de la intensidad luminosa y [CO2].

Había unas etapas en q el desprendimiento de O2 era proporcional a la intensidad luminosa. A una intensidad determinada no aumenta el desprendimiento.

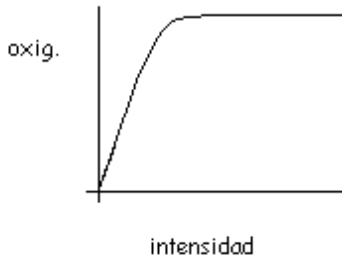
Con esto llega a la conclusión q hay dos fases: una donde las tasas de fotosíntesis dependen de la luz y otra donde dependen de procesos bioquímicos independientes de la luz y dependientes del CO2.

Este tipo de respuesta explica por q la fotosíntesis se ve afectada por la Tª y venenos metabólicos.

La fase luminosa es un proceso con reacciones biológicas no dependientes de la temperatura.

La fase oscura depende de la Tª dentro de los márgenes fisiológicos.

La aplicación de venenos limita las tasas fotosintéticas sobre todo en la fase oscura.



[Author ID1: at Thu Aug 30 17:01:00 2001]Esta teoría fue demostrada por Emerson con el alga Chlorella. Daba lo mismo aplicar luz continua o dar destellos de luz de distintas intensidades. A medida q aumenta la intensidad del destello aumenta la tasa de desprendimiento llegando a un momento en q por mucho q aumente la intensidad el desprendimiento de O2 no aumenta. Se da saturación luminosa. Esto ocurre con los destellos.

Llevaron a cabo experimentos de cómo influía el periodo entre dos destellos en el desprendimiento de O2. Si el periodo de oscuridad aumenta el desprendimiento aumenta.

Para que se consuman los productos de la fase luminosa se necesita un periodo de por lo menos 0.06 segundos.

Para reducir un mol de CO2 a CH− se necesita la fotolisis de 2 H2O para obtener los 4 e− y 4 H+ requeridos.

Para pasar 1 e− del par O2 al NADPH se necesitan dos fotones. Para producir la transferencia de los 4 e− se requieren como mínimo 8 fotones.

El −−>**rendimiento [Author ID1: at Sat Sep 1 16:55:00 2001]**[Author ID1: at Sat Sep 1 16:55:00 2001]−−>**re[Author ID1: at Sat Sep 1 16:55:00 2001]**[Author ID1: at Sat Sep 1 16:55:00 2001]**querimiento [Author ID1: at Sat Sep 1 17:01:00 2001]c[Author ID1: at Sat Sep 1 17:05:00 2001]**−−>**q[Author ID1: at Sat Sep 1 17:05:00 2001]**[Author ID1: at Sat Sep 1 16:55:00 2001]−−>**uántico**[Author ID1: at Sat Sep 1 16:55:00 2001] es la cantidad de energía q se precisan[Author ID1: at Sat Sep 1 17:01:00 2001] para fijar una molécula de CO2 o desprendimiento de un O2.[Author ID0: at]

El [Author ID1: at Sat Sep 1 17:01:00 2001]−−>**rendimiento cu[Author ID1: at Sat Sep 1 17:02:00 2001]**[Author ID1: at Sat Sep 1 17:04:00 2001]**á[Author ID1: at Sat Sep 1 17:05:00 2001]**−−>**ntico[Author**

ID1: at Sat Sep 1 17:02:00 2001][Author ID1: at Sat Sep 1 17:04:00 2001] es la cantidad de producto necesario ([Author ID1: at Sat Sep 1 17:02:00 2001]Fijación[Author ID1: at Sat Sep 1 17:03:00 2001] [Author ID1: at Sat Sep 1 17:02:00 2001]de CO[Author ID1: at Sat Sep 1 17:03:00 2001]2 [Author ID1: at Sat Sep 1 17:03:00 2001] o desprendimiento de O[Author ID1: at Sat Sep 1 17:03:00 2001]2[Author ID1: at Sat Sep 1 17:03:00 2001])[Author ID1: at Sat Sep 1 17:03:00 2001] para absorber un fotón. Es el inverso del requerimiento cu[Author ID1: at Sat Sep 1 17:04:00 2001]á[Author ID1: at Sat Sep 1 17:05:00 2001]ntico.[Author ID1: at Sat Sep 1 17:04:00 2001][Author ID0: at]

El [Author ID1: at Sat Sep 1 17:05:00 2001]−−>**cuantosoma[Author ID1: at Sat Sep 1 17:05:00 2001]**[Author ID1: at Sat Sep 1 17:06:00 2001] es la unidad funcional [Author ID1: at Sat Sep 1 17:05:00 2001]mínima[Author ID1: at Sat Sep 1 17:06:00 2001] para q se de desprendimiento de O[Author ID1: at Sat Sep 1 17:05:00 2001]2[Author ID1: at Sat Sep 1 17:06:00 2001] del fotosistema. No existe como tal.[Author ID1: at Sat Sep 1 17:06:00 2001]−−>[Author ID1: at Sat Sep 1 17:06:00 2001]

Para absorber un fotón se necesitan entre 240 − 300 clorofilas.

Tema 4 pigmentos fotosintéticos

(Hoja 13) Las células fotosintéticas contienen al menos un tipo de clorofila capaz de absorber radiación del visible.

La mayoría de las células tienen carotenoides y las ficobilinas. Estas son azules o rojas y los carotenoides son amarillos o naranjas. A estos se les denomina pigmentos accesorios (la radiación captada por ellos no se usa directamente en la fotosíntesis sino q es transferida a la clorofila.

Las ficobilinas son hidrosolubles y carotenos y clorofilas insolubles en agua (son solubles en disolventes orgánicos).

Las clorofilas son pigmentos fotosintéticos verdes con 4 anillos tetrapirrólicos con diversos sustituyentes unidos a los C de los anillos.

Los N de los pirroles tienen e− no compartidos q sirven para formar enlaces de coordinación con el Mg2+ formando una estructura prácticamente plana. Unido mediante enlace ester a través de un residuo propiónico q pende de C−7 del pirrol 4, hay un largo brazo con estructura terpenoide hidrófobo q es el resto del fitol.

Cuando por hidrólisis se pierde el fitol, la molécula q queda es la clorofilida.

La [Author ID1: at Mon Sep 10 21:55:00 2001]Si se elimina el Mg[Author ID1: at Mon Sep 10 21:54:00 2001]2+[Author ID1: at Mon Sep 10 21:54:00 2001] por tratamiento ácido la molécula q queda es la [Author ID1: at Mon Sep 10 21:54:00 2001]feofitina[Author ID1: at Mon Sep 10 21:55:00 2001]feofitina, [Author ID1: at Mon Sep 10 21:55:00 2001] [Author ID1: at Mon Sep 10 21:55:00 2001]q es el aceptor primario de e− del PS II, es una molécula de clorofila−a modificada, en la q dos [Author ID1: at Mon Sep 10 21:55:00 2001]átomos[Author ID1: at Mon Sep 10 21:58:00 2001] de H han reemplazado al Mg[Author ID1: at Mon Sep 10 21:55:00 2001]2+[Author ID1: at Mon Sep 10 21:56:00 2001] central.[Author ID1: at Mon Sep 10 21:56:00 2001].[Author ID1: at Mon Sep 10 21:55:00 2001]

Tanto en el núcleo central como en el fitol hay un doble enlace conjugado. Esta característica es lo[Author ID1: at Mon Aug 27 14:45:00 2001]la[Author ID1: at Mon Aug 27 14:45:00 2001] q permite la captación de la luz. [Author ID1: at Mon Aug 27 14:43:00 2001]Las clorofilas en [Author ID1: at Mon Aug 27 14:48:00 2001]éter[Author ID1: at Mon Aug 27 14:51:00 2001] de [Author ID1: at Mon Aug 27 14:48:00 2001]petróleo[Author ID1: at Mon Aug 27 14:51:00 2001] en el espectro de absorción [Author ID1: at Mon Aug 27 14:48:00 2001]presentan[Author ID1: at Tue Aug 28 19:44:00 2001] un máximo en la clorofila b a

644 [Author ID1: at Mon Aug 27 14:48:00 2001]−[Author ID1: at Mon Aug 27 14:49:00 2001] 430 [Author ID1: at Mon Aug 27 14:48:00 2001]nm y en la clorofila a 663 − 420 nm. Variando [Author ID1: at Mon Aug 27 14:49:00 2001]el disolvente en q han sido [Author ID1: at Mon Aug 27 14:50:00 2001]extraídas[Author ID1: at Mon Aug 27 14:51:00 2001] estas[Author ID1: at Mon Aug 27 14:50:00 2001] [Author ID1: at Mon Aug 27 14:51:00 2001]medidas [Author ID1: at Mon Aug 27 14:50:00 2001]varían[Author ID1: at Mon Aug 27 14:51:00 2001].[Author ID1: at Mon Aug 27 14:50:00 2001] [Author ID1: at Mon Aug 27 14:51:00 2001][Author ID1: at Mon Aug 27 14:44:00 2001]

T[Author ID1: at Mon Aug 27 14:51:00 2001]odos los organismos [Author ID1: at Mon Aug 27 14:50:00 2001]fotosintéticos tienen clorofila a y las plantas verdes tien[Author ID1: at Mon Aug 27 14:51:00 2001]en entre la clorofila a y la b [Author ID1: at Mon Aug 27 14:52:00 2001]una[Author ID1: at Tue Aug 28 19:44:00 2001] relación de 2/3. se encuentran en los clorop[Author ID1: at Mon Aug 27 14:52:00 2001]lastos. Las algas pardas diatomeas tienen la c u las rojas tienen las clorofilas d.[Author ID1: at Mon Aug 27 14:53:00 2001]

En la [Author ID1: at Mon Aug 27 14:56:00 2001]mayoría[Author ID1: at Mon Aug 27 15:07:00 2001] de las bacterias fotosintéticas el pigmento principal es la bacterioclorofila [Author ID1: at Mon Aug 27 14:56:00 2001]a,[Author ID1: at Tue Aug 28 19:45:00 2001] si bien algunas del genero Rhodopseudomonas tien[Author ID1: at Mon Aug 27 14:56:00 2001]en bacterioclorofila d.[Author ID1: at Mon Aug 27 14:57:00 2001][Author ID0: at]

Las bacterias [Author ID1: at Mon Aug 27 14:58:00 2001]verde sulfúreas[Author ID1: at Mon Aug 27 15:07:00 2001] tienen las clorofilas de clorobiun. [Author ID1: at Mon Aug 27 14:58:00 2001]Es [Author ID1: at Mon Aug 27 14:59:00 2001]una[Author ID1: at Tue Aug 28 19:45:00 2001] familia de clorofilas.[Author ID0: at]

[Author ID0: at]

En la captación participan los carotenoides. Son poliisoprenoides q pueden ser de dos tipos[Author ID1: at Mon Aug 27 14:59:00 2001]: carotenoides constituidos por C e [Author ID1: at Mon Aug 27 15:01:00 2001]H[Author ID1: at Fri Aug 31 11:54:00 2001] y xantofila[Author ID1: at Mon Aug 27 15:01:00 2001]s q [Author ID1: at Mon Aug 27 15:02:00 2001]tienen[Author ID1: at Mon Aug 27 15:08:00 2001] C, O e H. Son tetrapirroles con dobles enlaces conjugados.[Author ID1: at Mon Aug 27 15:02:00 2001][Author ID0: at]

Máxima absorción a 450 − 490 nm por lo q apoyan a aumentar el es[Author ID1: at Mon Aug 27 15:03:00 2001]pectro de absorción de organismos q los poseen. [Author ID1: at Mon Aug 27 15:04:00 2001]Están[Author ID1: at Mon Aug 27 15:08:00 2001] en los tilac[Author ID1: at Mon Aug 27 15:04:00 2001]o[Author ID1: at Mon Aug 27 15:08:00 2001]ides[Author ID1: at Mon Aug 27 15:04:00 2001] asociados a [Author ID1: at Mon Aug 27 15:05:00 2001]proteínas[Author ID1: at Mon Aug 27 15:08:00 2001] y clorofila y también en la envuelta del cloroplasto.[Author ID0: at]

Tienen papel como fotoprotectores [Author ID1: at Mon Aug 27 15:05:00 2001]además[Author ID1: at Mon Aug 27 15:08:00 2001] de [Author ID1: at Mon Aug 27 15:05:00 2001]captación[Author ID1: at Mon Aug 27 15:06:00 2001] [Author ID1: at Mon Aug 27 15:05:00 2001]de radiación y pigmentos [Author ID1: at Mon Aug 27 15:06:00 2001]accesorios[Author ID1: at Mon Aug 27 15:08:00 2001].[Author ID1: at Mon Aug 27 15:06:00 2001] [Author ID0: at]

Las ficobilinas son pigmentos de algas, normalmente tetrapirroles abiertos.[Author ID1: at Mon Aug 27 15:18:00 2001]

[Author ID1: at Mon Aug 27 15:19:00 2001]

Biosíntesis de clorofilas[Author ID1: at Mon Aug 27 15:19:00 2001]

Se sintetizan a [Author ID1: at Mon Aug 27 15:19:00 2001]partir[Author ID1: at Mon Aug 27 18:51:00 2001] de glutamato. Mediante una serie de etapas se forma el tetrapirrol, [Author ID1: at Mon Aug 27 15:19:00 2001]luego[Author ID1: at Mon Aug 27 18:51:00 2001] se incluye el magnesio llegando a formarse al final la clorofila.[Author ID1: at Mon Aug 27 15:19:00 2001]

(Hoja 15)[Author ID1: at Mon Aug 27 15:21:00 2001] Partimos de glutamato q es activado al uniese al RNAt con gasto de ATP y el Mg[Author ID1: at Mon Aug 27 15:21:00 2001]2+[Author ID1: at Mon Aug 27 15:22:00 2001] como cofactor. Seguidamente es reducido con gasto de NADH [Author ID1: at Mon Aug 27 15:22:00 2001]para[Author ID1: at Fri Aug 31 02:33:00 2001] dar glutamatosemialdehido. A partir de [Author ID1: at Mon Aug 27 15:22:00 2001]aquí[Author ID1: at Mon Aug 27 15:23:00 2001] [Author ID1: at Mon Aug 27 15:22:00 2001]se obtiene el[Author ID1: at Mon Aug 27 15:23:00 2001] ac.[Author ID1: at Mon Aug 27 15:30:00 2001] [Author ID1: at Mon Aug 27 15:23:00 2001] [Author ID1: at Mon Aug 27 15:29:00 2001]− aninolevulínico[Author ID1: at Mon Aug 27 15:30:00 2001], q es el inicio de la síntesis. [Author ID0: at]

A partir de dos moléculas de − aminolevulínico por [Author ID1: at Mon Aug 27 15:31:00 2001]condensación[Author ID1: at Mon Aug 27 15:32:00 2001] [Author ID1: at Mon Aug 27 15:31:00 2001]y [Author ID1: at Mon Aug 27 15:32:00 2001]deshidrogenación[Author ID1: at Mon Aug 27 15:36:00 2001] se forma el[Author ID1: at Mon Aug 27 15:32:00 2001] [Author ID1: at Mon Aug 27 15:36:00 2001]porfobilinógeno (PBG) q es el pirrol [Author ID1: at Mon Aug 27 15:32:00 2001]liberándose[Author ID1: at Mon Aug 27 15:33:00 2001] [Author ID1: at Mon Aug 27 15:32:00 2001]2 H[Author ID1: at Mon Aug 27 15:33:00 2001]2[Author ID1: at Mon Aug 27 15:33:00 2001]O.[Author ID0: at]

4 [Author ID1: at Mon Aug 27 15:33:00 2001]moléculas[Author ID1: at Mon Aug 27 15:36:00 2001] de p[Author ID1: at Mon Aug 27 15:33:00 2001]o[Author ID1: at Mon Aug 27 15:36:00 2001]rfobilinógeno forman el tetrapirrol[Author ID1: at Mon Aug 27 15:33:00 2001] catalizadas po[Author ID1: at Mon Aug 27 15:33:00 2001]r do enzimas, la primera cataliza la [Author ID1: at Mon Aug 27 15:34:00 2001]unión[Author ID1: at Mon Aug 27 15:37:00 2001] de los pirroles con liberación de 2 amonios. L[Author ID1: at Mon Aug 27 15:34:00 2001]a segunda canaliza la permutación de los radicales del 4º pirro[Author ID1: at Mon Aug 27 15:35:00 2001]l.[Author ID1: at Mon Aug 27 15:36:00 2001][Author ID0: at]

El uroporfirinógeno se descarboxila 4 veces dando el coproporfirin[Author ID1: at Mon Aug 27 19:07:00 2001]ó[Author ID1: at Mon Aug 27 19:13:00 2001]geno[Author ID1: at Mon Aug 27 19:07:00 2001] III, el CO[Author ID1: at Mon Aug 27 19:11:00 2001]2[Author ID1: at Mon Aug 27 19:11:00 2001] [Author ID1: at Mon Aug 27 19:15:00 2001]q se libera proviene de los acetilos. La siguiente etapa es un descarboxilación oxidativa [Author ID1: at Mon Aug 27 19:14:00 2001]transformándose[Author ID1: at Mon Aug 27 19:15:00 2001] [Author ID1: at Mon Aug 27 19:14:00 2001]en protoporfirinogeno IX.[Author ID1: at Mon Aug 27 19:15:00 2001]

Deshidrogenación[Author ID1: at Mon Aug 27 19:16:00 2001] [Author ID1: at Mon Aug 27 19:15:00 2001]transformándose en protoporfirina IX. Es el punto de bifurcación en la síntesis de ferroporfirinas, clorofila...[Author ID1: at Mon Aug 27 19:16:00 2001]

Incorporación de Mg[Author ID1: at Mon Aug 27 19:17:00 2001]2+[Author ID1: at Mon Aug 27 19:17:00 2001] por la Mg[Author ID1: at Mon Aug 27 19:17:00 2001]2+[Author ID1: at Mon Aug 27 19:17:00 2001] quelasa con gasto de ATP formando un enlace de [Author ID1: at Mon Aug 27 19:17:00 2001]coordinación[Author ID1: at Mon Aug 27 19:18:00 2001] [Author ID1: at Mon Aug 27 19:17:00 2001]con los N.[Author ID1: at Mon Aug 27 19:18:00 2001][Author ID0: at]

Incorporación de metilo en el radical [Author ID1: at Mon Aug 27 19:21:00 2001]propílico[Author ID1: at

Mon Aug 27 19:22:00 2001] ligado al C[Author ID1: at Mon Aug 27 19:21:00 2001]6[Author ID1: at Mon Aug 27 19:21:00 2001]. [Author ID1: at Mon Aug 27 19:21:00 2001]A[Author ID1: at Tue Aug 28 19:46:00 2001] partir de esta molécula en las siguientes etapas se forma el 5º anillo.[Author ID1: at Mon Aug 27 19:21:00 2001][Author ID0: at]

Las siguientes etapas son hidrogenaciones. [Author ID1: at Mon Aug 27 19:22:00 2001]En la siguiente etapa interviene la luz, un destello de 650 nm en la q se añaden 2 H[Author ID1: at Mon Aug 27 19:23:00 2001]+[Author ID1: at Mon Aug 27 19:24:00 2001]. La ultima etapa es la esterificaci[Author ID1: at Mon Aug 27 19:24:00 2001]ó[Author ID1: at Mon Aug 27 19:27:00 2001]n del fitol para dar la clorofila.[Author ID0: at]

La luz [Author ID1: at Mon Aug 27 19:24:00 2001]además[Author ID1: at Mon Aug 27 19:26:00 2001] de controlar la [Author ID1: at Mon Aug 27 19:24:00 2001]adición[Author ID1: at Mon Aug 27 19:26:00 2001] de 2H tiene q regular las pri[Author ID1: at Mon Aug 27 19:24:00 2001]mera 3 etapas, para la [Author ID1: at Mon Aug 27 19:24:00 2001]formación[Author ID1: at Mon Aug 27 19:25:00 2001] [Author ID1: at Mon Aug 27 19:24:00 2001]del[Author ID1: at Mon Aug 27 19:25:00 2001] − aminolevulínico[Author ID1: at Mon Aug 27 19:26:00 2001].[Author ID0: at]

Se catalizan en cloroplastos mediante enzimas sintetizados por ri[Author ID1: at Mon Aug 27 19:27:00 2001]bosomas codificados por el genoma [Author ID1: at Mon Aug 27 19:28:00 2001]nuclear[Author ID1: at Mon Aug 27 19:29:00 2001].[Author ID0: at]

El Fe también participa en el control de la síntesis de la clorofila[Author ID1: at Mon Aug 27 19:28:00 2001].[Author ID0: at]

El exceso [Author ID1: at Mon Aug 27 19:29:00 2001]inhibe[Author ID1: at Mon Aug 27 20:01:00 2001] la s[Author ID1: at Mon Aug 27 19:29:00 2001]íntesis de clorofila porque tira a la [Author ID1: at Mon Aug 27 19:29:00 2001]síntesis[Author ID1: at Mon Aug 27 19:30:00 2001] [Author ID1: at Mon Aug 27 19:29:00 2001]de grupos hemo y no hacia la síntesis de clorofila. La regulación del sistema viene determinado por los niveles de [Author ID1: at Mon Aug 27 19:30:00 2001]protoclorofilida−[Author ID1: at Thu Aug 30 18:38:00 2001]a:[Author ID1: at Mon Aug 27 19:30:00 2001]

[Author ID1: at Mon Aug 27 19:31:00 2001]

Síntesis de [Author ID1: at Mon Aug 27 19:31:00 2001]carotenoides [Author ID1: at Mon Aug 27 19:32:00 2001](Hoja 16 [Author ID1: at Mon Aug 27 19:31:00 2001]Fig.[Author ID1: at Mon Aug 27 22:09:00 2001] 11.9)[Author ID1: at Mon Aug 27 19:31:00 2001]

Se inicia con [Author ID1: at Mon Aug 27 19:32:00 2001]Ac. CoA condensándose dos moléculas para dar acetoacetil CoA.[Author ID1: at Mon Aug 27 19:33:00 2001] A continuación se incorpora otro Ac. CoA para dar [Author ID1: at Mon Aug 27 19:34:00 2001] −hidroxi− −metilglutaril−CoA q se reduce a mevalonico mediante un enzima[Author ID1: at Mon Aug 27 19:35:00 2001] dependiente de NADP.[Author ID1: at Mon Aug 27 19:38:00 2001][Author ID0: at]

Se fosforilan y descarboxilan para obtener los intermediarios de [Author ID1: at Mon Aug 27 19:39:00 2001]5C para la síntesis del resto de terpenoides.[Author ID1: at Mon Aug 27 19:40:00 2001][Author ID0: at]

Hay otra ruta q parte de ac. pir[Author ID1: at Mon Aug 27 19:43:00 2001]ú[Author ID1: at Mon Aug 27 20:00:00 2001]vicos y 3PGA.[Author ID1: at Mon Aug 27 19:43:00 2001]

[Author ID1: at Mon Aug 27 19:45:00 2001]

[Author ID1: at Mon Aug 27 19:45:00 2001]

T[Author ID1: at Mon Aug 27 19:45:00 2001]ema 5 aparato fotosintético[Author ID1: at Mon Aug 27 19:45:00 2001]

[Author ID1: at Mon Aug 27 19:45:00 2001]

Los [Author ID1: at Mon Aug 27 19:46:00 2001]experimentos[Author ID1: at Mon Aug 27 20:00:00 2001] llevados a cabo por Engelman y Von Sach determinaban la [Author ID1: at Mon Aug 27 19:46:00 2001]relación[Author ID1: at Mon Aug 27 20:00:00 2001] de diferentes [Author ID1: at Mon Aug 27 19:46:00 2001]orgánulos[Author ID1: at Mon Aug 27 20:00:00 2001]. [Author ID1: at Mon Aug 27 19:46:00 2001]El desprendimiento de O[Author ID1: at Mon Aug 27 19:47:00 2001]2[Author ID1: at Mon Aug 27 19:47:00 2001] y formación de [Author ID1: at Mon Aug 27 19:47:00 2001]almidón[Author ID1: at Mon Aug 27 20:00:00 2001] en estos [Author ID1: at Mon Aug 27 19:47:00 2001]orgánulos[Author ID1: at Mon Aug 27 20:00:00 2001] q son los cloroplastos. [Author ID1: at Mon Aug 27 19:47:00 2001]Son [Author ID1: at Mon Aug 27 19:48:00 2001]orgánulos[Author ID1: at Mon Aug 27 20:00:00 2001] subcelulares en la [Author ID1: at Mon Aug 27 19:48:00 2001]mayoría[Author ID1: at Mon Aug 27 20:00:00 2001] de células de tejidos fotosintéticos de tamaño de 5 [Author ID1: at Mon Aug 27 19:48:00 2001]−[Author ID1: at Mon Aug 27 19:49:00 2001] 10 [Author ID1: at Mon Aug 27 19:48:00 2001] m de diámetro. Dado [Author ID1: at Mon Aug 27 19:49:00 2001]su color verde y gran tamaño se pueden ver con microscopio [Author ID1: at Mon Aug 27 19:50:00 2001]óptico[Author ID1: at Mon Aug 27 20:00:00 2001].[Author ID0: at]

En algas unicelulares hay un [Author ID1: at Mon Aug 27 19:50:00 2001]único[Author ID1: at Mon Aug 27 19:59:00 2001] cloroplasto. [Author ID1: at Mon Aug 27 19:50:00 2001]Lo [Author ID1: at Mon Aug 27 19:51:00 2001]normal[Author ID1: at Mon Aug 27 20:00:00 2001] es 20−50 cloroplastos por [Author ID1: at Mon Aug 27 19:51:00 2001]célula[Author ID1: at Mon Aug 27 20:00:00 2001] fotosintética.[Author ID0: at]

Difieren de forma y tamaño en [Author ID1: at Mon Aug 27 19:51:00 2001]las distintas plantas. Son carac[Author ID1: at Mon Aug 27 19:52:00 2001]terísticos de organismos fotosintéticos eucariotas. Procariotas y algas [Author ID1: at Mon Aug 27 19:52:00 2001]verde azuladas[Author ID1: at Mon Aug 27 20:00:00 2001] poseen verdaderos clorop[Author ID1: at Mon Aug 27 19:52:00 2001]lastos. Todos los [Author ID1: at Mon Aug 27 19:53:00 2001]orgánulos[Author ID1: at Mon Aug 27 20:00:00 2001] tienen un sistema laminar de membrana donde se da la captación y [Author ID1: at Mon Aug 27 19:53:00 2001]transformación de [Author ID1: at Mon Aug 27 19:54:00 2001]energía[Author ID1: at Mon Aug 27 20:00:00 2001].[Author ID0: at]

En los organismos fotosintéticos eucariotas estas estructuras laminares [Author ID1: at Mon Aug 27 19:54:00 2001]están[Author ID1: at Mon Aug 27 19:59:00 2001] separadas del citoplasma por una cubierta membranosa.[Author ID1: at Mon Aug 27 19:54:00 2001][Author ID0: at]

Eubacterias fotosintéticas no tienen esta cubierta. Los sistemas membranosos se unen en estructuras discretas denominadas [Author ID1: at Mon Aug 27 19:55:00 2001]cromatóforos[Author ID1: at Mon Aug 27 19:59:00 2001].[Author ID0: at]

En cianofíceas las membranas se [Author ID1: at Mon Aug 27 19:56:00 2001]dan por plegamientos y ramificación de la membrana externa.[Author ID0: at]

Los cloroplastos son una subclase de [Author ID1: at Mon Aug 27 20:09:00 2001]orgánulos[Author ID1: at Mon Aug 27 20:11:00 2001] [Author ID1: at Mon Aug 27 20:09:00 2001]subcelulares[Author ID1: at Mon Aug 27 20:10:00 2001] [Author ID1: at Mon Aug 27 20:09:00 2001]llamados plastidios q [Author ID1: at Mon Aug 27 20:10:00 2001]están[Author ID1: at Mon Aug 27 20:11:00 2001] en todas las células [Author ID1: at Mon Aug 27 20:10:00 2001]fotosintéticas[Author ID1: at Mon Aug 27 20:11:00 2001].[Author ID1:

at Mon Aug 27 20:10:00 2001]

−−>**(Hoja 18)[Author ID1: at Mon Aug 27 20:10:00 2001]**[Author ID1: at Mon Aug 27 20:11:00 2001] Desde el punto de vista de estructura microscópica los cloroplastos [Author ID1: at Mon Aug 27 20:11:00 2001]están[Author ID1: at Mon Aug 27 20:17:00 2001] constituidos por lamelas q se disponen paralelas al eje[Author ID1: at Mon Aug 27 20:11:00 2001] mayor de la estructura del cloroplasto. Estas lamelas se [Author ID1: at Mon Aug 27 20:12:00 2001]sitúan[Author ID1: at Mon Aug 27 20:17:00 2001] agrupad[Author ID1: at Mon Aug 27 20:12:00 2001]as de modo paralelo en forma de saco dejando un espacio entre ellos denominado tilacoides.[Author ID1: at Mon Aug 27 20:13:00 2001]

Están[Author ID1: at Mon Aug 27 20:16:00 2001] [Author ID1: at Mon Aug 27 20:13:00 2001]embebidos en la matriz q es el estroma. Varios tilacoides se unen formando [Author ID1: at Mon Aug 27 20:14:00 2001]una[Author ID1: at Tue Aug 28 19:52:00 2001] agrupación de entre 10− 100 q reciben el nombre de grana. [Author ID1: at Mon Aug 27 20:14:00 2001]Estos, [Author ID1: at Mon Aug 27 20:15:00 2001]están[Author ID1: at Mon Aug 27 20:17:00 2001] conectados por lamas o laminas [Author ID1: at Mon Aug 27 20:15:00 2001]más[Author ID1: at Tue Aug 28 19:52:00 2001] grandes q se expanden por e[Author ID1: at Mon Aug 27 20:15:00 2001]l citoplasma del cloroplasto.[Author ID1: at Mon Aug 27 20:16:00 2001] El [Author ID1: at Mon Aug 27 20:19:00 2001]tamaño de los grana esta entre 0.2−0.3 [Author ID1: at Mon Aug 27 20:21:00 2001] m, habien[Author ID1: at Mon Aug 27 20:21:00 2001]do unos 50 por cloroplasto.[Author ID1: at Mon Aug 27 20:22:00 2001]

(Hoja[Author ID1: at Mon Aug 27 20:22:00 2001] 19)[Author ID1: at Mon Aug 27 20:23:00 2001] Los tilacoides encierran un espacio q es el lumen del cloroplasto. Las membranas tienen permeabilidad selectiva. [Author ID1: at Mon Aug 27 20:24:00 2001]La selectividad la [Author ID1: at Mon Aug 27 20:25:00 2001]determina[Author ID1: at Mon Aug 27 20:28:00 2001] la membrana interna. La externa en m[Author ID1: at Mon Aug 27 20:25:00 2001]á[Author ID1: at Sun Sep 2 17:06:00 2001]s o menos permeable. Entran a[Author ID1: at Mon Aug 27 20:25:00 2001]l espacio intermembranal por los poros y para pasar la membrana interna necesitan transportadores.[Author ID1: at Mon Aug 27 20:25:00 2001]

Del exterior al interior[Author ID1: at Mon Aug 27 20:26:00 2001] [Author ID1: at Mon Aug 27 20:29:00 2001]hay una doble membrana, estroma y una serie de laminillas dispuestas en agrupaciones o libres y dentro de los sacos el lumen.[Author ID1: at Mon Aug 27 20:30:00 2001]

Con frecuencia los cloroplastos de [Author ID1: at Mon Aug 27 20:31:00 2001]muchas[Author ID1: at Mon Aug 27 20:32:00 2001] algas presentan una acumulación de [Author ID1: at Mon Aug 27 20:31:00 2001]almidón[Author ID1: at Mon Aug 27 20:32:00 2001] q se denomina piren[Author ID1: at Mon Aug 27 20:31:00 2001]o[Author ID1: at Mon Aug 27 20:32:00 2001]ide.[Author ID1: at Mon Aug 27 20:31:00 2001] En plantas superiores [Author ID1: at Mon Aug 27 20:32:00 2001]también[Author ID1: at Mon Aug 27 20:33:00 2001] [Author ID1: at Mon Aug 27 20:32:00 2001]hay acumulación de almidón q se acumula de día y se degrada de noche.[Author ID0: at]

[Author ID1: at Mon Aug 27 20:33:00 2001]

Membrana cloroplástica[Author ID1: at Mon Aug 27 20:34:00 2001]

No [Author ID1: at Mon Aug 27 20:34:00 2001]deriva[Author ID1: at Mon Aug 27 20:41:00 2001] del retículo endoplasmatico. Su biogénesis es propia, es decir, [Author ID1: at Mon Aug 27 20:34:00 2001]están[Author ID1: at Mon Aug 27 20:41:00 2001] [Author ID1: at Mon Aug 27 20:34:00 2001]reguladas[Author ID1: at Mon Aug 27 20:41:00 2001] por su propio genoma. [Author ID1: at Mon Aug 27 20:34:00 2001]Sin clorofila.[Author ID0: at]

Contiene carotenoides q no participan en la captación de la [Author ID1: at Mon Aug 27 20:35:00

2001]radiación[Author ID1: at Mon Aug 27 20:36:00 2001].[Author ID1: at Mon Aug 27 20:35:00 2001][Author ID0: at]

Ricos en [Author ID1: at Mon Aug 27 20:36:00 2001]sulfolípidos[Author ID1: at Tue Aug 28 19:47:00 2001] y galactol[Author ID1: at Mon Aug 27 20:36:00 2001]í[Author ID1: at Tue Aug 28 19:48:00 2001]pidos. [Author ID1: at Mon Aug 27 20:36:00 2001]No tiene fosfatidilcolina ni fosfatidiletanolamina.[Author ID1: at Mon Aug 27 20:40:00 2001] [Author ID1: at Mon Aug 27 20:41:00 2001]Posee quinonas. Es el lugar de síntesis de los componentes de membrana (fosfol[Author ID1: at Mon Aug 27 20:38:00 2001]í[Author ID1: at Tue Aug 28 19:48:00 2001]pidos, [Author ID1: at Mon Aug 27 20:38:00 2001]carotenoides[Author ID1: at Mon Aug 27 20:39:00 2001],[Author ID1: at Mon Aug 27 20:38:00 2001] flavonoides, terpenos, [Author ID1: at Mon Aug 27 20:39:00 2001]quinonas,[Author ID1: at Tue Aug 28 19:53:00 2001] ac. [Author ID1: at Mon Aug 27 20:39:00 2001]grasos)[Author ID1: at Mon Aug 27 20:40:00 2001].[Author ID0: at]

[Author ID1: at Mon Aug 27 20:45:00 2001]

Membrana del Tilacoide[Author ID1: at Mon Aug 27 20:45:00 2001]

−−>Po[Author ID1: at Mon Aug 27 20:45:00 2001][Author ID1: at Mon Aug 27 20:46:00 2001]ca fosfatidilcolina, no hay fosfatidiletanolamina. Ricos en galctol[Author ID1: at Mon Aug 27 20:46:00 2001]í[Author ID1: at Mon Aug 27 20:52:00 2001]pidos y sulfolípidos. Ricas en ac grasos muy insaturados q le dan gran fluidez a la membrana [Author ID1: at Mon Aug 27 20:46:00 2001]favoreciendo[Author ID1: at Mon Aug 27 20:47:00 2001] [Author ID1: at Mon Aug 27 20:46:00 2001]el desplazamiento de transportadores de e[Author ID1: at Mon Aug 27 20:47:00 2001]−[Author ID1: at Mon Aug 27 20:48:00 2001] (plastoquinona, plastocianina)[Author ID1: at Mon Aug 27 20:48:00 2001]

[Author ID0: at]

[Author ID1: at Sun Sep 2 17:07:00 2001]

−−>Tilacoides granales[Author ID1: at Mon Aug 27 20:48:00 2001][Author ID1: at Mon Aug 27 20:53:00 2001]

Tienen una [Author ID1: at Mon Aug 27 20:48:00 2001]relación[Author ID1: at Mon Aug 27 20:52:00 2001] clorofila a/b menor q la de los [Author ID1: at Mon Aug 27 20:48:00 2001]tilacoides[Author ID1: at Mon Aug 27 20:49:00 2001] [Author ID1: at Mon Aug 27 20:48:00 2001]estromales 4/3 por 4/1. desde el punto de vista funciona[Author ID1: at Mon Aug 27 20:49:00 2001]l[Author ID1: at Sun Sep 2 17:12:00 2001] [Author ID1: at Mon Aug 27 20:49:00 2001]los granales tienen PS II aunque en los márgenes pueden tener PS I[Author ID1: at Sun Sep 2 18:35:00 2001].[Author ID1: at Sun Sep 2 18:36:00 2001] [Author ID1: at Sun Sep 2 18:35:00 2001][Author ID1: at Mon Aug 27 20:50:00 2001]

−−>Tilacoides[Author ID1: at Mon Aug 27 20:51:00 2001][Author ID1: at Mon Aug 27 20:53:00 2001]−−> [Author ID1: at Mon Aug 27 20:50:00 2001][Author ID1: at Mon Aug 27 20:53:00 2001]−−>estromales[Author ID1: at Mon Aug 27 20:51:00 2001][Author ID1: at Mon Aug 27 20:53:00 2001]

Fosforilación y fotofosforilación cíclica.[Author ID1: at Mon Aug 27 20:51:00 2001] Los estromales tienen [Author ID1: at Sun Sep 2 18:35:00 2001]exclusivamente [Author ID1: at Sun Sep 2 18:37:00 2001]PS I, no tienen PS II[Author ID1: at Sun Sep 2 18:35:00 2001].[Author ID1: at Sun Sep 2 18:36:00 2001][Author ID0: at]

[Author ID1: at Mon Aug 27 20:53:00 2001]

(Hoja 20) [Author ID1: at Mon Aug 27 20:53:00 2001]En los tilacoides se localizan los pigmentos

fotosintéticos q captan la radiación, también se encuentran los componentes de la CTE, ligados a los [Author ID1: at Mon Aug 27 20:54:00 2001]tilacoides[Author ID1: at Mon Aug 27 20:55:00 2001] [Author ID1: at Mon Aug 27 20:54:00 2001]también esta la ATPasa q utiliza el potencial electroquímico generado [Author ID1: at Mon Aug 27 20:55:00 2001]para[Author ID1: at Fri Aug 31 02:33:00 2001] acoplar la [Author ID1: at Mon Aug 27 20:55:00 2001]síntesis[Author ID1: at Mon Aug 27 20:56:00 2001] [Author ID1: at Mon Aug 27 20:55:00 2001]de ATP.[Author ID1: at Mon Aug 27 20:56:00 2001]

(Hoja 21[Author ID1: at Mon Aug 27 20:56:00 2001]−−>)[Author ID1: at Mon Aug 27 20:56:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]−−> Los pigmentos [Author ID1: at Mon Aug 27 20:56:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]−−>están[Author ID1: at Mon Aug 27 21:05:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]−−> asociados como [Author ID1: at Mon Aug 27 20:56:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]−−>proteínas[Author ID1: at Mon Aug 27 21:05:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]−−> formando 4 complejos:[Author ID1: at Mon Aug 27 20:56:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001][Author ID1: at Mon Aug 27 20:57:00 2001]

- **Complejo[Author ID1: at Tue Aug 28 19:53:00 2001] centro de [Author ID1: at Mon Aug 27 20:58:00 2001]reacción[Author ID1: at Mon Aug 27 21:02:00 2001] del PS I: [Author ID1: at Mon Aug 27 20:58:00 2001]**tienen [Author ID1: at Mon Aug 27 20:59:00 2001]una[Author ID1: at Tue Aug 28 19:53:00 2001] clorofila especial P[Author ID1: at Mon Aug 27 20:59:00 2001]700[Author ID1: at Mon Aug 27 20:59:00 2001] q absorbe a 700 nm y unida hay hasta 40 clorofilas y [Author ID1: at Mon Aug 27 20:59:00 2001] caroteno.[Author ID1: at Mon Aug 27 21:00:00 2001]−−>[Author ID1: at Mon Aug 27 21:00:00 2001][Author ID1: at Mon Aug 27 21:00:00 2001]
- **Complejo centro de [Author ID1: at Mon Aug 27 21:00:00 2001]reacción[Author ID1: at Mon Aug 27 21:02:00 2001] del PS II:[Author ID1: at Mon Aug 27 21:00:00 2001]** [Author ID1: at Mon Aug 27 21:00:00 2001]tienen una clorofila especial P[Author ID1: at Mon Aug 27 21:01:00 2001]680[Author ID1: at Mon Aug 27 21:01:00 2001] q absorbe a 680 nm y muchas clorofilas con [Author ID1: at Mon Aug 27 21:01:00 2001]relación[Author ID1: at Mon Aug 27 21:02:00 2001] a/b 4/3.[Author ID1: at Mon Aug 27 21:01:00 2001]−−>[Author ID1: at Mon Aug 27 21:02:00 2001][Author ID1: at Mon Aug 27 21:02:00 2001]
- **Complejo antena LHC I:[Author ID1: at Mon Aug 27 21:02:00 2001]** [Author ID1: at Mon Aug 27 21:03:00 2001]clorofila a y b.[Author ID1: at Mon Aug 27 21:02:00 2001]−−>[Author ID1: at Mon Aug 27 21:02:00 2001][Author ID1: at Mon Aug 27 21:03:00 2001]
- **Complejo antena LHC II:[Author ID1: at Mon Aug 27 21:03:00 2001]** [Author ID1: at Mon Aug 27 21:03:00 2001]xantofilas y [Author ID1: at Mon Aug 27 21:03:00 2001]relación[Author ID1: at Mon Aug 27 21:04:00 2001] clorofila a/b 4/3.[Author ID1: at Mon Aug 27 21:03:00 2001]−−>[Author ID1: at Mon Aug 27 21:03:00 2001][Author ID1: at Mon Aug 27 21:04:00 2001]

−−>La m[Author ID1: at Mon Aug 27 21:04:00 2001][Author ID1: at Mon Aug 27 21:05:00 2001]−−>ayor parte de la clorofila b se encuentra en el complejo antena del PS II[Author ID1: at Mon Aug 27 21:04:00 2001][Author ID1: at Mon Aug 27 21:05:00 2001].[Author ID1: at Mon Aug 27 21:06:00 2001][Author ID1: at Mon Aug 27 21:07:00 2001]

−−>**(Hoja 22)[Author ID1: at Mon Aug 27 21:07:00 2001]**[Author ID1: at Mon Aug 27 21:07:00 2001] Existe una distribución espacial [Author ID1: at Mon Aug 27 21:07:00 2001]asimétrica[Author ID1: at Mon Aug 27 21:08:00 2001] [Author ID1: at Mon Aug 27 21:07:00 2001]de los PS I y PS II y sus componentes [Author ID1: at Mon Aug 27 21:08:00 2001]entre[Author ID1: at Mon Aug 27 21:11:00 2001] los tilacoides estromales y granales.[Author ID0: at]

El PS II se localiza en los [Author ID1: at Mon Aug 27 21:08:00 2001]tilacoides[Author ID1: at Mon Aug 27 21:09:00 2001] [Author ID1: at Mon Aug 27 21:08:00 2001]granales mientras q el PS I se [Author ID1: at Mon Aug 27 21:09:00 2001]localiza[Author ID1: at Mon Aug 27 21:11:00 2001] básicamente en los tilac[Author ID1: at Mon Aug 27 21:09:00 2001]o[Author ID1: at Mon Aug 27 21:11:00 2001]ides estromales y en las [Author ID1: at Mon Aug 27 21:09:00 2001]zonas[Author ID1: at Mon Aug 27 21:11:00 2001] marginales de [Author ID1: at Mon Aug 27 21:09:00 2001]tilacoides granales.[Author ID0: at]

Otros compuestos como el citocromo b[Author ID1: at Mon Aug 27 21:16:00 2001]6f[Author ID1: at Mon Aug 27 21:16:00 2001] esta repartido m[Author ID1: at Mon Aug 27 21:16:00 2001]á[Author ID1: at Sun Sep 2 17:27:00 2001]s [Author ID1: at Mon Aug 27 21:16:00 2001]uniformemente[Author ID1: at Mon Aug 27 21:17:00 2001].[Author ID1: at Mon Aug 27 21:16:00 2001][Author ID0: at]

El factor de acoplamiento [Author ID1: at Mon Aug 27 21:17:00 2001]para[Author ID1: at Fri Aug 31 02:33:00 2001] la síntesis de ATP se localiza básicamente en zona de los [Author ID1: at Mon Aug 27 21:17:00 2001]tilacoides[Author ID1: at Tue Aug 28 19:48:00 2001] [Author ID1: at Mon Aug 27 21:17:00 2001]estromales[Author ID1: at Mon Aug 27 21:18:00 2001].[Author ID1: at Mon Aug 27 21:17:00 2001][Author ID0: at]

Esta distribución implica q algunos intermediarios sean [Author ID1: at Mon Aug 27 21:18:00 2001]móviles[Author ID1: at Mon Aug 27 21:26:00 2001].[Author ID0: at]

Desde el punto de vista [Author ID1: at Mon Aug 27 21:18:00 2001]energético[Author ID1: at Mon Aug 27 21:26:00 2001] los sistemas antenales de deben mover de la zona granal a la estromal para la [Author ID1: at Mon Aug 27 21:18:00 2001]distribución[Author ID1: at Mon Aug 27 21:19:00 2001] [Author ID1: at Mon Aug 27 21:18:00 2001]de la [Author ID1: at Mon Aug 27 21:19:00 2001]energía[Author ID1: at Mon Aug 27 21:25:00 2001].[Author ID1: at Mon Aug 27 21:19:00 2001]

(Hoja 23 [Author ID1: at Mon Aug 27 21:19:00 2001]Fig.[Author ID1: at Mon Aug 27 21:25:00 2001] 3.1)[Author ID1: at Mon Aug 27 21:19:00 2001] Los sistemas antena son marcadamente distintos den contra de [Author ID1: at Mon Aug 27 21:19:00 2001]los centros de [Author ID1: at Mon Aug 27 21:20:00 2001]reacción[Author ID1: at Mon Aug 27 21:25:00 2001]. La variación se debe a mecanismos adaptativos donde se han desarrollado los diferentes organismos [Author ID1: at Mon Aug 27 21:20:00 2001]fotosintéticos[Author ID1: at Mon Aug 27 21:21:00 2001].[Author ID1: at Mon Aug 27 21:20:00 2001][Author ID1: at Mon Aug 27 21:28:00 2001]

Plantas superiores[Author ID1: at Mon Aug 27 21:28:00 2001]

Clorofila a, b, etc. Hasta llegar la [Author ID1: at Mon Aug 27 21:28:00 2001]energía[Author ID1: at Mon Aug 27 21:39:00 2001] al PS II y PS I.[Author ID1: at Mon Aug 27 21:28:00 2001]

Son procesos [Author ID1: at Mon Aug 27 21:29:00 2001]fotofísicos[Author ID1: at Mon Aug 27 21:39:00 2001] q transcurren en tiempos de piconanosegundos.[Author ID0: at]

La transferencia de [Author ID1: at Mon Aug 27 21:29:00 2001]energía[Author ID1: at Mon Aug 27 21:39:00 2001] no es directa. [Author ID1: at Mon Aug 27 21:29:00 2001]Se transmite la [Author ID1: at Mon Aug 27 21:30:00 2001]energía[Author ID1: at Mon Aug 27 21:39:00 2001] vibracional de [Author ID1: at Mon Aug 27 21:30:00 2001]una[Author ID1: at Tue Aug 28 19:49:00 2001] molécula a otra. Cuando las moléculas [Author ID1: at Mon Aug 27 21:30:00 2001]están[Author ID1: at Mon Aug 27 21:39:00 2001] muy cerca, las [Author ID1: at Mon Aug 27 21:30:00 2001]energías[Author ID1: at Mon Aug 27 21:39:00 2001] de [Author ID1: at Mon Aug 27 21:30:00 2001]excitación[Author ID1: at Mon Aug 27 21:31:00 2001] [Author ID1: at Mon Aug 27 21:30:00 2001]son capaces de pasar de un a otra (transferencia por resonancia [Author ID1: at Mon Aug 27 21:31:00 2001]de la transmisión)[Author ID1: at Mon Aug 27 21:42:00 2001]

(Hoja 24 fig2)[Author ID1: at Mon Aug 27 21:43:00 2001]mecanismo tipo Foster[Author ID1: at Mon Aug 27 21:43:00 2001]

La[Author ID1: at Tue Aug 28 19:49:00 2001] [Author ID1: at Mon Aug 27 21:43:00 2001]transferencia[Author ID1: at Mon Aug 27 21:48:00 2001] de [Author ID1: at Mon Aug 27 21:43:00 2001]energía[Author ID1: at Mon Aug 27 21:48:00 2001] vibracional [Author ID1: at Mon Aug 27 21:43:00 2001]también[Author ID1: at Mon Aug 27 21:48:00 2001] se da por mecanismo del excit[Author ID1: at Mon Aug 27 21:43:00 2001]ó[Author ID1: at Mon Aug 27 21:48:00 2001]n q se establece entre capas de [Author ID1: at Mon Aug 27 21:43:00 2001]moléculas[Author ID1: at Mon Aug 27 21:44:00 2001] [Author ID1: at Mon Aug 27 21:43:00 2001]similares.[Author ID0: at]

El 95−98 % de la [Author ID1: at Mon Aug 27 21:44:00 2001]energía[Author ID1: at Mon Aug 27 21:48:00 2001] se puede transferir de este modo para canalizar la [Author ID1: at Mon Aug 27 21:44:00 2001]energía[Author ID1: at Mon Aug 27 21:48:00 2001] a los centros de [Author ID1: at Mon Aug 27 21:44:00 2001]reacción[Author ID1: at Mon Aug 27 21:48:00 2001].[Author ID1: at Mon Aug 27 21:44:00 2001]

La [Author ID1: at Mon Aug 27 21:45:00 2001]diferencia entre los dos tipos es la[Author ID1: at Mon Aug 27 21:46:00 2001] [Author ID1: at Mon Aug 27 21:48:00 2001]direccionalidad de la [Author ID1: at Mon Aug 27 21:46:00 2001]energía[Author ID1: at Mon Aug 27 21:48:00 2001]. En el mecanismo de [Author ID1: at Mon Aug 27 21:46:00 2001]Foster[Author ID1: at Mon Aug 27 21:46:00 2001] la [Author ID1: at Mon Aug 27 21:46:00 2001]energía[Author ID1: at Mon Aug 27 21:48:00 2001] va pasando de una molécula a otra q tienen espectros de [Author ID1: at Mon Aug 27 21:46:00 2001]absorción[Author ID1: at Mon Aug 27 21:47:00 2001] [Author ID1: at Mon Aug 27 21:46:00 2001]ligeramente diferentes.[Author ID1: at Mon Aug 27 21:47:00 2001]

En [Author ID1: at Mon Aug 27 21:47:00 2001]el[Author ID1: at Tue Aug 28 11:38:00 2001] mecanismo de [Author ID1: at Mon Aug 27 21:47:00 2001]excitón[Author ID1: at Mon Aug 27 21:48:00 2001] la [Author ID1: at Mon Aug 27 21:47:00 2001]energía[Author ID1: at Mon Aug 27 21:49:00 2001] se deslocaliza en las moléculas adyacentes.[Author ID1: at Mon Aug 27 21:47:00 2001][Author ID0: at]

[Author ID1: at Tue Aug 28 11:39:00 2001]

Papel de los carotenoides[Author ID1: at Tue Aug 28 11:39:00 2001]

Dos básicamente:[Author ID1: at Tue Aug 28 11:40:00 2001][Author ID0: at]

- Como pigmentos accesorios[Author ID1: at Tue Aug 28 11:41:00 2001]−−>[Author ID1: at Tue Aug 28 11:41:00 2001][Author ID1: at Tue Aug 28 11:39:00 2001]
- Como agentes protectores[Author ID1: at Tue Aug 28 11:41:00 2001]−−>[Author ID1: at Tue Aug 28 11:42:00 2001][Author ID1: at Tue Aug 28 11:39:00 2001]

Todos los organismos fotosintéticos poseen carotenoides [Author ID1: at Tue Aug 28 11:42:00 2001]excepto[Author ID1: at Tue Aug 28 11:43:00 2001] [Author ID1: at Tue Aug 28 11:42:00 2001]los mutantes en su maquinaria enzimática. Los diferentes carotenoides desde el punto de vista químico son tetraterpenos [Author ID1: at Tue Aug 28 11:43:00 2001](vía ac. mevalonico) [Author ID1: at Wed Sep 12 19:45:00 2001]con muchos dobles enlaces conjugados q les p[Author ID1: at Tue Aug 28 11:43:00 2001]ermiten captar la radiación del color naranja con un máximo de [Author ID1: at Tue Aug 28 11:44:00 2001]absorción de 450−490 nm.[Author ID1: at Tue Aug 28 11:45:00 2001]

Están[Author ID1: at Tue Aug 28 11:49:00 2001] en el sistema antena y en el centro de [Author ID1: at Tue Aug 28 11:46:00 2001]reacción[Author ID1: at Tue Aug 28 11:49:00 2001] y forman parte de las membranas

cloropl[Author ID1: at Tue Aug 28 11:46:00 2001]á[Author ID1: at Tue Aug 28 11:49:00 2001]sticas.[Author ID1: at Tue Aug 28 11:46:00 2001]

La eficiencia de la transferencia es de 30−40 % [Author ID1: at Tue Aug 28 11:47:00 2001]frente[Author ID1: at Tue Aug 28 11:49:00 2001] al 90−95−99 % de las clorofilas.[Author ID1: at Tue Aug 28 11:47:00 2001][Author ID0: at]

También juegan un papel como [Author ID1: at Tue Aug 28 11:49:00 2001]agentes[Author ID1: at Tue Aug 28 11:55:00 2001] fotoprotectores ya q las me[Author ID1: at Tue Aug 28 11:49:00 2001]mbranas tilacoidales son fácilmente dañadas por la [Author ID1: at Tue Aug 28 11:50:00 2001]energía[Author ID1: at Tue Aug 28 11:55:00 2001] si es acumulada en gran cantidad y no puede ser disipada [Author ID1: at Tue Aug 28 11:50:00 2001]rápidamente[Author ID1: at Tue Aug 28 11:55:00 2001] por cal[Author ID1: at Tue Aug 28 11:50:00 2001]or o fluorescencia.[Author ID0: at]

Cuando las clorofilas [Author ID1: at Tue Aug 28 11:51:00 2001]están[Author ID1: at Tue Aug 28 11:55:00 2001] en triplete [Author ID1: at Tue Aug 28 11:51:00 2001]pueden[Author ID1: at Tue Aug 28 11:52:00 2001] [Author ID1: at Tue Aug 28 11:53:00 2001]reaccionar[Author ID1: at Tue Aug 28 11:55:00 2001] con O[Author ID1: at Tue Aug 28 11:53:00 2001]2[Author ID1: at Tue Aug 28 11:53:00 2001] dando radicales super[Author ID1: at Tue Aug 28 11:53:00 2001]ó[Author ID1: at Tue Aug 28 11:55:00 2001]xido [Author ID1: at Tue Aug 28 11:53:00 2001]actuando[Author ID1: at Tue Aug 28 11:55:00 2001] sobre las membranas mediante la [Author ID1: at Tue Aug 28 11:53:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] llegando a [Author ID1: at Tue Aug 28 11:54:00 2001]degradarlas[Author ID1: at Tue Aug 28 11:55:00 2001].[Author ID1: at Tue Aug 28 11:54:00 2001]

(Hoja 25 [Author ID1: at Tue Aug 28 11:56:00 2001]Fig.[Author ID1: at Tue Aug 28 12:20:00 2001] 3.7[Author ID1: at Tue Aug 28 11:56:00 2001] [Author ID1: at Tue Aug 28 11:57:00 2001]a)[Author ID1: at Tue Aug 28 11:57:00 2001] Puede ceder la [Author ID1: at Tue Aug 28 11:57:00 2001]energía[Author ID1: at Tue Aug 28 12:20:00 2001] [Author ID1: at Tue Aug 28 11:57:00 2001]transfiriéndola[Author ID1: at Tue Aug 28 11:58:00 2001] [Author ID1: at Tue Aug 28 11:57:00 2001]al carotenoide volviendo la clorofila al estado basal siendo capaz de volver a captar [Author ID1: at Tue Aug 28 11:58:00 2001]energía[Author ID1: at Tue Aug 28 12:20:00 2001]. El [Author ID1: at Tue Aug 28 11:58:00 2001]carotenoide[Author ID1: at Tue Aug 28 12:20:00 2001] vuelve al estado basal perdiendo la [Author ID1: at Tue Aug 28 11:58:00 2001]energía[Author ID1: at Tue Aug 28 12:20:00 2001] po[Author ID1: at Tue Aug 28 11:58:00 2001]r[Author ID1: at Tue Aug 28 12:25:00 2001] calor. [Author ID1: at Tue Aug 28 11:58:00 2001]**(b)[Author ID1: at Tue Aug 28 11:59:00 2001]** el carotenoide en estado excitado no reacciona con el O[Author ID1: at Tue Aug 28 12:00:00 2001]2[Author ID1: at Tue Aug 28 12:00:00 2001] en forma de triplete mediante una epoxidaci[Author ID1: at Tue Aug 28 12:01:00 2001]ó[Author ID1: at Tue Aug 28 12:20:00 2001]n [Author ID1: at Tue Aug 28 12:01:00 2001]transformándose[Author ID1: at Tue Aug 28 12:02:00 2001] [Author ID1: at Tue Aug 28 12:01:00 2001]en epoxicarotenoide. Este puede volver el estado basal mediante una [Author ID1: at Tue Aug 28 12:02:00 2001]reacción[Author ID1: at Tue Aug 28 12:27:00 2001] de desepoxidaci[Author ID1: at Tue Aug 28 12:02:00 2001]ó[Author ID1: at Tue Aug 28 12:26:00 2001]n. [Author ID1: at Tue Aug 28 12:02:00 2001]**(d)[Author ID1: at Tue Aug 28 12:03:00 2001]** esta [Author ID1: at Tue Aug 28 12:03:00 2001]reacción[Author ID1: at Tue Aug 28 12:26:00 2001] se puede dar con la [Author ID1: at Tue Aug 28 12:03:00 2001]actuación[Author ID1: at Tue Aug 28 12:04:00 2001] [Author ID1: at Tue Aug 28 12:03:00 2001]de las xantofilas.[Author ID0: at]

Las reacciones de [Author ID1: at Tue Aug 28 12:04:00 2001]epoxidación[Author ID1: at Tue Aug 28 12:26:00 2001] se dan en la cara estromal a pH de 7.5−8. [Author ID1: at Tue Aug 28 12:04:00 2001]la [Author ID1: at Tue Aug 28 12:05:00 2001]reacción[Author ID1: at Tue Aug 28 12:27:00 2001] se revierte en la zona luminal a un pH de 5.[Author ID0: at]

[Author ID1: at Tue Aug 28 12:05:00 2001]

[Author ID0: at]

[Author ID1: at Tue Aug 28 12:29:00 2001]

Biogénesis de [Author ID1: at Tue Aug 28 12:05:00 2001]cloroplastos[Author ID1: at Tue Aug 28 12:06:00 2001][Author ID1: at Tue Aug 28 12:27:00 2001]

[Author ID1: at Tue Aug 28 12:06:00 2001]

En el curso de la [Author ID1: at Tue Aug 28 12:07:00 2001]diferenciación[Author ID1: at Tue Aug 28 12:30:00 2001] de los [Author ID1: at Tue Aug 28 12:07:00 2001]tejidos[Author ID1: at Tue Aug 28 12:30:00 2001] [Author ID1: at Tue Aug 28 12:07:00 2001]fotosintéticos[Author ID1: at Tue Aug 28 12:30:00 2001] a partir de las células meristem[Author ID1: at Tue Aug 28 12:07:00 2001]á[Author ID1: at Tue Aug 28 12:30:00 2001]ticas se va a formar la maquinaria [Author ID1: at Tue Aug 28 12:07:00 2001]enzimática[Author ID1: at Tue Aug 28 12:08:00 2001].[Author ID1: at Tue Aug 28 12:07:00 2001][Author ID0: at]

En las células meristem[Author ID1: at Tue Aug 28 12:08:00 2001]á[Author ID1: at Tue Aug 28 12:30:00 2001]ticas existen [Author ID1: at Tue Aug 28 12:08:00 2001]orgánulos[Author ID1: at Tue Aug 28 12:30:00 2001] muy [Author ID1: at Tue Aug 28 12:08:00 2001]pequeños[Author ID1: at Tue Aug 28 12:30:00 2001] q poseen doble membrana con la [Author ID1: at Tue Aug 28 12:08:00 2001]dotación[Author ID1: at Tue Aug 28 12:09:00 2001] [Author ID1: at Tue Aug 28 12:08:00 2001]genética[Author ID1: at Tue Aug 28 12:30:00 2001] parecida a la q tienen los cloroplastos desarrollados.[Author ID0: at]

A partir de estos [Author ID1: at Tue Aug 28 12:09:00 2001]orgánulos[Author ID1: at Tue Aug 28 12:30:00 2001] de da el desarrollo por dos [Author ID1: at Tue Aug 28 12:09:00 2001]vías[Author ID1: at Tue Aug 28 12:30:00 2001]: [Author ID1: at Tue Aug 28 12:09:00 2001]**(Hoja 26)[Author ID1: at Tue Aug 28 12:10:00 2001]**

- Con[Author ID1: at Tue Aug 28 19:49:00 2001] luz:[Author ID1: at Tue Aug 28 12:11:00 2001] se da la [Author ID1: at Tue Aug 28 12:11:00 2001]invaginación[Author ID1: at Tue Aug 28 12:30:00 2001] de la membrana interna q va creciendo hacia el interior, se va situando en una [Author ID1: at Tue Aug 28 12:11:00 2001]disposición[Author ID1: at Tue Aug 28 12:12:00 2001] [Author ID1: at Tue Aug 28 12:11:00 2001]longitudinal según al eje mayor, se da el aplastamiento y se independiza de la membrana [Author ID1: at Tue Aug 28 12:12:00 2001]externa[Author ID1: at Tue Aug 28 12:31:00 2001] [Author ID1: at Tue Aug 28 12:12:00 2001]formándose[Author ID1: at Tue Aug 28 12:13:00 2001] [Author ID1: at Tue Aug 28 12:12:00 2001]los tilacoides. Paralelamente se sintetizan masivamente [Author ID1: at Tue Aug 28 12:13:00 2001]proteínas[Author ID1: at Tue Aug 28 12:30:00 2001], clorofilas, pigmentos q van a transformar la [Author ID1: at Tue Aug 28 12:13:00 2001]energía[Author ID1: at Tue Aug 28 12:30:00 2001] [Author ID1: at Tue Aug 28 12:13:00 2001]luminosa[Author ID1: at Tue Aug 28 12:31:00 2001] en [Author ID1: at Tue Aug 28 12:13:00 2001]electroquímica[Author ID1: at Tue Aug 28 12:14:00 2001].[Author ID1: at Tue Aug 28 12:13:00 2001]−−>[Author ID1: at Tue Aug 28 12:14:00 2001][Author ID1: at Tue Aug 28 12:10:00 2001]
- En[Author ID1: at Tue Aug 28 19:49:00 2001] oscuridad:[Author ID1: at Tue Aug 28 12:14:00 2001] las invaginaciones dan lugar a estructuras tubulares q van a dar[Author ID1: at Tue Aug 28 12:14:00 2001],[Author ID1: at Tue Aug 28 12:15:00 2001] por [Author ID1: at Tue Aug 28 12:14:00 2001]combinación[Author ID1: at Tue Aug 28 12:15:00 2001] [Author ID1: at Tue Aug 28 12:14:00 2001]de 3 tubos, redes [Author ID1: at Tue Aug 28 12:15:00 2001]cúbicas[Author ID1: at Tue Aug 28 12:31:00 2001] de 300 [Author ID1: at Tue Aug 28 12:15:00 2001]Å de diámetro constituyendo los cuerpos prolamelares. [Author ID1: at Tue Aug 28 12:17:00 2001]Si estos cuerpos se someten a luz se da la transformación a los verdaderos tilacoides. A [Author ID1: at Tue Aug 28 12:18:00 2001]continuación[Author ID1: at Tue Aug 28 12:19:00 2001] [Author ID1: at Tue Aug 28 12:18:00

2001]se da el desarrollo de las actividades [Author ID1: at Tue Aug 28 12:19:00 2001]fotosintéticas[Author ID1: at Tue Aug 28 12:31:00 2001].[Author ID1: at Tue Aug 28 12:19:00 2001]−−>[Author ID1: at Tue Aug 28 12:31:00 2001][Author ID1: at Tue Aug 28 12:10:00 2001]

[Author ID1: at Tue Aug 28 12:33:00 2001]

Una[Author ID1: at Tue Aug 28 13:01:00 2001] vez sintetizados los pigmentos, cloroplastos y [Author ID1: at Tue Aug 28 12:33:00 2001]proteínas[Author ID1: at Tue Aug 28 13:01:00 2001] se [Author ID1: at Tue Aug 28 12:33:00 2001]ven[Author ID1: at Tue Aug 28 19:50:00 2001] la [Author ID1: at Tue Aug 28 12:33:00 2001]aparición[Author ID1: at Tue Aug 28 13:01:00 2001] secuencial de las [Author ID1: at Tue Aug 28 12:33:00 2001]actividades[Author ID1: at Tue Aug 28 12:34:00 2001] [Author ID1: at Tue Aug 28 12:33:00 2001]fotosintéticas. Aparece antes la actividad ligada al fotosistema I (PS I) q la del PS II. [Author ID1: at Tue Aug 28 12:34:00 2001]Nada mas iluminar las hojas se ve actividad del PS I.[Author ID0: at]

La del PS II se da m[Author ID1: at Tue Aug 28 12:35:00 2001]á[Author ID1: at Tue Aug 28 13:02:00 2001]s [Author ID1: at Tue Aug 28 12:35:00 2001]paulatinamente, a las 2 horas los niveles de[Author ID1: at Tue Aug 28 12:36:00 2001] desprendimiento de O[Author ID1: at Tue Aug 28 12:37:00 2001]2[Author ID1: at Tue Aug 28 12:37:00 2001] son equiparables a los niveles de actividad fotosintética.[Author ID1: at Tue Aug 28 12:37:00 2001] A las 2 horas las tasas de desprendimiento de O[Author ID1: at Tue Aug 28 13:03:00 2001]2[Author ID1: at Tue Aug 28 13:04:00 2001] son 80 veces superiores q cuando se han desarro[Author ID1: at Tue Aug 28 13:04:00 2001]l[Author ID1: at Tue Aug 28 13:07:00 2001]lado [Author ID1: at Tue Aug 28 13:04:00 2001]totalmente[Author ID1: at Tue Aug 28 13:05:00 2001] [Author ID1: at Tue Aug 28 13:04:00 2001]los [Author ID1: at Tue Aug 28 13:05:00 2001]cloroplastos[Author ID1: at Tue Aug 28 13:07:00 2001]. Esto se debe a q la actividad fotosintética de los PS es [Author ID1: at Tue Aug 28 13:05:00 2001]más[Author ID1: at Tue Aug 28 19:50:00 2001] [Author ID1: at Tue Aug 28 13:05:00 2001]eficiente;[Author ID1: at Tue Aug 28 19:50:00 2001] en cambio la [Author ID1: at Tue Aug 28 13:05:00 2001]actividad[Author ID1: at Tue Aug 28 13:06:00 2001] [Author ID1: at Tue Aug 28 13:05:00 2001]de los sistemas antena no es tan alta q cuando ya [Author ID1: at Tue Aug 28 13:06:00 2001]están[Author ID1: at Tue Aug 28 13:07:00 2001] totalmente desarrollados. Se necesita mayor [Author ID1: at Tue Aug 28 13:06:00 2001]energía[Author ID1: at Tue Aug 28 13:07:00 2001] ya q no [Author ID1: at Tue Aug 28 13:06:00 2001]están[Author ID1: at Tue Aug 28 13:07:00 2001] tan d[Author ID1: at Tue Aug 28 13:06:00 2001]esarrollados.[Author ID0: at]

Las tasas de fijación de CO[Author ID1: at Tue Aug 28 13:07:00 2001]2[Author ID1: at Tue Aug 28 13:07:00 2001] [Author ID1: at Tue Aug 28 13:02:00 2001]se observan transcurridas 3 horas tras la iluminación. El [Author ID1: at Tue Aug 28 13:08:00 2001]−−>punto de compensación[Author ID1: at Tue Aug 28 13:08:00 2001][Author ID1: at Thu Aug 30 18:42:00 2001]−−> *[Author ID1: at Tue Aug 28 13:08:00 2001]*[Author ID1: at Thu Aug 30 18:42:00 2001]de CO[Author ID1: at Tue Aug 28 13:08:00 2001]2[Author ID1: at Tue Aug 28 13:08:00 2001] no se alcanza hasta m[Author ID1: at Tue Aug 28 13:09:00 2001]á[Author ID1: at Mon Sep 3 11:55:00 2001]s de 30 horas.[Author ID0: at]

El [Author ID1: at Tue Aug 28 13:09:00 2001]−−>**punto de [Author ID1: at Tue Aug 28 13:09:00 2001]**[Author ID1: at Thu Aug 30 18:42:00 2001]−−>**compensación[Author ID1: at Tue Aug 28 13:10:00 2001]**[Author ID1: at Thu Aug 30 18:42:00 2001] [Author ID1: at Tue Aug 28 13:09:00 2001]son las tasas de fijación de CO[Author ID1: at Tue Aug 28 13:10:00 2001]2[Author ID1: at Tue Aug 28 13:10:00 2001] q contrarrestan las tasas de [Author ID1: at Tue Aug 28 13:10:00 2001]respiración[Author ID1: at Tue Aug 28 13:11:00 2001] [Author ID1: at Tue Aug 28 13:10:00 2001]mitocondrial o [Author ID1: at Tue Aug 28 13:11:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001].[Author ID0: at]

Los procesos del ciclo de [Author ID1: at Tue Aug 28 13:11:00 2001]Calvin[Author ID1: at Tue Aug 28 13:12:00 2001] [Author ID1: at Tue Aug 28 12:57:00 2001]son [Author ID1: at Tue Aug 28 13:12:00 2001]más[Author ID1: at Tue Aug 28 19:50:00 2001] lentos, no son tan [Author ID1: at Tue Aug 28 13:12:00

2001]rápidos[Author ID1: at Tue Aug 28 13:21:00 2001] en las etapas de reverdecimiento.[Author ID1: at Tue Aug 28 13:12:00 2001][Author ID0: at]

La luz y las fitoquininas juegan un papel regulador en [Author ID1: at Tue Aug 28 13:13:00 2001]el[Author ID1: at Tue Aug 28 19:50:00 2001] proceso de formación de la maquinaria enzimática.[Author ID0: at]

La luz a [Author ID1: at Tue Aug 28 13:13:00 2001]través[Author ID1: at Tue Aug 28 13:21:00 2001] del [Author ID1: at Tue Aug 28 13:13:00 2001]citocromo[Author ID1: at Tue Aug 28 13:14:00 2001] [Author ID1: at Tue Aug 28 13:13:00 2001]controla los procesos de protoclorofilida a clorofilida.[Author ID0: at]

Las fitoquininas controlan el proceso porque favorecen los [Author ID1: at Tue Aug 28 13:14:00 2001]apilamientos[Author ID1: at Tue Aug 28 13:21:00 2001] granales y [Author ID1: at Tue Aug 28 13:14:00 2001]síntesis[Author ID1: at Tue Aug 28 13:15:00 2001] [Author ID1: at Tue Aug 28 13:14:00 2001]de [Author ID1: at Tue Aug 28 13:15:00 2001]proteínas[Author ID1: at Tue Aug 28 13:21:00 2001] q forman los complejos clorofila−[Author ID1: at Tue Aug 28 13:15:00 2001]proteína[Author ID1: at Tue Aug 28 13:21:00 2001] de los sistemas antena.[Author ID1: at Tue Aug 28 13:15:00 2001][Author ID0: at]

Los cloroplastos de dividen por estrangulamiento de la membrana.[Author ID1: at Tue Aug 28 13:16:00 2001] Son una clase de plastidios q contienen una cubierta de doble membrana como los leucoplastos o [Author ID1: at Tue Aug 28 13:17:00 2001]cromoplastos[Author ID1: at Tue Aug 28 13:18:00 2001].[Author ID1: at Tue Aug 28 13:17:00 2001][Author ID0: at]

Aquellos plastos con pigmentos q no sean clorofila son los cromoplastos.[Author ID0: at]

Entre los leucoplastos [Author ID1: at Tue Aug 28 13:18:00 2001]están[Author ID1: at Tue Aug 28 13:21:00 2001] los [Author ID1: at Tue Aug 28 13:18:00 2001]amiloplastos[Author ID1: at Tue Aug 28 13:19:00 2001] [Author ID1: at Tue Aug 28 13:18:00 2001]q almacenan [Author ID1: at Tue Aug 28 13:19:00 2001]almidón[Author ID1: at Tue Aug 28 13:22:00 2001] y los proteinoplastos q almacenan [Author ID1: at Tue Aug 28 13:19:00 2001]proteínas[Author ID1: at Tue Aug 28 13:22:00 2001]; también [Author ID1: at Tue Aug 28 13:19:00 2001]están[Author ID1: at Tue Aug 28 13:22:00 2001] los oleoplastos q almacenan aceite, [Author ID1: at Tue Aug 28 13:19:00 2001]lípido[Author ID1: at Tue Aug 28 13:22:00 2001]s.[Author ID0: at]

Los cloroplastos pueden transformarse en otros plastos sobre todo en [Author ID1: at Tue Aug 28 13:23:00 2001]cromoplastos cuando se degradan las clorofilas.[Author ID1: at Tue Aug 28 13:29:00 2001][Author ID0: at]

Los cloroplastos tienen [Author ID1: at Tue Aug 28 13:30:00 2001]anatomía[Author ID1: at Tue Aug 28 13:32:00 2001] [Author ID1: at Tue Aug 28 13:30:00 2001]genética[Author ID1: at Tue Aug 28 13:32:00 2001] parcial, tienen la maquinaria par[Author ID1: at Tue Aug 28 13:30:00 2001]a[Author ID1: at Tue Aug 28 13:32:00 2001] la [Author ID1: at Tue Aug 28 13:30:00 2001]replicación del DNA, [Author ID1: at Tue Aug 28 13:32:00 2001]trascripción[Author ID1: at Tue Aug 28 13:34:00 2001] del RNA y [Author ID1: at Tue Aug 28 13:32:00 2001]traducción[Author ID1: at Tue Aug 28 13:33:00 2001] [Author ID1: at Tue Aug 28 13:32:00 2001]de [Author ID1: at Tue Aug 28 13:33:00 2001]proteínas[Author ID1: at Tue Aug 28 13:34:00 2001].[Author ID0: at]

Se hereda de modo no mendeliano, [Author ID1: at Tue Aug 28 13:33:00 2001]vía[Author ID1: at Tue Aug 28 13:34:00 2001] materna.[Author ID1: at Tue Aug 28 13:33:00 2001] E[Author ID1: at Tue Aug 28 13:34:00 2001]l DNA es circular con doble [Author ID1: at Tue Aug 28 13:35:00 2001]hélice[Author ID1: at Tue Aug 28 13:41:00 2001]. El DNA esta localizado en los nucleoides, cada uno puede contener 4 cromosomas. [Author ID1: at Tue Aug 28 13:35:00 2001]Se puede separar mediante ultracentrifugaci[Author ID1: at Tue Aug 28 13:36:00 2001]ó[Author ID1: at Tue Aug 28 13:42:00 2001]n y por gradiante de

ClCs.[Author ID1: at Tue Aug 28 13:36:00 2001]

Los constituyentes del cloroplasto [Author ID1: at Tue Aug 28 13:37:00 2001]están[Author ID1: at Tue Aug 28 13:42:00 2001] sintetizados de modo coordinado por inducción del genoma nuclear y cloropl[Author ID1: at Tue Aug 28 13:37:00 2001]á[Author ID1: at Tue Aug 28 19:51:00 2001]stico. [Author ID1: at Tue Aug 28 13:37:00 2001]Dentro de los constituyentes del cloroplasto tenemos unas [Author ID1: at Tue Aug 28 13:38:00 2001]proteínas[Author ID1: at Tue Aug 28 13:42:00 2001] como son la subunidad grande de la [Author ID1: at Tue Aug 28 13:38:00 2001]RUBISCO[Author ID1: at Tue Aug 28 13:42:00 2001]. [Author ID1: at Tue Aug 28 13:38:00 2001]Este enzima tiene dos cadenas [Author ID1: at Tue Aug 28 13:39:00 2001]polipeptídicas[Author ID1: at Tue Aug 28 13:41:00 2001] una constituida por 8 subunidades codificadas por el genoma[Author ID1: at Tue Aug 28 13:39:00 2001] del[Author ID1: at Thu Aug 30 18:47:00 2001] [Author ID1: at Tue Aug 28 13:39:00 2001]cloroplasto [Author ID1: at Thu Aug 30 18:47:00 2001](la Subunidad grande[Author ID1: at Thu Aug 30 18:48:00 2001], donde [Author ID1: at Fri Aug 31 17:24:00 2001]están[Author ID1: at Fri Aug 31 17:25:00 2001] los centros [Author ID1: at Fri Aug 31 17:24:00 2001]catalíticos[Author ID1: at Fri Aug 31 17:25:00 2001] del enzima[Author ID1: at Fri Aug 31 17:24:00 2001])[Author ID1: at Thu Aug 30 18:48:00 2001],[Author ID1: at Tue Aug 28 13:39:00 2001] y otras 8 subunidades codificadas por el genoma [Author ID1: at Tue Aug 28 13:40:00 2001]nuclear (la Subunidad [Author ID1: at Thu Aug 30 18:48:00 2001]pequeña[Author ID1: at Thu Aug 30 18:49:00 2001])[Author ID1: at Thu Aug 30 18:48:00 2001].[Author ID1: at Tue Aug 28 13:40:00 2001] [Author ID0: at]

La RUBISCO [Author ID1: at Tue Aug 28 13:41:00 2001]constituye hasta un 50 % de la [Author ID1: at Tue Aug 28 13:43:00 2001]proteína[Author ID1: at Tue Aug 28 13:44:00 2001] soluble de la hoja.[Author ID1: at Tue Aug 28 13:43:00 2001][Author ID0: at]

Otros constituyentes codificados por su propio genoma son:[Author ID1: at Tue Aug 28 13:44:00 2001]

- polipéptidos complejos [Author ID1: at Tue Aug 28 13:45:00 2001]proteína[Author ID1: at Tue Aug 28 13:54:00 2001]−clorofila.[Author ID1: at Tue Aug 28 13:45:00 2001]−−>[Author ID1: at Tue Aug 28 13:45:00 2001][Author ID1: at Tue Aug 28 12:37:00 2001]
- Proteínas[Author ID1: at Tue Aug 28 13:54:00 2001] ribosomales.[Author ID1: at Tue Aug 28 13:45:00 2001]−−>[Author ID1: at Tue Aug 28 13:45:00 2001][Author ID1: at Tue Aug 28 12:37:00 2001]
- Proteína[Author ID1: at Tue Aug 28 13:54:00 2001] de 32 Kda del PS II a la q s[Author ID1: at Tue Aug 28 13:46:00 2001]e[Author ID1: at Tue Aug 28 13:54:00 2001] unen las quinonas y herbicidas como el DCMU q desplaza a las quinonas.[Author ID1: at Tue Aug 28 13:46:00 2001]−−>[Author ID1: at Tue Aug 28 13:46:00 2001][Author ID1: at Tue Aug 28 12:37:00 2001]
- Subunidades [Author ID1: at Tue Aug 28 13:47:00 2001] [Author ID1: at Tue Aug 28 13:52:00 2001], [Author ID1: at Tue Aug 28 13:53:00 2001] [Author ID1: at Tue Aug 28 13:52:00 2001], [Author ID1: at Tue Aug 28 13:53:00 2001] [Author ID1: at Tue Aug 28 13:52:00 2001] de la ATPas[Author ID1: at Tue Aug 28 13:53:00 2001]a [Author ID1: at Tue Aug 28 13:54:00 2001]−−>[Author ID1: at Tue Aug 28 13:55:00 2001][Author ID1: at Tue Aug 28 12:37:00 2001]

Las [Author ID1: at Tue Aug 28 13:55:00 2001]proteínas[Author ID1: at Tue Aug 28 14:01:00 2001] del cloroplasto [Author ID1: at Tue Aug 28 13:55:00 2001]están[Author ID1: at Tue Aug 28 14:01:00 2001] sintetizadas en los ribosomas 70s inhibidos por [Author ID1: at Tue Aug 28 13:55:00 2001]cloranfenicol[Author ID1: at Tue Aug 28 14:01:00 2001]. [Author ID1: at Tue Aug 28 13:55:00 2001]Los citoplasmáticos son 80s inhibidos por la cicloheximida.[Author ID0: at]

Los [Author ID1: at Tue Aug 28 13:56:00 2001]constituyentes codificados por el genoma nuclear entran a

[Author ID1: at Tue Aug 28 13:57:00 2001]través[Author ID1: at Tue Aug 28 14:01:00 2001] de la [Author ID1: at Tue Aug 28 13:57:00 2001]membrana.[Author ID0: at]

No se conoce la [Author ID1: at Tue Aug 28 13:57:00 2001]síntesis[Author ID1: at Tue Aug 28 13:58:00 2001] [Author ID1: at Tue Aug 28 13:57:00 2001]en cloroplastos y q salgan al citoplasma. La [Author ID1: at Tue Aug 28 13:58:00 2001]anatomía[Author ID1: at Tue Aug 28 14:01:00 2001] [Author ID1: at Tue Aug 28 13:58:00 2001]genética[Author ID1: at Tue Aug 28 14:01:00 2001] parcial es porque intervienen genes del cloroplasto y del [Author ID1: at Tue Aug 28 13:58:00 2001]núcleo[Author ID1: at Tue Aug 28 13:59:00 2001].[Author ID1: at Tue Aug 28 13:58:00 2001][Author ID0: at]

También se plantea q los cloroplastos derivan de la inclusión de un simbionte q [Author ID1: at Tue Aug 28 13:59:00 2001]posiblemente[Author ID1: at Tue Aug 28 14:00:00 2001] [Author ID1: at Tue Aug 28 13:59:00 2001]fuera un antecesor [Author ID1: at Tue Aug 28 14:00:00 2001]común[Author ID1: at Tue Aug 28 14:01:00 2001] a las algas verdeazuladas.[Author ID0: at]

[Author ID1: at Tue Aug 28 14:00:00 2001]

Extracción de los [Author ID1: at Tue Aug 28 14:00:00 2001]cloroplastos[Author ID1: at Tue Aug 28 14:01:00 2001]

Los cloroplastos se extraen en un medio tamponado en el q se incluyen distintos componentes, cuya finalidad es mantener los enlaces SH. [Author ID1: at Tue Aug 28 14:01:00 2001]También se incluye una sal de Mg para[Author ID1: at Tue Aug 28 14:02:00 2001] [Author ID1: at Tue Aug 28 14:03:00 2001]mantener [Author ID1: at Tue Aug 28 14:02:00 2001]tasas altas de desprendimiento de O[Author ID1: at Tue Aug 28 14:03:00 2001]2[Author ID1: at Tue Aug 28 14:04:00 2001], sales de Mn para la lisis del agua.[Author ID0: at]

Se [Author ID1: at Tue Aug 28 14:04:00 2001]añade[Author ID1: at Tue Aug 28 14:06:00 2001] una [Author ID1: at Tue Aug 28 14:04:00 2001]concentración[Author ID1: at Tue Aug 28 14:05:00 2001] [Author ID1: at Tue Aug 28 14:04:00 2001]0.2−0.4 M de sacarosa, glucosa o sorbito[Author ID1: at Tue Aug 28 14:05:00 2001]l[Author ID1: at Tue Aug 28 14:06:00 2001] para evitar q por choque [Author ID1: at Tue Aug 28 14:07:00 2001]osmótico[Author ID1: at Tue Aug 28 14:11:00 2001] se rompan los cloroplastos.[Author ID1: at Tue Aug 28 14:07:00 2001][Author ID0: at]

También se evita la [Author ID1: at Tue Aug 28 14:08:00 2001]acción[Author ID1: at Tue Aug 28 14:11:00 2001] de taninos [Author ID1: at Tue Aug 28 14:08:00 2001]añadiendo[Author ID1: at Tue Aug 28 14:11:00 2001] moléculas q los secuestren.[Author ID0: at]

Se homogeneiz[Author ID1: at Tue Aug 28 14:08:00 2001]a el tejido vegetal y se filtra por capas de muselina. Se centr[Author ID1: at Tue Aug 28 14:09:00 2001]i[Author ID1: at Tue Aug 28 19:52:00 2001]fuga, se dan lavados para corregir mayor [Author ID1: at Tue Aug 28 14:09:00 2001]purificación[Author ID1: at Tue Aug 28 14:10:00 2001].[Author ID1: at Tue Aug 28 14:09:00 2001][Author ID0: at]

También se puede centrifugar por gradiente de densidad. A continuación estos cloroplastos se pueden utilizar para los diferentes experimentos.[Author ID1: at Tue Aug 28 14:10:00 2001][Author ID0: at]

Si se hace la dilución en un medio orgánico perdemos los pigmentos[Author ID1: at Tue Aug 28 14:11:00 2001].[Author ID1: at Tue Aug 28 14:06:00 2001]

Un 20 % de los cloroplastos son materia seca de la q un 60 % son [Author ID1: at Tue Aug 28 14:12:00 2001]proteínas[Author ID1: at Tue Aug 28 14:14:00 2001], un 15 % lípidos, 4 % clorofila, 0.7 % [Author ID1: at Tue Aug 28 14:12:00 2001]carotenoides[Author ID1: at Tue Aug 28 14:13:00 2001],[Author ID1: at

Tue Aug 28 14:12:00 2001] 2 % RNA, un porcentaje [Author ID1: at Tue Aug 28 14:13:00 2001]más[Author ID1: at Tue Aug 28 19:52:00 2001] pequeño corresponde a DNA, aa libres, iones[Author ID1: at Tue Aug 28 14:13:00 2001] inorgánicos[Author ID1: at Tue Aug 28 14:14:00 2001], [Author ID1: at Tue Aug 28 14:13:00 2001]fenoles[Author ID1: at Tue Aug 28 14:14:00 2001],[Author ID1: at Tue Aug 28 14:13:00 2001] metabolitos secundarios...[Author ID1: at Tue Aug 28 14:14:00 2001]

[Author ID0: at]

[Author ID1: at Tue Aug 28 14:15:00 2001]

[Author ID1: at Thu Aug 30 20:52:00 2001]

−−>**Tema 6 conversión energética[Author ID1: at Tue Aug 28 14:15:00 2001]**[Author ID1: at Fri Aug 31 14:43:00 2001]

[Author ID1: at Tue Aug 28 14:15:00 2001]

Implica intermediarios para conducir los e[Author ID1: at Tue Aug 28 14:16:00 2001]−[Author ID1: at Tue Aug 28 14:16:00 2001] de la [Author ID1: at Tue Aug 28 14:16:00 2001]fotosíntesis[Author ID1: at Tue Aug 28 14:17:00 2001] del agua hasta el NADPH[Author ID1: at Tue Aug 28 14:16:00 2001]. Tiene un proceso endoerg[Author ID1: at Tue Aug 28 14:17:00 2001]ó[Author ID1: at Tue Aug 28 14:18:00 2001]nico (requiere [Author ID1: at Tue Aug 28 14:17:00 2001]energía[Author ID1: at Tue Aug 28 14:18:00 2001]) y otro exoerg[Author ID1: at Tue Aug 28 14:17:00 2001]ó[Author ID1: at Tue Aug 28 14:18:00 2001]nico (libera [Author ID1: at Tue Aug 28 14:17:00 2001]energía[Author ID1: at Tue Aug 28 14:18:00 2001])[Author ID1: at Tue Aug 28 14:17:00 2001].[Author ID0: at]

La [Author ID1: at Tue Aug 28 14:18:00 2001]fotosíntesis[Author ID1: at Tue Aug 28 14:22:00 2001] es un proceso endoergónico. Se produce la [Author ID1: at Tue Aug 28 14:18:00 2001]síntesis[Author ID1: at Tue Aug 28 14:19:00 2001] [Author ID1: at Tue Aug 28 14:18:00 2001]de [Author ID1: at Tue Aug 28 14:19:00 2001]compuestos[Author ID1: at Tue Aug 28 14:22:00 2001] [Author ID1: at Tue Aug 28 14:19:00 2001]orgánicos[Author ID1: at Tue Aug 28 14:22:00 2001] a partir de agua. Como el CO[Author ID1: at Tue Aug 28 14:19:00 2001]2[Author ID1: at Tue Aug 28 14:20:00 2001] y el H[Author ID1: at Tue Aug 28 14:19:00 2001]2[Author ID1: at Tue Aug 28 14:20:00 2001]O tienen un nivel energético muy bajo respecto al CH[Author ID1: at Tue Aug 28 14:20:00 2001]2[Author ID1: at Tue Aug 28 14:20:00 2001]O, n va la [Author ID1: at Tue Aug 28 14:20:00 2001]reacción[Author ID1: at Tue Aug 28 14:22:00 2001] [Author ID1: at Tue Aug 28 14:20:00 2001]espontáneamente[Author ID1: at Tue Aug 28 14:21:00 2001] [Author ID1: at Tue Aug 28 14:20:00 2001]a la derecha, sino q necesita [Author ID1: at Tue Aug 28 14:21:00 2001]energía[Author ID1: at Tue Aug 28 14:22:00 2001] fot[Author ID1: at Tue Aug 28 14:21:00 2001]ó[Author ID1: at Tue Aug 28 14:22:00 2001]nica a partir de la membrana del cloroplasto y es transformada en [Author ID1: at Tue Aug 28 14:21:00 2001]energía[Author ID1: at Tue Aug 28 14:22:00 2001] [Author ID1: at Tue Aug 28 14:21:00 2001]química[Author ID1: at Tue Aug 28 14:22:00 2001].[Author ID1: at Tue Aug 28 14:21:00 2001][Author ID0: at]

La [Author ID1: at Tue Aug 28 14:28:00 2001]energía[Author ID1: at Tue Aug 28 14:29:00 2001] global es ligeramente superior a la [Author ID1: at Tue Aug 28 14:28:00 2001]energía[Author ID1: at Tue Aug 28 14:29:00 2001] de los productos [Author ID1: at Tue Aug 28 14:28:00 2001]así[Author ID1: at Tue Aug 28 14:29:00 2001] do se da la [Author ID1: at Tue Aug 28 14:28:00 2001]reacción[Author ID1: at Tue Aug 28 14:29:00 2001] [Author ID1: at Tue Aug 28 14:28:00 2001]inversa[Author ID1: at Tue Aug 28 14:29:00 2001] [Author ID1: at Tue Aug 28 14:28:00 2001]espontánea[Author ID1: at Tue Aug 28 14:29:00 2001]. [Author ID1: at Tue Aug 28 14:28:00 2001][Author ID0: at]

La conversión energética se lleva a cabo en la membrana de los [Author ID1: at Tue Aug 28 14:29:00

2001]tilacoides[Author ID1: at Tue Aug 28 14:30:00 2001] [Author ID1: at Tue Aug 28 14:29:00 2001]transformándola en NADH y[Author ID1: at Tue Aug 28 14:30:00 2001] [Author ID1: at Tue Aug 28 14:37:00 2001]ATP usada en la fase oscura del Ciclo de Calvin.[Author ID0: at]

En la fase luminosa el lumen se carga de H[Author ID1: at Tue Aug 28 14:30:00 2001]+[Author ID1: at Tue Aug 28 14:31:00 2001], crea un gradiente electroquímico [Author ID1: at Tue Aug 28 14:31:00 2001]usado[Author ID1: at Tue Aug 28 14:37:00 2001] para la [Author ID1: at Tue Aug 28 14:31:00 2001]síntesis[Author ID1: at Tue Aug 28 14:37:00 2001] de [Author ID1: at Tue Aug 28 14:31:00 2001]ATP[Author ID1: at Tue Aug 28 14:37:00 2001]. [Author ID1: at Tue Aug 28 14:31:00 2001]La transferencia de e[Author ID1: at Tue Aug 28 14:32:00 2001]−[Author ID1: at Tue Aug 28 14:32:00 2001] del agua al NADPH requiere el aporte de fotones. Por cada e[Author ID1: at Tue Aug 28 14:32:00 2001]−[Author ID1: at Tue Aug 28 14:33:00 2001] transferido del agua al NADPH se necesitan 2 fotones q van a ser captados por el PS II y PS I. Como para [Author ID1: at Tue Aug 28 14:33:00 2001]oxidar[Author ID1: at Tue Aug 28 14:37:00 2001] dos [Author ID1: at Tue Aug 28 14:33:00 2001]moléculas[Author ID1: at Tue Aug 28 14:34:00 2001] [Author ID1: at Tue Aug 28 14:33:00 2001]de [Author ID1: at Tue Aug 28 14:34:00 2001]H[Author ID1: at Tue Aug 28 14:35:00 2001]2[Author ID1: at Tue Aug 28 14:35:00 2001]O[Author ID1: at Tue Aug 28 14:35:00 2001] se liberan 4 H[Author ID1: at Tue Aug 28 14:34:00 2001]+[Author ID1: at Tue Aug 28 14:34:00 2001] y 4 e[Author ID1: at Tue Aug 28 14:34:00 2001]−[Author ID1: at Tue Aug 28 14:34:00 2001] y una molécula de [Author ID1: at Tue Aug 28 14:34:00 2001]O[Author ID1: at Tue Aug 28 14:36:00 2001]2[Author ID1: at Tue Aug 28 14:36:00 2001] para [Author ID1: at Tue Aug 28 14:36:00 2001]transferir[Author ID1: at Tue Aug 28 14:37:00 2001] los 4 e[Author ID1: at Tue Aug 28 14:36:00 2001]−[Author ID1: at Tue Aug 28 14:36:00 2001] al NADPH se requieren un [Author ID1: at Tue Aug 28 14:36:00 2001]mínimo[Author ID1: at Tue Aug 28 14:37:00 2001] de 8 fotones.[Author ID1: at Tue Aug 28 14:36:00 2001] [Author ID1: at Tue Aug 28 14:35:00 2001][Author ID0: at]

Experimentalmente se requieren 8−10 fotones.[Author ID1: at Tue Aug 28 18:43:00 2001]

El NADPH y el ATP son [Author ID1: at Tue Aug 28 18:44:00 2001]usados[Author ID1: at Tue Aug 28 18:45:00 2001] en reacciones bioquímicas ara reducir al O[Author ID1: at Tue Aug 28 18:44:00 2001]2[Author ID1: at Tue Aug 28 18:45:00 2001] y CH[Author ID1: at Tue Aug 28 18:45:00 2001]2[Author ID1: at Tue Aug 28 18:45:00 2001]O.[Author ID0: at]

Mientras q la fase luminosa ocurre en 10[Author ID1: at Tue Aug 28 18:45:00 2001]−12[Author ID1: at Tue Aug 28 18:45:00 2001] sg, la fase oscura es [Author ID1: at Tue Aug 28 18:45:00 2001]más[Author ID1: at Tue Aug 28 19:52:00 2001] lenta.[Author ID1: at Tue Aug 28 18:45:00 2001]

La entrada de [Author ID1: at Tue Aug 28 18:46:00 2001]energía[Author ID1: at Tue Aug 28 19:00:00 2001] requiere la participación de dos procesos fotoquímicos encargados de obtener la [Author ID1: at Tue Aug 28 18:46:00 2001]energía[Author ID1: at Tue Aug 28 18:50:00 2001] (PS)[Author ID1: at Tue Aug 28 18:46:00 2001][Author ID1: at Tue Aug 28 18:48:00 2001]

−−>Rendimiento cu[Author ID1: at Tue Aug 28 18:48:00 2001][Author ID1: at Tue Aug 28 18:56:00 2001]−−>á[Author ID1: at Tue Aug 28 18:50:00 2001][Author ID1: at Tue Aug 28 18:56:00 2001]−−>ntico[Author ID1: at Tue Aug 28 18:48:00 2001][Author ID1: at Tue Aug 28 18:56:00 2001]−−>[Author ID1: at Tue Aug 28 18:49:00 2001][Author ID1: at Tue Aug 28 18:56:00 2001]−−>=[Author ID1: at Tue Aug 28 18:51:00 2001][Author ID1: at Tue Aug 28 18:56:00 2001] desprendimiento de O[Author ID1: at Tue Aug 28 18:51:00 2001]2[Author ID1: at Tue Aug 28 18:54:00 2001] frente a destellos[Author ID1: at Tue Aug 28 18:54:00 2001] de longitud de onda variable entre [Author ID1: at Tue Aug 28 18:55:00 2001]400−680 nm, el rendimiento cu[Author ID1: at Tue Aug 28 18:55:00 2001]á[Author ID1: at Tue Aug 28 18:56:00 2001]ntico es el mismo. A partir de 680 nm se da [Author ID1: at Tue Aug 28 18:55:00 2001]una[Author ID1: at Tue Aug 28 18:57:00 2001] [Author ID1: at Tue Aug 28 18:55:00 2001]caída[Author ID1: at Tue Aug 28 18:56:00 2001] del rendimiento cu[Author ID1: at Tue Aug 28

18:55:00 2001]á[Author ID1: at Tue Aug 28 18:57:00 2001]ntico de la[Author ID1: at Tue Aug 28 18:55:00 2001] fotosíntesis.[Author ID1: at Tue Aug 28 18:56:00 2001][Author ID1: at Tue Aug 28 19:00:00 2001]

Efecto intensificador o efecto Emerson =[Author ID1: at Tue Aug 28 19:00:00 2001] al analizar la tasa [Author ID1: at Tue Aug 28 19:00:00 2001]metabólica en función de [Author ID1: at Tue Aug 28 19:01:00 2001] [Author ID1: at Tue Aug 28 19:04:00 2001] distintas observo q al aplicar [Author ID1: at Tue Aug 28 19:04:00 2001]simultán[Author ID1: at Tue Aug 28 19:07:00 2001]eamente[Author ID1: at Tue Aug 28 19:07:00 2001] superior a 700 nm e inferior a700 nm, la tasa [Author ID1: at Tue Aug 28 19:05:00 2001]fotosintética[Author ID1: at Tue Aug 28 19:07:00 2001] era superior q al aplicarlas por separado.[Author ID1: at Tue Aug 28 19:05:00 2001][Author ID0: at]

Esto llevo a determinar la existencia del PS II ([Author ID1: at Tue Aug 28 19:06:00 2001]absorbe[Author ID1: at Tue Aug 28 19:07:00 2001] [Author ID1: at Tue Aug 28 19:06:00 2001]radiación hasta 680 nm) y del PS I (absorbe radiación superior a 700 nm)[Author ID1: at Tue Aug 28 19:07:00 2001].[Author ID0: at]

[Author ID1: at Tue Aug 28 19:08:00 2001]Así[Author ID1: at Tue Aug 28 19:11:00 2001] como consecuencia de la absorción del PS I se da la existencia de un agente reductor fuerte y un oxidante [Author ID1: at Tue Aug 28 19:08:00 2001]débil[Author ID1: at Tue Aug 28 19:11:00 2001] (oxida al [Author ID1: at Tue Aug 28 19:08:00 2001]citocromo[Author ID1: at Tue Aug 28 19:09:00 2001])[Author ID1: at Tue Aug 28 19:08:00 2001].[Author ID1: at Tue Aug 28 19:09:00 2001]

Cuando [Author ID1: at Tue Aug 28 19:10:00 2001]absorbe[Author ID1: at Tue Aug 28 19:11:00 2001] el PS II se origina un agente reductor [Author ID1: at Tue Aug 28 19:10:00 2001]débil[Author ID1: at Tue Aug 28 19:11:00 2001] (reduce al citocromo oxidado por el PS I y un agente oxidante fuerte capaz de o[Author ID1: at Tue Aug 28 19:10:00 2001]xidar al agua[Author ID1: at Tue Aug 28 19:11:00 2001].[Author ID1: at Tue Aug 28 19:36:00 2001][Author ID0: at]

A partir de estos experimentos se determina la existencia de dos[Author ID1: at Tue Aug 28 19:12:00 2001] proceso fotoquímicos ligados al PS I y[Author ID1: at Tue Aug 28 19:13:00 2001] [Author ID1: at Tue Aug 28 19:36:00 2001]PS II q [Author ID1: at Tue Aug 28 19:13:00 2001]actúan[Author ID1: at Tue Aug 28 19:36:00 2001] en serie (esquema Z[Author ID1: at Tue Aug 28 19:13:00 2001]).[Author ID1: at Tue Aug 28 19:36:00 2001] [Author ID1: at Tue Aug 28 19:13:00 2001]Este proceso de transferencia electrónica es [Author ID1: at Tue Aug 28 19:15:00 2001]típico[Author ID1: at Tue Aug 28 19:36:00 2001] y exclusivo de planta[Author ID1: at Tue Aug 28 19:15:00 2001]s superiores y algas verde azulada (las bacterias fotosintéticas poseen solo un fotosistema)[Author ID0: at]

La [Author ID1: at Tue Aug 28 19:16:00 2001]energía[Author ID1: at Tue Aug 28 19:37:00 2001] de la luz es captada por los [Author ID1: at Tue Aug 28 19:16:00 2001]sistemas[Author ID1: at Tue Aug 28 19:37:00 2001] colectores de [Author ID1: at Tue Aug 28 19:16:00 2001]radiación[Author ID1: at Tue Aug 28 19:17:00 2001] [Author ID1: at Tue Aug 28 19:16:00 2001] que son [Author ID1: at Tue Aug 28 19:17:00 2001]el[Author ID1: at Tue Aug 28 19:38:00 2001] sistema antena y se canalizan a los centros de [Author ID1: at Tue Aug 28 19:17:00 2001]reacción[Author ID1: at Tue Aug 28 19:37:00 2001] de los PS, d[Author ID1: at Tue Aug 28 19:17:00 2001]í[Author ID1: at Tue Aug 28 19:37:00 2001]mero especial de clorofila[Author ID1: at Tue Aug 28 19:17:00 2001].[Author ID1: at Tue Aug 28 19:18:00 2001]

(Hoja 29 [Author ID1: at Tue Aug 28 19:18:00 2001]Fig.[Author ID1: at Tue Aug 28 19:19:00 2001] 2 [Author ID1: at Tue Aug 28 19:18:00 2001]y 65) [Author ID1: at Tue Aug 28 19:19:00 2001]La [Author ID1: at Tue Aug 28 19:19:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] q llega al PS es [Author ID1: at Tue Aug 28 19:19:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] captada[Author ID1: at Tue Aug 28 19:19:00 2001] por los sistemas antena. La [Author ID1: at Tue Aug 28 19:20:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] de excitación se transfiere desde las moléculas de pigmento a moléculas adyacentes con [Author ID1: at Tue Aug 28 19:20:00

2001]máximos[Author ID1: at Tue Aug 28 19:21:00 2001] [Author ID1: at Tue Aug 28 19:20:00 2001]de absorción superiores (menos energéticos) transmitiendo la [Author ID1: at Tue Aug 28 19:21:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] a los centros de [Author ID1: at Tue Aug 28 19:21:00 2001]reacción[Author ID1: at Tue Aug 28 19:38:00 2001].[Author ID1: at Tue Aug 28 19:21:00 2001]

(Hoja 30 [Author ID1: at Tue Aug 28 19:21:00 2001]Fig.[Author ID1: at Tue Aug 28 19:38:00 2001] 8.21) [Author ID1: at Tue Aug 28 19:21:00 2001]Durante este [Author ID1: at Tue Aug 28 19:22:00 2001]proceso[Author ID1: at Tue Aug 28 19:38:00 2001] de transferencia hay carotenoides, clorofila a y b q realizan un [Author ID1: at Tue Aug 28 19:22:00 2001]movimiento[Author ID1: at Tue Aug 28 19:38:00 2001] hacia abajo ([Author ID1: at Tue Aug 28 19:22:00 2001]direccional[Author ID1: at Tue Aug 28 19:38:00 2001] e irreversible) con perdida[Author ID1: at Tue Aug 28 19:22:00 2001]s de calor [Author ID1: at Tue Aug 28 19:23:00 2001]mínimas[Author ID1: at Tue Aug 28 19:38:00 2001]. Es un proceso muy eficiente.[Author ID1: at Tue Aug 28 19:23:00 2001]

−−>**([Author ID1: at Tue Aug 28 19:23:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001]−−>**Fig.[Author ID1: at Tue Aug 28 19:38:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001]−−> **8.22)[Author ID1: at Tue Aug 28 19:23:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001] Existe una heterogeneidad lateral entre ambos PS. [Author ID1: at Tue Aug 28 19:23:00 2001]Existen tilacoides granales y estromales, afecta a la capacidad del sistema para [Author ID1: at Tue Aug 28 19:24:00 2001]distribuir[Author ID1: at Tue Aug 28 19:38:00 2001] la [Author ID1: at Tue Aug 28 19:24:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] entre [Author ID1: at Tue Aug 28 19:24:00 2001]ambos[Author ID1: at Tue Aug 28 19:38:00 2001] fotosistemas.[Author ID1: at Tue Aug 28 19:24:00 2001]

La [Author ID1: at Tue Aug 28 19:25:00 2001]fotosíntesis[Author ID1: at Tue Aug 28 19:38:00 2001] en plantas superiores depende de dos PS con distintas [Author ID1: at Tue Aug 28 19:25:00 2001]propiedades[Author ID1: at Tue Aug 28 19:26:00 2001].[Author ID1: at Tue Aug 28 19:25:00 2001][Author ID0: at]

Presenta un problema para el sistema: si la tasa de absorción de [Author ID1: at Tue Aug 28 19:26:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] no esta balanceada, todo el proceso [Author ID1: at Tue Aug 28 19:26:00 2001]fotosintético[Author ID1: at Tue Aug 28 19:27:00 2001] [Author ID1: at Tue Aug 28 19:26:00 2001]estará[Author ID1: at Tue Aug 28 19:38:00 2001] limitado por el proceso q reciba menor [Author ID1: at Tue Aug 28 19:27:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001]. [Author ID1: at Tue Aug 28 19:27:00 2001]Así[Author ID1: at Tue Aug 28 19:39:00 2001] las plantas de[Author ID1: at Tue Aug 28 19:27:00 2001]b[Author ID1: at Tue Aug 28 19:39:00 2001]en conseguir q se equilibre el aporte de [Author ID1: at Tue Aug 28 19:27:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] mediante [Author ID1: at Tue Aug 28 19:27:00 2001]trasvase[Author ID1: at Tue Aug 28 19:39:00 2001] de la [Author ID1: at Tue Aug 28 19:27:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] desde la zona de [Author ID1: at Tue Aug 28 19:27:00 2001]tilacoides[Author ID1: at Tue Aug 28 19:28:00 2001] [Author ID1: at Tue Aug 28 19:27:00 2001]granales del PS II a los tilacoides estromales del PS I.[Author ID1: at Tue Aug 28 19:28:00 2001][Author ID0: at]

En este proceso en un principio hay una situación donde el PS II recibe [Author ID1: at Tue Aug 28 19:29:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] de LHC II y la PS I recibe menos [Author ID1: at Tue Aug 28 19:29:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001]. [Author ID1: at Tue Aug 28 19:29:00 2001]En las membranas del Tilacoide hay proteinkinasas q fosforilan las [Author ID1: at Tue Aug 28 19:30:00 2001]proteínas[Author ID1: at Tue Aug 28 19:39:00 2001] del sistema captador de [Author ID1: at Tue Aug 28 19:30:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] (residuo de treonina).[Author ID1: at Tue Aug 28 19:30:00 2001]

Como consecuencia se produce un desplazamiento motivado por el rechazo de cargas del mismo signo de [Author ID1: at Tue Aug 28 19:31:00 2001]proteína[Author ID1: at Tue Aug 28 19:39:00 2001] adyacentes desde la zona granal a la estromal ([Author ID1: at Tue Aug 28 19:31:00 2001]redistribución[Author ID1: at Tue Aug 28 19:39:00 2001] de la [Author ID1: at Tue Aug 28 19:31:00 2001]energía[Author ID1: at Tue Aug 28 19:38:00 2001] de ambos fotosistemas).[Author ID1: at Tue Aug 28 19:31:00 2001]

Cuando hay de nuevo [Author ID1: at Tue Aug 28 19:32:00 2001]descompensación[Author ID1: at Tue Aug 28 19:39:00 2001] se activa la fosfatasa q desfosforila las treoninas desplazando el complejo antena de la zona estromal a la granal.[Author ID1: at Tue Aug 28 19:32:00 2001]

La señal de [Author ID1: at Tue Aug 28 19:33:00 2001]activación[Author ID1: at Tue Aug 28 19:40:00 2001] de la proteinkinasa de la membrana de los tilac[Author ID1: at Tue Aug 28 19:33:00 2001]o[Author ID1: at Tue Aug 28 19:40:00 2001]ides es el estado de [Author ID1: at Tue Aug 28 19:33:00 2001]reducción[Author ID1: at Tue Aug 28 19:34:00 2001] [Author ID1: at Tue Aug 28 19:33:00 2001]de un [Author ID1: at Tue Aug 28 19:34:00 2001]intermediario[Author ID1: at Tue Aug 28 19:40:00 2001] de la CTE, la plastoquinona[Author ID1: at Tue Aug 28 19:34:00 2001]−−>**.[Author ID1: at Tue Aug 28 19:34:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001] **[Author ID1: at Tue Aug 28 19:35:00 2001]**−−>**(Hoja 31 [Author ID1: at Tue Aug 28 19:34:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001]−−>**Fig.[Author ID1: at Tue Aug 28 19:38:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001]−−> **4.15)[Author ID1: at Tue Aug 28 19:34:00 2001]**[Author ID1: at Tue Aug 28 19:35:00 2001]**.[Author ID1: at Tue Aug 28 20:29:00 2001]**

−−>Si hay descompensación de entrada de luz frente al PS I del PS II, los e[Author ID1: at Tue Aug 28 20:29:00 2001][Author ID1: at Tue Aug 28 20:29:00 2001]−[Author ID1: at Tue Aug 28 20:30:00 2001] procedentes del agua llegan a la plastoquinona oxidada y la reducen.[Author ID0: at]

Para [Author ID1: at Tue Aug 28 20:30:00 2001]volver[Author ID1: at Tue Aug 28 20:31:00 2001] a recibir e[Author ID1: at Tue Aug 28 20:30:00 2001]−[Author ID1: at Tue Aug 28 20:31:00 2001] la reoxida el PS I para llevarlos al NADPH. Se produce una acumulación de plastoquinona reducida. [Author ID1: at Tue Aug 28 20:31:00 2001]Q la tiene disipar por calor, fluorescencia...[Author ID0: at]

Este acumulo activa la proteinkinasa para q oxide las treoninas desplazando los sistemas antena desde el estroma a los grana.[Author ID1: at Tue Aug 28 20:32:00 2001]

Cuando los niveles [Author ID1: at Tue Aug 28 20:33:00 2001]están[Author ID1: at Tue Aug 28 20:34:00 2001] balanceados la plastoquinona reducida baja, y se activa una fosfatasa q desfosforila la [Author ID1: at Tue Aug 28 20:33:00 2001]treonina[Author ID1: at Tue Aug 28 20:34:00 2001],[Author ID1: at Tue Aug 28 20:33:00 2001] y puede regresar de nuevo el sistema de una zona a otra.[Author ID1: at Tue Aug 28 20:34:00 2001][Author ID1: at Thu Aug 30 20:52:00 2001]

[Author ID0: at]

[Author ID1: at Thu Aug 30 20:42:00 2001]

−−>**Tema 7 mecanismos de transporte de [Author ID1: at Thu Aug 30 20:42:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**electrones [Author ID1: at Thu Aug 30 21:12:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**y [Author ID1: at Thu Aug 30 20:42:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**protones[Author ID1: at Thu Aug 30 20:43:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]

−−>**[Author ID1: at Thu Aug 30 20:43:00 2001]**[Author ID1: at Sun Sep 2 17:23:00 2001]

[Author ID1: at Thu Aug 30 20:47:00 2001]

(Hoja 32 [Author ID1: at Thu Aug 30 20:43:00 2001]Fig.[Author ID1: at Thu Aug 30 20:45:00 2001] 8.25)[Author ID1: at Thu Aug 30 20:43:00 2001] Hay 4 complejos:[Author ID0: at]

- Complejo [Author ID1: at Thu Aug 30 20:43:00 2001]PS II[Author ID1: at Thu Aug 30 20:44:00 2001]−−>[Author ID1: at Thu Aug 30 20:44:00 2001][Author ID1: at Thu Aug 30 20:43:00 2001]
- Complejo cit b[Author ID1: at Thu Aug 30 20:44:00 2001]6[Author ID1: at Thu Aug 30 20:44:00 2001]f[Author ID1: at Thu Aug 30 20:44:00 2001] H[Author ID1: at Thu Aug 30 20:49:00 2001]2[Author ID1: at Thu Aug 30 20:49:00 2001]O NADPH[Author ID1: at Thu Aug 30 20:50:00 2001]−−>[Author ID1: at Thu Aug 30 20:44:00 2001][Author ID1: at Thu Aug 30 20:43:00 2001]
- Complejo[Author ID1: at Thu Aug 30 20:45:00 2001] PS I[Author ID1: at Thu Aug 30 20:44:00 2001]−−>[Author ID1: at Thu Aug 30 20:44:00 2001][Author ID1: at Thu Aug 30 20:43:00 2001]
- Complejo ATP sintasa [Author ID1: at Thu Aug 30 20:44:00 2001] [Author ID1: at Thu Aug 30 20:50:00 2001]Síntesis[Author ID1: at Thu Aug 30 20:54:00 2001] de ATP[Author ID1: at Thu Aug 30 20:50:00 2001]−−>[Author ID1: at Thu Aug 30 20:50:00 2001][Author ID1: at Thu Aug 30 20:43:00 2001]

[Author ID1: at Thu Aug 30 20:51:00 2001]

−−>[Author ID1: at Thu Aug 30 20:42:00 2001][Author ID1: at Thu Aug 30 20:43:00 2001]

(Hoja 33 [Author ID1: at Thu Aug 30 20:52:00 2001]Fig.[Author ID1: at Thu Aug 30 21:46:00 2001] 13.4)[Author ID1: at Thu Aug 30 20:52:00 2001] Estos complejos [Author ID1: at Thu Aug 30 20:53:00 2001]están[Author ID1: at Thu Aug 30 20:54:00 2001] vectorialmente en la membrana q provoca una diferencia de carga [Author ID1: at Thu Aug 30 20:53:00 2001]eléctrica[Author ID1: at Thu Aug 30 20:54:00 2001] (+ en el interior y [Author ID1: at Thu Aug 30 20:53:00 2001]−[Author ID1: at Thu Aug 30 20:54:00 2001] en [Author ID1: at Thu Aug 30 20:53:00 2001]el lumen por la descarga de H[Author ID1: at Thu Aug 30 20:54:00 2001]+[Author ID1: at Thu Aug 30 20:55:00 2001])[Author ID1: at Thu Aug 30 20:55:00 2001]

E[Author ID1: at Thu Aug 30 20:57:00 2001]l primer paso del [Author ID1: at Thu Aug 30 20:55:00 2001]almacenamiento[Author ID1: at Thu Aug 30 21:46:00 2001] de la [Author ID1: at Thu Aug 30 20:55:00 2001]energía[Author ID1: at Thu Aug 30 21:46:00 2001] en el sistema se produce a nivel del centro de [Author ID1: at Thu Aug 30 20:55:00 2001]reacción[Author ID1: at Thu Aug 30 21:46:00 2001] del PS II,[Author ID1: at Thu Aug 30 20:55:00 2001] molécula de [Author ID1: at Thu Aug 30 20:56:00 2001]clorofila[Author ID1: at Thu Aug 30 21:46:00 2001] P[Author ID1: at Thu Aug 30 20:56:00 2001]680[Author ID1: at Thu Aug 30 20:56:00 2001] [Author ID1: at Thu Aug 30 20:56:00 2001]**(Hoja 34 [Author ID1: at Thu Aug 30 20:56:00 2001]Fig.[Author ID1: at Thu Aug 30 20:57:00 2001] 8.27)[Author ID1: at Thu Aug 30 20:56:00 2001]**[Author ID0: at]

Esta[Author ID1: at Thu Aug 30 20:57:00 2001] captación directa o a [Author ID1: at Thu Aug 30 20:58:00 2001]través[Author ID1: at Thu Aug 30 21:46:00 2001] de pigmento antena, excita la molécula de clorofila, un e[Author ID1: at Thu Aug 30 20:58:00 2001]−[Author ID1: at Thu Aug 30 20:58:00 2001] se lanza del orbital basal a otro [Author ID1: at Thu Aug 30 20:58:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] externo, este e[Author ID1: at Thu Aug 30 20:58:00 2001]−[Author ID1: at Thu Aug 30 20:59:00 2001] excitado esta [Author ID1: at Thu Aug 30 20:59:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] débilmente retenido por fuerzas de atracción de cargas +del [Author ID1: at Thu Aug 30 20:59:00 2001]núcleo[Author ID1: at Thu Aug 30 21:00:00 2001].[Author ID1: at Thu Aug 30 20:59:00 2001][Author ID0: at]

La molécula de clorofila en estado [Author ID1: at Thu Aug 30 21:00:00 2001]excitado[Author ID1: at Thu

Aug 30 21:04:00 2001] se convierte en una molécula [Author ID1: at Thu Aug 30 21:00:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] reductora. El e[Author ID1: at Thu Aug 30 21:00:00 2001]−[Author ID1: at Thu Aug 30 21:00:00 2001] tiene dos posibilidades:[Author ID1: at Thu Aug 30 21:01:00 2001]

- Q[Author ID1: at Thu Aug 30 21:04:00 2001] el e[Author ID1: at Thu Aug 30 21:01:00 2001]−[Author ID1: at Thu Aug 30 21:02:00 2001] regrese al orbital basal, perdiendo calor (derroche energético sin actividad [Author ID1: at Thu Aug 30 21:02:00 2001]fotosintética[Author ID1: at Thu Aug 30 21:03:00 2001])[Author ID1: at Thu Aug 30 21:02:00 2001]−−>[Author ID1: at Thu Aug 30 21:03:00 2001][Author ID1: at Thu Aug 30 20:57:00 2001]
- Q[Author ID1: at Thu Aug 30 21:04:00 2001] el e[Author ID1: at Thu Aug 30 21:03:00 2001]−[Author ID1: at Thu Aug 30 21:03:00 2001] sea cedido a otra molécula de feofitina q lo cede a sucesivos aceptores hasta el NADP (aceptor final)[Author ID1: at Thu Aug 30 21:03:00 2001].[Author ID1: at Thu Aug 30 21:04:00 2001]−−>[Author ID1: at Thu Aug 30 21:04:00 2001][Author ID1: at Thu Aug 30 20:57:00 2001]

Así[Author ID1: at Thu Aug 30 21:47:00 2001] la molécula de clorofila posee un hueco [Author ID1: at Thu Aug 30 21:05:00 2001]electrónico[Author ID1: at Thu Aug 30 21:46:00 2001] q se rellena por e[Author ID1: at Thu Aug 30 21:05:00 2001]−[Author ID1: at Thu Aug 30 21:05:00 2001] cedidos por el donador 1º q lo recibe de un donador 2º y el ultimo donador es el agua.[Author ID1: at Thu Aug 30 21:05:00 2001]

Cuando la clorofila pierde un e[Author ID1: at Thu Aug 30 21:06:00 2001]−[Author ID1: at Thu Aug 30 21:07:00 2001] la molécula esta en estado oxidado, [Author ID1: at Thu Aug 30 21:07:00 2001]varían[Author ID1: at Thu Aug 30 21:47:00 2001] las características espectrales de absorción del rojo y estos picos se ven disminuidos cuando se oxidan.[Author ID1: at Thu Aug 30 21:07:00 2001][Author ID0: at]

KoK [Author ID1: at Thu Aug 30 21:08:00 2001]encontró[Author ID1: at Thu Aug 30 21:47:00 2001] el centro de [Author ID1: at Thu Aug 30 21:08:00 2001]reacción[Author ID1: at Thu Aug 30 21:47:00 2001] 1º con un [Author ID1: at Thu Aug 30 21:08:00 2001]máximo[Author ID1: at Thu Aug 30 21:09:00 2001] [Author ID1: at Thu Aug 30 21:08:00 2001]de absorción de 700 nm y lo denomino P[Author ID1: at Thu Aug 30 21:09:00 2001]700[Author ID1: at Thu Aug 30 21:09:00 2001].[Author ID0: at]

Witt [Author ID1: at Thu Aug 30 21:09:00 2001]observó[Author ID1: at Thu Aug 30 21:47:00 2001] una [Author ID1: at Thu Aug 30 21:09:00 2001]absorción[Author ID1: at Thu Aug 30 21:10:00 2001] [Author ID1: at Thu Aug 30 21:09:00 2001]de 680 nm y lo denominó P[Author ID1: at Thu Aug 30 21:10:00 2001]680[Author ID1: at Thu Aug 30 21:10:00 2001], era el centro de [Author ID1: at Thu Aug 30 21:10:00 2001]reacción[Author ID1: at Thu Aug 30 21:47:00 2001] 2º.[Author ID1: at Thu Aug 30 21:10:00 2001][Author ID0: at]

Dnysens [Author ID1: at Thu Aug 30 21:13:00 2001]trabajando con bacterias fotosintéticas [Author ID1: at Thu Aug 30 21:14:00 2001]estableció[Author ID1: at Thu Aug 30 21:17:00 2001] q el centro de [Author ID1: at Thu Aug 30 21:14:00 2001]reacción[Author ID1: at Thu Aug 30 21:47:00 2001] de bacterias con clorofila tiene un [Author ID1: at Thu Aug 30 21:14:00 2001]máximo[Author ID1: at Thu Aug 30 21:15:00 2001] [Author ID1: at Thu Aug 30 21:14:00 2001]de absorción a 870 nm y lo llamo P[Author ID1: at Thu Aug 30 21:15:00 2001]870[Author ID1: at Thu Aug 30 21:15:00 2001].[Author ID0: at]

Por rayos X [Author ID1: at Thu Aug 30 21:15:00 2001]estableció[Author ID1: at Thu Aug 30 21:17:00 2001] q es un d[Author ID1: at Thu Aug 30 21:15:00 2001]í[Author ID1: at Thu Aug 30 21:17:00 2001]mero de [Author ID1: at Thu Aug 30 21:15:00 2001]bacterioclorofila[Author ID1: at Thu Aug 30 21:16:00 2001].[Author ID1: at Thu Aug 30 21:15:00 2001] Análisis semejantes determinaron q el PS I es un d[Author ID1: at Thu Aug 30 21:16:00 2001]í[Author ID1: at Thu Aug 30 21:17:00 2001]mero de P[Author ID1: at Thu Aug 30 21:16:00 2001]700[Author ID1: at Thu Aug 30 21:16:00 2001]. existen [Author ID1: at Thu Aug 30 21:16:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] dudas del estado de [Author ID1: at Thu

Aug 30 21:16:00 2001]agregación[Author ID1: at Thu Aug 30 21:17:00 2001] del PS II.[Author ID1: at Thu Aug 30 21:16:00 2001][Author ID1: at Thu Aug 30 21:17:00 2001]

(Hoja 34 [Author ID1: at Thu Aug 30 21:17:00 2001]Fig.[Author ID1: at Thu Aug 30 21:47:00 2001] 8.26)[Author ID1: at Thu Aug 30 21:17:00 2001] El hueco electrónico de ceder los e[Author ID1: at Thu Aug 30 21:18:00 2001]−[Author ID1: at Thu Aug 30 21:18:00 2001] va a ser rellenado por e[Author ID1: at Thu Aug 30 21:18:00 2001]−[Author ID1: at Thu Aug 30 21:19:00 2001] de l fotolisis del agua.[Author ID0: at]

Todo el complejo es polipept[Author ID1: at Thu Aug 30 21:19:00 2001]í[Author ID1: at Thu Aug 30 21:47:00 2001]dico, tiene P[Author ID1: at Thu Aug 30 21:19:00 2001]680[Author ID1: at Thu Aug 30 21:19:00 2001], [Author ID1: at Thu Aug 30 21:19:00 2001]feofitina[Author ID1: at Thu Aug 30 21:20:00 2001],[Author ID1: at Thu Aug 30 21:19:00 2001] varias quinonas asociadas al centro de [Author ID1: at Thu Aug 30 21:20:00 2001]reacción[Author ID1: at Thu Aug 30 21:47:00 2001] q a su vez consta de varias [Author ID1: at Thu Aug 30 21:20:00 2001]proteínas[Author ID1: at Thu Aug 30 21:47:00 2001]; fundamentalmente estas [Author ID1: at Thu Aug 30 21:20:00 2001]proteínas[Author ID1: at Thu Aug 30 21:47:00 2001] tienen un Pm de 32 y 34 Kda,[Author ID1: at Thu Aug 30 21:20:00 2001] conocidas como [Author ID1: at Thu Aug 30 21:21:00 2001]proteínas[Author ID1: at Thu Aug 30 21:47:00 2001] D[Author ID1: at Thu Aug 30 21:21:00 2001]1[Author ID1: at Thu Aug 30 21:21:00 2001] y D[Author ID1: at Thu Aug 30 21:21:00 2001]2[Author ID1: at Thu Aug 30 21:21:00 2001] respectivamente y existen otras [Author ID1: at Thu Aug 30 21:21:00 2001]proteínas[Author ID1: at Thu Aug 30 21:47:00 2001] de Pm 33, 23 y 16 Kda [Author ID1: at Thu Aug 30 21:21:00 2001]al q [Author ID1: at Thu Aug 30 21:22:00 2001]están[Author ID1: at Thu Aug 30 21:47:00 2001] ligados el sistema [Author ID1: at Thu Aug 30 21:22:00 2001]enzimático[Author ID1: at Thu Aug 30 21:47:00 2001] q produce la fotolisis del agua.[Author ID1: at Thu Aug 30 21:22:00 2001]

La [Author ID1: at Thu Aug 30 21:23:00 2001]reacción[Author ID1: at Thu Aug 30 21:47:00 2001] química por la q se oxida el agua consiste en la ruptura de 2 [Author ID1: at Thu Aug 30 21:23:00 2001]moléculas[Author ID1: at Thu Aug 30 21:48:00 2001] de agua para liberar un O[Author ID1: at Thu Aug 30 21:23:00 2001]2[Author ID1: at Thu Aug 30 21:24:00 2001], la acumulación de 4 H[Author ID1: at Thu Aug 30 21:26:00 2001]+[Author ID1: at Thu Aug 30 21:26:00 2001] en el lumen del Tilacoide y liberación de 4 e[Author ID1: at Thu Aug 30 21:26:00 2001]−[Author ID1: at Thu Aug 30 21:27:00 2001] transferidos a [Author ID1: at Thu Aug 30 21:27:00 2001]través[Author ID1: at Thu Aug 30 21:48:00 2001] de la CTE para dar 2 NADPH.[Author ID0: at]

Se conoce poco del mecanismo de ruptura del agua ligado al PS II.[Author ID1: at Thu Aug 30 21:27:00 2001]

Existen pruebas indirectas sobre el proceso:[Author ID1: at Thu Aug 30 21:28:00 2001]

- Si partimos de cloroplastos [Author ID1: at Thu Aug 30 21:29:00 2001]sometidos[Author ID1: at Thu Aug 30 21:48:00 2001] a oscuridad y aplicamos destellos de luz, tras los primeros destellos apenas si se produce desprendimiento [Author ID1: at Thu Aug 30 21:29:00 2001]y se alcanza el [Author ID1: at Thu Aug 30 21:30:00 2001]máximo[Author ID1: at Thu Aug 30 21:31:00 2001] [Author ID1: at Thu Aug 30 21:30:00 2001]de desprendimiento tras tres destellos. Si seguimos, se alcanza es máximo [Author ID1: at Thu Aug 30 21:31:00 2001]dados[Author ID1: at Thu Aug 30 21:48:00 2001] 4 destellos hasta los 20 destellos.[Author ID1: at Thu Aug 30 21:31:00 2001]−−>[Author ID1: at Thu Aug 30 21:31:00 2001][Author ID1: at Thu Aug 30 21:27:00 2001]

Este [Author ID1: at Thu Aug 30 21:31:00 2001]mecanismo se h intentado explicar por el [Author ID1: at Thu Aug 30 21:32:00 2001]**Modelo S de Kok.[Author ID1: at Thu Aug 30 21:32:00 2001]** [Author ID1: at

Thu Aug 30 21:32:00 2001]S[Author ID1: at Thu Aug 30 21:32:00 2001]1[Author ID1: at Thu Aug 30 21:32:00 2001], S[Author ID1: at Thu Aug 30 21:32:00 2001]2[Author ID1: at Thu Aug 30 21:32:00 2001], [Author ID1: at Thu Aug 30 21:32:00 2001]S[Author ID1: at Thu Aug 30 21:33:00 2001]3[Author ID1: at Thu Aug 30 21:33:00 2001], ...[Author ID1: at Thu Aug 30 21:33:00 2001][Author ID1: at Thu Aug 30 21:34:00 2001]

El sistema lítico del agua atraviesa por etapas sucesivamente [Author ID1: at Thu Aug 30 21:34:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] oxidadas. Cuando [Author ID1: at Thu Aug 30 21:34:00 2001]pasa de un estado a otro implica la captación de un fot[Author ID1: at Thu Aug 30 21:35:00 2001]ó[Author ID1: at Thu Aug 30 21:48:00 2001]n. [Author ID1: at Thu Aug 30 21:35:00 2001]**(Hoja 35 [Author ID1: at Thu Aug 30 21:35:00 2001]Fig.[Author ID1: at Thu Aug 30 21:49:00 2001] 8.29)[Author ID1: at Thu Aug 30 21:35:00 2001]**

Se piensa q estos estados de [Author ID1: at Thu Aug 30 21:36:00 2001]oxidorreducción[Author ID1: at Thu Aug 30 21:49:00 2001] serian estados de oxidación de [Author ID1: at Thu Aug 30 21:36:00 2001]átomos[Author ID1: at Thu Aug 30 21:49:00 2001] de Mn q se sabe q forman parte del complejo del PS II.[Author ID1: at Thu Aug 30 21:36:00 2001]

Los 4 Mn [Author ID1: at Thu Aug 30 21:37:00 2001]estarían[Author ID1: at Thu Aug 30 21:49:00 2001] sometidos a oxidaciones sucesivas pasando a tener distintos estados hasta llevarse a cabo la fotolisis del agua.[Author ID1: at Thu Aug 30 21:37:00 2001]

En el sistema [Author ID1: at Thu Aug 30 21:38:00 2001]lítico[Author ID1: at Thu Aug 30 21:44:00 2001] del agua también existen [Author ID1: at Thu Aug 30 21:38:00 2001]átomos[Author ID1: at Thu Aug 30 21:44:00 2001] de Ca[Author ID1: at Thu Aug 30 21:38:00 2001]2+[Author ID1: at Thu Aug 30 21:38:00 2001] e iones Cl[Author ID1: at Thu Aug 30 21:38:00 2001]−[Author ID1: at Thu Aug 30 21:38:00 2001] cuyo papel no se conoce; se piensa q el Ca[Author ID1: at Thu Aug 30 21:38:00 2001]2+[Author ID1: at Thu Aug 30 21:39:00 2001] estabiliza las [Author ID1: at Thu Aug 30 21:39:00 2001]proteínas[Author ID1: at Thu Aug 30 21:44:00 2001] q se unen a los [Author ID1: at Thu Aug 30 21:39:00 2001]átomos[Author ID1: at Thu Aug 30 21:44:00 2001] de Mn.[Author ID0: at]

Los e[Author ID1: at Thu Aug 30 21:39:00 2001]−[Author ID1: at Thu Aug 30 21:39:00 2001]derivados de la ruptura del agua no pasan directamente al P[Author ID1: at Thu Aug 30 21:39:00 2001]680[Author ID1: at Thu Aug 30 21:40:00 2001], primero son cedidos a un componente [Author ID1: at Thu Aug 30 21:40:00 2001]más[Author ID1: at Mon Sep 3 15:37:00 2001] de la CTE q se llama componente Z Y[Author ID1: at Thu Aug 30 21:40:00 2001]z[Author ID1: at Thu Aug 30 21:42:00 2001] q es un residuo de Tyr de la propia [Author ID1: at Thu Aug 30 21:42:00 2001]proteína[Author ID1: at Thu Aug 30 21:44:00 2001] D[Author ID1: at Thu Aug 30 21:42:00 2001]1[Author ID1: at Thu Aug 30 21:43:00 2001] del centro de [Author ID1: at Thu Aug 30 21:43:00 2001]reacción[Author ID1: at Thu Aug 30 21:44:00 2001].[Author ID1: at Thu Aug 30 21:43:00 2001]−−>[Author ID1: at Thu Aug 30 21:33:00 2001][Author ID1: at Thu Aug 30 21:43:00 2001]

−−>[Author ID1: at Thu Aug 30 21:16:00 2001][Author ID1: at Thu Aug 30 21:27:00 2001]

−−>[Author ID1: at Thu Aug 30 21:10:00 2001][Author ID1: at Thu Aug 30 21:16:00 2001]

−−>[Author ID1: at Thu Aug 30 21:03:00 2001][Author ID1: at Thu Aug 30 21:10:00 2001]

−−>[Author ID1: at Thu Aug 30 20:43:00 2001][Author ID1: at Thu Aug 30 20:57:00 2001]

−−>[Author ID1: at Tue Aug 28 18:56:00 2001][Author ID1: at Tue Aug 28 20:31:00 2001]

[Author ID0: at]

[Author ID0: at]

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El primer aceptor de e[Author ID1: at Thu Aug 30 22:14:00 2001]−[Author ID1: at Thu Aug 30 22:15:00 2001] es una feofitina q cede e[Author ID1: at Thu Aug 30 22:15:00 2001]−[Author ID1: at Thu Aug 30 22:15:00 2001] a las quinonas.[Author ID0: at]

La feofitina tiene sustituido el Mg por 2 H[Author ID1: at Thu Aug 30 22:15:00 2001]+[Author ID1: at Thu Aug 30 22:16:00 2001]. La [Author ID1: at Thu Aug 30 22:16:00 2001]energía[Author ID1: at Thu Aug 30 22:22:00 2001] redox de esta es distinta a la de la clorofila excitada par[Author ID1: at Thu Aug 30 22:16:00 2001]a ser [Author ID1: at Thu Aug 30 22:22:00 2001]capaz de captar la [Author ID1: at Thu Aug 30 22:16:00 2001]energía[Author ID1: at Thu Aug 30 22:21:00 2001] de la clorofila excitada. [Author ID1: at Thu Aug 30 22:16:00 2001]Esta cede e[Author ID1: at Thu Aug 30 22:17:00 2001]−[Author ID1: at Thu Aug 30 22:17:00 2001] a las quinonas, a la plastoquinona.[Author ID1: at Thu Aug 30 22:17:00 2001]

([Author ID1: at Thu Aug 30 22:17:00 2001]Fig.[Author ID1: at Thu Aug 30 22:21:00 2001] 8.30)[Author ID1: at Thu Aug 30 22:17:00 2001] Esta [Author ID1: at Thu Aug 30 22:17:00 2001]molécula[Author ID1: at Thu Aug 30 22:18:00 2001] [Author ID1: at Thu Aug 30 22:17:00 2001]funciona con 2 e[Author ID1: at Thu Aug 30 22:18:00 2001]−[Author ID1: at Thu Aug 30 22:18:00 2001] y 2 H[Author ID1: at Thu Aug 30 22:18:00 2001]+[Author ID1: at Thu Aug 30 22:18:00 2001] de [Author ID1: at Thu Aug 30 22:18:00 2001]modo[Author ID1: at Thu Aug 30 22:21:00 2001] q [Author ID1: at Thu Aug 30 22:18:00 2001]tenemos[Author ID1: at Thu Aug 30 22:21:00 2001] quinona oxidada, semioxidada y reducida.[Author ID1: at Thu Aug 30 22:18:00 2001]

Tenemos una molécula de P[Author ID1: at Thu Aug 30 22:19:00 2001]680[Author ID1: at Thu Aug 30 22:19:00 2001], una Phe y dos quinonas A y B oxidadas en estado basal.[Author ID1: at Thu Aug 30 22:19:00 2001]

Cuando P[Author ID1: at Thu Aug 30 22:20:00 2001]680[Author ID1: at Thu Aug 30 22:20:00 2001] recibe un fot[Author ID1: at Thu Aug 30 22:20:00 2001]ó[Author ID1: at Thu Aug 30 22:21:00 2001]n pierde 1 e[Author ID1: at Thu Aug 30 22:20:00 2001]−[Author ID1: at Thu Aug 30 22:20:00 2001]−−>q pasa a Phe y este a la primera quinona quedando semirreducida.[Author ID1: at Thu Aug 30 22:20:00 2001][Author ID1: at Thu Aug 30 22:21:00 2001][Author ID0: at]

El e[Author ID1: at Thu Aug 30 22:22:00 2001]− [Author ID1: at Thu Aug 30 22:23:00 2001]−−>de la primera quinona[Author ID1: at Thu Aug 30 22:23:00 2001][Author ID1: at Thu Aug 30 22:23:00 2001] es[Author ID1: at Thu Aug 30 22:24:00 2001]−−> transferido a la segunda q es[Author ID1: at Thu Aug 30 22:23:00 2001][Author ID1: at Thu Aug 30 22:23:00 2001]ta semirreducida.[Author ID0: at]

Un pequeño destello provoca la perdida[Author ID1: at Thu Aug 30 22:24:00 2001] de un e[Author ID1: at Thu Aug 30 22:25:00 2001]−[Author ID1: at Thu Aug 30 22:25:00 2001] del P[Author ID1: at Thu Aug 30 22:25:00 2001]680[Author ID1: at Thu Aug 30 22:25:00 2001] llegando a [Author ID1: at Thu Aug 30 22:25:00 2001]tener[Author ID1: at Thu Aug 30 22:28:00 2001] las dos quinonas semirreducidas.[Author ID0: at]

El [Author ID1: at Thu Aug 30 22:25:00 2001]e[Author ID1: at Thu Aug 30 22:26:00 2001]−[Author ID1: at Thu Aug 30 22:26:00 2001] de la quinona A pasa a la B q toma H[Author ID1: at Thu Aug 30 22:26:00 2001]+[Author ID1: at Thu Aug 30 22:26:00 2001] del estroma transformándose en plastohidroquinona q traspasa la membrana tilacoidal y c[Author ID1: at Thu Aug 30 22:26:00 2001]ede los H[Author ID1: at Thu Aug 30 22:27:00 2001]+[Author ID1: at Thu Aug 30 22:27:00 2001] [Author ID1: at Thu Aug 30 22:28:00 2001]al lumen.[Author ID0: at]

Los e[Author ID1: at Thu Aug 30 22:27:00 2001]−[Author ID1: at Thu Aug 30 22:27:00 2001] de la plastohidroquinona pasan al complejo [Author ID1: at Thu Aug 30 22:27:00 2001]citocromo[Author ID1: at Thu Aug 30 22:28:00 2001] [Author ID1: at Thu Aug 30 22:27:00 2001]b[Author ID1: at Thu Aug 30 22:28:00 2001]6[Author ID1: at Sun Sep 2 17:28:00 2001] f.[Author ID1: at Thu Aug 30 22:28:00 2001][Author ID0: at]

Este es un complejo altamente [Author ID1: at Thu Aug 30 23:11:00 2001]polimérico[Author ID1: at Thu Aug 30 23:13:00 2001] con muchos grupos [Author ID1: at Thu Aug 30 23:11:00 2001]prostéticos[Author ID1: at Thu Aug 30 23:13:00 2001]: dos citocromo b y un [Author ID1: at Thu Aug 30 23:11:00 2001]citocromo[Author ID1: at Thu Aug 30 23:12:00 2001] [Author ID1: at Thu Aug 30 23:11:00 2001]c q como se [Author ID1: at Thu Aug 30 23:12:00 2001]descubrió[Author ID1: at Thu Aug 30 23:13:00 2001] primero en la [Author ID1: at Thu Aug 30 23:12:00 2001]hoja[Author ID1: at Thu Aug 30 23:13:00 2001] se denomino citocromo f. [Author ID1: at Thu Aug 30 23:12:00 2001]**(Hoja 36 [Author ID1: at Thu Aug 30 23:12:00 2001]Fig.[Author ID1: at Thu Aug 30 23:13:00 2001] 8.31)[Author ID1: at Thu Aug 30 23:12:00 2001]**. este esta unido a residuos de cisteina de una [Author ID1: at Thu Aug 30 23:13:00 2001]proteína[Author ID1: at Fri Aug 31 01:15:00 2001]. [Author ID1: at Thu Aug 30 23:13:00 2001]Además[Author ID1: at Fri Aug 31 01:15:00 2001] [Author ID1: at Thu Aug 30 23:14:00 2001]existen[Author ID1: at Fri Aug 31 01:15:00 2001] [Author ID1: at Thu Aug 30 23:14:00 2001]proteínas[Author ID1: at Fri Aug 31 01:15:00 2001] de Rieske, sulfoprote[Author ID1: at Thu Aug 30 23:14:00 2001]í[Author ID1: at Fri Aug 31 01:16:00 2001]nas q tienen [Author ID1: at Thu Aug 30 23:14:00 2001]átomos[Author ID1: at Fri Aug 31 01:15:00 2001] de S unidos a [Author ID1: at Thu Aug 30 23:14:00 2001]átomos[Author ID1: at Fri Aug 31 01:15:00 2001] de Fe.[Author ID0: at]

La transferencia[Author ID1: at Thu Aug 30 23:14:00 2001] de e[Author ID1: at Fri Aug 31 01:16:00 2001]−[Author ID1: at Fri Aug 31 01:16:00 2001] a [Author ID1: at Fri Aug 31 01:16:00 2001]través[Author ID1: at Fri Aug 31 01:23:00 2001] del complejo cit b [Author ID1: at Fri Aug 31 01:16:00 2001]ó f se estudia mediante el [Author ID1: at Fri Aug 31 01:17:00 2001]**Modelo del ciclo de las quinonas ([Author ID1: at Fri Aug 31 01:17:00 2001]Fig.[Author ID1: at Fri Aug 31 01:23:00 2001] 8.32).[Author ID1: at Fri Aug 31 01:17:00 2001]** según el modelo las plastohidroquinonas ceden un e[Author ID1: at Fri Aug 31 01:18:00 2001]−[Author ID1: at Fri Aug 31 01:18:00 2001] a la [Author ID1: at Fri Aug 31 01:18:00 2001]proteína[Author ID1: at Fri Aug 31 01:23:00 2001] de Rieske q a su vez lo cede al [Author ID1: at Fri Aug 31 01:18:00 2001]citocromo[Author ID1: at Fri Aug 31 01:19:00 2001] [Author ID1: at Fri Aug 31 01:18:00 2001]f q a su vez a [Author ID1: at Fri Aug 31 01:19:00 2001]través[Author ID1: at Fri Aug 31 01:23:00 2001] de la plastocianina los cede al P[Author ID1: at Fri Aug 31 01:19:00 2001]700[Author ID1: at Fri Aug 31 01:19:00 2001].[Author ID0: at]

El 2º e[Author ID1: at Fri Aug 31 01:19:00 2001]− [Author ID1: at Fri Aug 31 01:19:00 2001]−−>es cedido a uno de los [Author ID1: at Fri Aug 31 01:19:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001]−−>citocromos b del complejo q a su [Author ID1: at Fri Aug 31 01:20:00 2001][Author ID1: at Fri

Aug 31 01:21:00 2001]−−>vez[Author ID1: at Fri Aug 31 01:23:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001]−−> lo cede a [Author ID1: at Fri Aug 31 01:20:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001]−−>través[Author ID1: at Fri Aug 31 01:23:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001]−−> del 2º citocromo b a una quinona oxidada pasando a estar semi[Author ID1: at Fri Aug 31 01:20:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001]−−>reducida.[Author ID1: at Fri Aug 31 01:21:00 2001][Author ID1: at Fri Aug 31 01:21:00 2001] Paralelamente con la [Author ID1: at Fri Aug 31 01:21:00 2001]cesión[Author ID1: at Fri Aug 31 01:23:00 2001] de los 2 e[Author ID1: at Fri Aug 31 01:21:00 2001]−[Author ID1: at Fri Aug 31 01:21:00 2001] se produce la liberación de 2 [Author ID1: at Fri Aug 31 01:21:00 2001]H[Author ID1: at Fri Aug 31 01:22:00 2001]+[Author ID1: at Fri Aug 31 01:22:00 2001] en el lumen del Tilacoide.[Author ID0: at]

En una 2ª[Author ID1: at Fri Aug 31 01:22:00 2001] [Author ID1: at Fri Aug 31 01:23:00 2001]etapa una 2ª[Author ID1: at Fri Aug 31 01:22:00 2001] [Author ID1: at Fri Aug 31 01:23:00 2001]plastohidroquinona cede e[Author ID1: at Fri Aug 31 01:22:00 2001]−[Author ID1: at Fri Aug 31 01:23:00 2001] al PS I por el mismo ciclo y un 2º e[Author ID1: at Fri Aug 31 01:24:00 2001]−[Author ID1: at Fri Aug 31 01:24:00 2001] a [Author ID1: at Fri Aug 31 01:24:00 2001]través[Author ID1: at Fri Aug 31 01:45:00 2001] de los dos [Author ID1: at Fri Aug 31 01:24:00 2001]citocromos[Author ID1: at Fri Aug 31 01:25:00 2001] [Author ID1: at Fri Aug 31 01:24:00 2001]a la semiquinona anterior para completar la [Author ID1: at Fri Aug 31 01:25:00 2001]reducción[Author ID1: at Fri Aug 31 01:45:00 2001] de la quinona.[Author ID0: at]

Dos hidroquinonas se han oxidado a quinonas, una quinona [Author ID1: at Fri Aug 31 01:25:00 2001]se[Author ID1: at Fri Aug 31 01:45:00 2001] reduce completamente a hidroquinona.[Author ID1: at Fri Aug 31 01:25:00 2001][Author ID0: at]

Dos e[Author ID1: at Fri Aug 31 01:26:00 2001]−[Author ID1: at Fri Aug 31 01:26:00 2001] han sido transferidos al PS I. [Author ID1: at Fri Aug 31 01:26:00 2001]La transferencia de los e[Author ID1: at Fri Aug 31 01:27:00 2001]−[Author ID1: at Fri Aug 31 01:27:00 2001] ha sido acompañada por la liberación de 4 H[Author ID1: at Fri Aug 31 01:27:00 2001]+[Author ID1: at Fri Aug 31 01:27:00 2001] al lumen.[Author ID1: at Fri Aug 31 01:27:00 2001]

Estos 4 H[Author ID1: at Fri Aug 31 01:28:00 2001]+[Author ID1: at Fri Aug 31 01:28:00 2001] con los de la fotolisis del agua constituyen el gradiente electroquímico q se establece entre el interior y [Author ID1: at Fri Aug 31 01:28:00 2001]exterior[Author ID1: at Fri Aug 31 01:29:00 2001] [Author ID1: at Fri Aug 31 01:28:00 2001]del estroma para la síntesis de ATP según la [Author ID1: at Fri Aug 31 01:29:00 2001]teoría[Author ID1: at Fri Aug 31 01:45:00 2001] de Mitchel.[Author ID0: at]

Dos H[Author ID1: at Fri Aug 31 01:29:00 2001]+[Author ID1: at Fri Aug 31 01:29:00 2001] se liberan al lumen la primera etapa y otros dos en la segunda etapa.[Author ID1: at Fri Aug 31 01:29:00 2001]

La quinona se desplaza cíclicamente por la membrana de los [Author ID1: at Fri Aug 31 01:30:00 2001]tilacoides[Author ID1: at Fri Aug 31 01:31:00 2001].[Author ID1: at Fri Aug 31 01:30:00 2001][Author ID0: at]

En la cara estromal es [Author ID1: at Fri Aug 31 01:31:00 2001]donde[Author ID1: at Sun Sep 2 16:49:00 2001] toma los e[Author ID1: at Fri Aug 31 01:31:00 2001]−[Author ID1: at Fri Aug 31 01:31:00 2001] y en la cara luminal es [Author ID1: at Fri Aug 31 01:31:00 2001]donde[Author ID1: at Sun Sep 2 16:49:00 2001] cede los e[Author ID1: at Fri Aug 31 01:31:00 2001]−[Author ID1: at Fri Aug 31 01:31:00 2001].[Author ID0: at]

El [Author ID1: at Fri Aug 31 01:32:00 2001]−−>transporte de e[Author ID1: at Fri Aug 31 01:32:00 2001][Author ID1: at Sun Sep 2 18:20:00 2001]−−>−[Author ID1: at Fri Aug 31 01:32:00 2001][Author ID1: at Sun Sep 2 18:20:00 2001]−−> [Author ID1: at Sun Sep 2 16:49:00 2001][Author ID1: at Sun Sep 2

18:20:00 2001]lineal[Author ID1: at Sun Sep 2 18:41:00 2001] (par[Author ID1: at Sun Sep 2 18:41:00 2001]a[Author ID1: at Mon Sep 3 16:04:00 2001] formar NADPH)[Author ID1: at Sun Sep 2 18:41:00 2001] se da[Author ID1: at Fri Aug 31 01:32:00 2001] [Author ID1: at Fri Aug 31 01:45:00 2001]cuando la [Author ID1: at Fri Aug 31 01:32:00 2001]plastocianina[Author ID1: at Fri Aug 31 01:35:00 2001] [Author ID1: at Fri Aug 31 01:32:00 2001]q es el [Author ID1: at Fri Aug 31 01:35:00 2001]siguiente[Author ID1: at Fri Aug 31 01:45:00 2001] [Author ID1: at Fri Aug 31 01:35:00 2001]transportador[Author ID1: at Fri Aug 31 01:45:00 2001] de 10.5 Kda q conecta el [Author ID1: at Fri Aug 31 01:35:00 2001]citocromo[Author ID1: at Fri Aug 31 01:36:00 2001] [Author ID1: at Fri Aug 31 01:35:00 2001]b ó f con el siguiente intermediario de la cadena transportadora q es el centro de [Author ID1: at Fri Aug 31 01:36:00 2001]reacción[Author ID1: at Fri Aug 31 01:45:00 2001] del PS I[Author ID1: at Fri Aug 31 01:36:00 2001] , P[Author ID1: at Fri Aug 31 01:37:00 2001]700[Author ID1: at Fri Aug 31 01:37:00 2001].[Author ID0: at]

En ocasiones se puede dar un [Author ID1: at Fri Aug 31 01:37:00 2001]−−>transporte electrónico [Author ID1: at Fri Aug 31 01:37:00 2001][Author ID1: at Sun Sep 2 18:20:00 2001]−−>cíclico[Author ID1: at Fri Aug 31 01:44:00 2001][Author ID1: at Sun Sep 2 18:20:00 2001] [Author ID1: at Fri Aug 31 01:37:00 2001]alrededor[Author ID1: at Fri Aug 31 01:38:00 2001] [Author ID1: at Fri Aug 31 01:37:00 2001]del PS I.[Author ID1: at Fri Aug 31 01:38:00 2001] (no se disocia [Author ID1: at Sun Sep 2 18:45:00 2001]ningún[Author ID1: at Sun Sep 2 18:46:00 2001] H[Author ID1: at Sun Sep 2 18:45:00 2001]2[Author ID1: at Sun Sep 2 18:45:00 2001]O [Author ID1: at Sun Sep 2 18:45:00 2001]porque[Author ID1: at Sun Sep 2 18:46:00 2001] no pa[Author ID1: at Sun Sep 2 18:45:00 2001]rticipa el PS II, de nodo q no hay formación de NADPH).[Author ID1: at Sun Sep 2 18:46:00 2001]−−>[Author ID1: at Fri Aug 31 01:38:00 2001][Author ID1: at Sun Sep 2 18:45:00 2001]

(Hoja 37 [Author ID1: at Fri Aug 31 01:38:00 2001]Fig.[Author ID1: at Fri Aug 31 01:44:00 2001] 8.25)[Author ID1: at Fri Aug 31 01:38:00 2001] Cuando los e[Author ID1: at Fri Aug 31 01:38:00 2001]−[Author ID1: at Fri Aug 31 01:38:00 2001] llegan a la ferredoxina van al [Author ID1: at Fri Aug 31 01:38:00 2001]citocromo[Author ID1: at Fri Aug 31 01:39:00 2001] [Author ID1: at Fri Aug 31 01:38:00 2001]b[Author ID1: at Fri Aug 31 01:39:00 2001]6[Author ID1: at Sun Sep 2 17:57:00 2001] f y de ahí al PS I. Este transporte contribuye a la creación del [Author ID1: at Fri Aug 31 01:39:00 2001]gradiente[Author ID1: at Fri Aug 31 01:44:00 2001] [Author ID1: at Fri Aug 31 01:39:00 2001]electroquímico[Author ID1: at Fri Aug 31 01:40:00 2001],[Author ID1: at Fri Aug 31 01:39:00 2001] pero no genera poder reductor en forma de NADPH. Esto es [Author ID1: at Fri Aug 31 01:40:00 2001]así[Author ID1: at Fri Aug 31 01:45:00 2001] porque a la vez q cede e[Author ID1: at Fri Aug 31 01:40:00 2001]−[Author ID1: at Fri Aug 31 01:40:00 2001], cede los H[Author ID1: at Fri Aug 31 01:40:00 2001]+[Author ID1: at Fri Aug 31 01:41:00 2001] al lumen.[Author ID0: at]

Hay acumulación de H[Author ID1: at Fri Aug 31 01:41:00 2001]+[Author ID1: at Fri Aug 31 01:41:00 2001] q favorecen la [Author ID1: at Fri Aug 31 01:41:00 2001]fotofosforilación[Author ID1: at Fri Aug 31 01:44:00 2001] cíclica.[Author ID0: at]

Esto va a ser importante en algunas plantas del grupo q tienen un metabolismo de tipo C[Author ID1: at Fri Aug 31 01:41:00 2001]4[Author ID1: at Fri Aug 31 01:42:00 2001]. [Author ID1: at Fri Aug 31 01:42:00 2001]

Una vez q los e[Author ID1: at Fri Aug 31 01:43:00 2001]−[Author ID1: at Fri Aug 31 01:43:00 2001] llegan al P[Author ID1: at Fri Aug 31 01:43:00 2001]700[Author ID1: at Fri Aug 31 01:43:00 2001], toma [Author ID1: at Fri Aug 31 01:43:00 2001]energía[Author ID1: at Fri Aug 31 01:44:00 2001] para impulsar los e[Author ID1: at Fri Aug 31 01:43:00 2001]−[Author ID1: at Fri Aug 31 01:44:00 2001] en [Author ID1: at Fri Aug 31 01:43:00 2001]su transferencia al NADP[Author ID1: at Fri Aug 31 01:44:00 2001].[Author ID0: at]

El P[Author ID1: at Fri Aug 31 01:46:00 2001]700[Author ID1: at Fri Aug 31 01:46:00 2001] (PS I) esta

incluido en un complejo multiproteico q consta del d[Author ID1: at Fri Aug 31 01:47:00 2001]í[Author ID1: at Fri Aug 31 02:06:00 2001]mero de P[Author ID1: at Fri Aug 31 01:47:00 2001]700[Author ID1: at Fri Aug 31 01:48:00 2001], unas 100 clorofila distintas del P[Author ID1: at Fri Aug 31 01:48:00 2001]700[Author ID1: at Fri Aug 31 01:48:00 2001], numerosas [Author ID1: at Fri Aug 31 01:48:00 2001]proteínas[Author ID1: at Fri Aug 31 02:06:00 2001] a las q se asocia el PS I, dos polipéptido de 66 y 70 Kda [Author ID1: at Fri Aug 31 01:48:00 2001]a la q [Author ID1: at Fri Aug 31 01:49:00 2001]se[Author ID1: at Fri Aug 31 02:06:00 2001] une la [Author ID1: at Fri Aug 31 01:49:00 2001]clorofila[Author ID1: at Fri Aug 31 02:06:00 2001] del P[Author ID1: at Fri Aug 31 01:49:00 2001]700[Author ID1: at Fri Aug 31 01:49:00 2001] y [Author ID1: at Fri Aug 31 01:49:00 2001]proteínas[Author ID1: at Fri Aug 31 02:06:00 2001] de Pm de 4−25 Kda.[Author ID0: at]

A estas [Author ID1: at Fri Aug 31 01:49:00 2001]proteínas[Author ID1: at Fri Aug 31 02:06:00 2001] se asocian de [Author ID1: at Fri Aug 31 01:49:00 2001]algún[Author ID1: at Fri Aug 31 02:06:00 2001] modo tanto la [Author ID1: at Fri Aug 31 01:49:00 2001]plastocianina[Author ID1: at Fri Aug 31 01:50:00 2001] [Author ID1: at Fri Aug 31 01:49:00 2001]y ferredoxina. [Author ID1: at Fri Aug 31 01:50:00 2001]Existe[Author ID1: at Fri Aug 31 02:06:00 2001] una [Author ID1: at Fri Aug 31 01:50:00 2001]proteína[Author ID1: at Fri Aug 31 02:06:00 2001] de 8 Kda a la q se unen [Author ID1: at Fri Aug 31 01:50:00 2001]proteínas[Author ID1: at Fri Aug 31 02:06:00 2001] sulfoferrosa[Author ID1: at Fri Aug 31 01:50:00 2001]s[Author ID1: at Fri Sep 7 21:00:00 2001] q [Author ID1: at Fri Aug 31 01:50:00 2001]intervienen[Author ID1: at Fri Aug 31 02:06:00 2001] [Author ID1: at Fri Aug 31 01:50:00 2001]en[Author ID1: at Fri Aug 31 02:05:00 2001] la [Author ID1: at Fri Aug 31 01:50:00 2001]trasferencia[Author ID1: at Fri Aug 31 02:05:00 2001] de e[Author ID1: at Fri Aug 31 01:50:00 2001]−[Author ID1: at Fri Aug 31 01:51:00 2001] del P[Author ID1: at Fri Aug 31 01:51:00 2001]700[Author ID1: at Fri Aug 31 01:51:00 2001] a la ferredoxina.[Author ID0: at]

Los aceptores primarios del P[Author ID1: at Fri Aug 31 01:51:00 2001]700[Author ID1: at Fri Aug 31 01:51:00 2001] tienen una fuerte tendencia a ceder e[Author ID1: at Fri Aug 31 01:51:00 2001]−[Author ID1: at Fri Aug 31 01:52:00 2001], tienen una vida corta y son difíciles de reconocer estos A[Author ID1: at Fri Aug 31 01:52:00 2001]0[Author ID1: at Fri Aug 31 01:54:00 2001] y A[Author ID1: at Fri Aug 31 01:54:00 2001]1[Author ID1: at Fri Aug 31 01:54:00 2001]. A[Author ID1: at Fri Aug 31 01:54:00 2001]0 [Author ID1: at Fri Aug 31 01:54:00 2001]puede q sea una molécula de clorofila a q [Author ID1: at Fri Aug 31 01:54:00 2001]absorbe[Author ID1: at Fri Aug 31 02:05:00 2001] a 430 nm denominado P[Author ID1: at Fri Aug 31 01:54:00 2001]430[Author ID1: at Fri Aug 31 01:55:00 2001] y el A[Author ID1: at Fri Aug 31 01:55:00 2001]1[Author ID1: at Fri Aug 31 01:55:00 2001] seria un quinona denominada fitoquinona.[Author ID0: at]

A[Author ID1: at Fri Aug 31 01:55:00 2001]0[Author ID1: at Fri Aug 31 01:55:00 2001] y[Author ID1: at Fri Aug 31 01:55:00 2001] [Author ID1: at Fri Aug 31 02:05:00 2001]A[Author ID1: at Fri Aug 31 01:55:00 2001]1[Author ID1: at Fri Aug 31 01:56:00 2001] cuando [Author ID1: at Fri Aug 31 01:56:00 2001]están[Author ID1: at Fri Aug 31 02:05:00 2001] reducidos son agentes reductores muy potentes con un vida media corta.[Author ID0: at]

Hay tres complejos sulfoferrosos: FeS[Author ID1: at Fri Aug 31 01:56:00 2001]x[Author ID1: at Fri Aug 31 01:57:00 2001], FeS[Author ID1: at Fri Aug 31 01:57:00 2001]a[Author ID1: at Fri Aug 31 01:57:00 2001] y FeS[Author ID1: at Fri Aug 31 01:57:00 2001]b[Author ID1: at Fri Aug 31 01:57:00 2001]. A [Author ID1: at Fri Aug 31 01:57:00 2001]través[Author ID1: at Fri Aug 31 02:05:00 2001] de estos los e[Author ID1: at Fri Aug 31 01:57:00 2001]−[Author ID1: at Fri Aug 31 01:57:00 2001] pasan a la ferredoxina q participa en procesos de [Author ID1: at Fri Aug 31 01:57:00 2001]asimilación[Author ID1: at Fri Aug 31 01:58:00 2001] [Author ID1: at Fri Aug 31 01:57:00 2001]de N[Author ID1: at Fri Aug 31 01:58:00 2001]2[Author ID1: at Fri Aug 31 01:58:00 2001] [Author ID1: at Fri Aug 31 01:58:00 2001]atmosférico[Author ID1: at Fri Aug 31 02:05:00 2001], cede los e[Author ID1: at Fri Aug 31 01:58:00 2001]−[Author ID1: at Fri Aug 31 01:58:00 2001] a la nitrogenasa en la [Author ID1: at Fri Aug 31 01:58:00 2001]fijación[Author ID1: at Fri Aug 31

01:59:00 2001] [Author ID1: at Fri Aug 31 01:58:00 2001]de N[Author ID1: at Fri Aug 31 01:59:00 2001]2[Author ID1: at Fri Aug 31 01:59:00 2001] y reducción de SO[Author ID1: at Fri Aug 31 01:59:00 2001]4[Author ID1: at Fri Aug 31 01:59:00 2001]=[Author ID1: at Fri Aug 31 01:59:00 2001] a sulfuro.[Author ID0: at]

Los e[Author ID1: at Fri Aug 31 01:59:00 2001]−[Author ID1: at Fri Aug 31 02:00:00 2001] q llegan a la ferredoxina pasan al NADP mediante una flavoprote[Author ID1: at Fri Aug 31 02:00:00 2001]í[Author ID1: at Fri Aug 31 02:04:00 2001]na soluble con Pm 40 Kda.[Author ID0: at]

De este modo se termina la CTE [Author ID1: at Fri Aug 31 02:00:00 2001]acumulándose[Author ID1: at Fri Aug 31 02:01:00 2001] [Author ID1: at Fri Aug 31 02:00:00 2001]la [Author ID1: at Fri Aug 31 02:01:00 2001]energía[Author ID1: at Fri Aug 31 02:04:00 2001] en equivalentes r[Author ID1: at Fri Aug 31 02:01:00 2001]e[Author ID1: at Fri Aug 31 02:04:00 2001]dox.[Author ID0: at]

Los e[Author ID1: at Fri Aug 31 02:01:00 2001]−[Author ID1: at Fri Aug 31 02:01:00 2001] en vez de acabar en NADP si este no esta oxidado[Author ID1: at Fri Aug 31 02:01:00 2001],[Author ID1: at Fri Aug 31 02:03:00 2001] viajan [Author ID1: at Fri Aug 31 02:01:00 2001]alrededor[Author ID1: at Fri Aug 31 02:02:00 2001] [Author ID1: at Fri Aug 31 02:01:00 2001]del PS I por un transporte electroquímico [Author ID1: at Fri Aug 31 02:02:00 2001]cíclico al citocromo b[Author ID1: at Fri Aug 31 02:03:00 2001]6[Author ID1: at Sun Sep 2 18:53:00 2001]f q a [Author ID1: at Fri Aug 31 02:03:00 2001]través[Author ID1: at Fri Aug 31 02:06:00 2001] de la plastocianina llegan al P[Author ID1: at Fri Aug 31 02:03:00 2001]700[Author ID1: at Fri Aug 31 02:04:00 2001]. cada vez q los e[Author ID1: at Fri Aug 31 02:04:00 2001]−[Author ID1: at Fri Aug 31 02:04:00 2001] pasan[Author ID1: at Fri Aug 31 02:07:00 2001] al citocromo b ó f se incorporan H[Author ID1: at Fri Aug 31 02:08:00 2001]+[Author ID1: at Fri Aug 31 02:08:00 2001] en el interior del lumen.[Author ID0: at]

Los H[Author ID1: at Fri Aug 31 02:08:00 2001]+[Author ID1: at Fri Aug 31 02:08:00 2001] [Author ID1: at Fri Aug 31 02:08:00 2001]darán[Author ID1: at Fri Aug 31 02:18:00 2001] origen al gradiente [Author ID1: at Fri Aug 31 02:08:00 2001]electroquímico[Author ID1: at Fri Aug 31 02:09:00 2001] [Author ID1: at Fri Aug 31 02:08:00 2001]q [Author ID1: at Fri Aug 31 02:09:00 2001]dará[Author ID1: at Fri Aug 31 02:18:00 2001] lugar a la síntesis de ATP.[Author ID1: at Fri Aug 31 02:09:00 2001]

−−>**(Hoja 38 [Author ID1: at Fri Aug 31 02:09:00 2001]**[Author ID1: at Fri Aug 31 02:18:00 2001]−−>**Fig.[Author ID1: at Fri Aug 31 02:18:00 2001]**[Author ID1: at Fri Aug 31 02:18:00 2001]−−> **8.34)[Author ID1: at Fri Aug 31 02:09:00 2001]**[Author ID1: at Fri Aug 31 02:18:00 2001] El transporte de e[Author ID1: at Fri Aug 31 02:09:00 2001]−[Author ID1: at Fri Aug 31 02:10:00 2001] puede estar bloqueado por agentes químicos usados como [Author ID1: at Fri Aug 31 02:10:00 2001]herbicidas[Author ID1: at Fri Aug 31 02:18:00 2001]. Algunos herbicidas impiden la CTE. Unos lo inhiben a nivel de la zona reductora del PS I y el otro grupo lo p[Author ID1: at Fri Aug 31 02:10:00 2001]aran a nivel de quinonas el transporte de e[Author ID1: at Fri Aug 31 02:11:00 2001]−[Author ID1: at Fri Aug 31 02:11:00 2001] . DCMU.[Author ID1: at Fri Aug 31 02:11:00 2001]

−−>A los primeros corresponde el paraquat[Author ID1: at Fri Aug 31 02:12:00 2001][Author ID1: at Fri Aug 31 02:21:00 2001]. [Author ID1: at Fri Aug 31 02:12:00 2001]Captan los e[Author ID1: at Fri Aug 31 02:13:00 2001]−[Author ID1: at Fri Aug 31 02:13:00 2001] [Author ID1: at Sun Sep 2 18:48:00 2001]de la quinona, se reduce no cede los electrones. Cuando se reduce cede los e[Author ID1: at Fri Aug 31 02:13:00 2001]−[Author ID1: at Fri Aug 31 02:14:00 2001] al O[Author ID1: at Fri Aug 31 02:14:00 2001]2[Author ID1: at Fri Aug 31 02:14:00 2001] y forma el radical [Author ID1: at Fri Aug 31 02:14:00 2001]superóxido[Author ID1: at Fri Aug 31 02:18:00 2001] atacando a los lípidos de membrana y [Author ID1: at Fri Aug 31 02:14:00 2001]destruyéndolas[Author ID1: at Fri Aug 31 02:15:00 2001].[Author ID1: at Fri Aug 31 02:14:00 2001][Author ID0: at]

El radical superóxido puede combinarse con H[Author ID1: at Fri Aug 31 02:15:00 2001]+[Author ID1: at Fri Aug 31 02:15:00 2001] dando H[Author ID1: at Fri Aug 31 02:15:00 2001]2[Author ID1: at Fri Aug 31 02:15:00 2001]O[Author ID1: at Fri Aug 31 02:15:00 2001]2[Author ID1: at Fri Aug 31 02:15:00 2001] q también es perjudicial.[Author ID0: at]

En [Author ID1: at Fri Aug 31 02:15:00 2001]los cloroplastos esta la catalasa q degrada el H[Author ID1: at Fri Aug 31 02:16:00 2001]2[Author ID1: at Fri Aug 31 02:16:00 2001]O[Author ID1: at Fri Aug 31 02:16:00 2001]2[Author ID1: at Fri Aug 31 02:16:00 2001] liberando O[Author ID1: at Fri Aug 31 02:16:00 2001]2[Author ID1: at Fri Aug 31 02:16:00 2001] y agua. También esta la ascorbato peroxidasa q destruye el H[Author ID1: at Fri Aug 31 02:16:00 2001]2[Author ID1: at Fri Aug 31 02:17:00 2001]O[Author ID1: at Fri Aug 31 02:17:00 2001]2[Author ID1: at Fri Aug 31 02:17:00 2001] con el ascórbico, para dar dos de [Author ID1: at Fri Aug 31 02:17:00 2001]H[Author ID1: at Sun Sep 2 18:56:00 2001]2[Author ID1: at Sun Sep 2 18:57:00 2001]O[Author ID1: at Sun Sep 2 18:57:00 2001]. [Author ID1: at Fri Aug 31 02:17:00 2001][Author ID1: at Fri Aug 31 02:18:00 2001]

−−> [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 02:17:00 2001]−−>Al otro grupo pertenece el DCMU[Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 02:21:00 2001]−−>.[Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 02:17:00 2001] Este se [Author ID1: at Fri Aug 31 02:19:00 2001]sitúa[Author ID1: at Fri Aug 31 02:20:00 2001] en la [Author ID1: at Fri Aug 31 02:19:00 2001]proteína[Author ID1: at Fri Aug 31 02:20:00 2001] de 32 Kda a la q se une la quinona. El DCMU no toma los e[Author ID1: at Fri Aug 31 02:19:00 2001]−[Author ID1: at Fri Aug 31 02:20:00 2001], pero impide q la quinona los tome impidiendo el transporte de H[Author ID1: at Fri Aug 31 02:20:00 2001]+[Author ID1: at Fri Aug 31 02:20:00 2001].[Author ID1: at Fri Aug 31 02:20:00 2001] [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID0: at]

La mutación de un aa en la [Author ID1: at Fri Aug 31 02:21:00 2001]proteína[Author ID1: at Fri Aug 31 02:23:00 2001] de 32 KDA[Author ID1: at Fri Aug 31 02:21:00 2001] (se pasa de Gly a Cis) da resistencia a este herbicida.[Author ID0: at]

[Author ID1: at Fri Aug 31 02:22:00 2001]

Conversión de la energía en ATP. Fotofosforilación (Hoja 39 Fig. 8.37)[Author ID1: at Fri Aug 31 02:23:00 2001] [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID0: at]

La [Author ID1: at Fri Aug 31 02:24:00 2001]energía[Author ID1: at Fri Aug 31 02:28:00 2001] se puede utilizar para la síntesis de ATP.[Author ID0: at]

En el transcurso de la transferencia de e[Author ID1: at Fri Aug 31 02:24:00 2001]−[Author ID1: at Fri Aug 31 02:24:00 2001] estamos creando una carga de H[Author ID1: at Fri Aug 31 02:24:00 2001]+[Author ID1: at Fri Aug 31 02:25:00 2001] en el lumen.[Author ID0: at]

En principio, para q se de el acumulo de H[Author ID1: at Fri Aug 31 02:25:00 2001]+[Author ID1: at Fri Aug 31 02:25:00 2001] tiene q darse un transporte de e[Author ID1: at Fri Aug 31 02:25:00 2001]−[Author ID1: at Fri Aug 31 02:25:00 2001].[Author ID0: at]

Existen agentes desacoplantes q descargan el lumen de H[Author ID1: at Fri Aug 31 02:25:00 2001]+[Author ID1: at Fri Aug 31 02:26:00 2001] dándose solo el transporte y no la síntesis de ATP. Uno puede ser el propio amonio[Author ID1: at Fri Aug 31 02:26:00 2001] (NH[Author ID1: at Sun Sep 2 20:50:00 2001]4[Author ID1: at Sun Sep 2 20:50:00 2001])[Author ID1: at Sun Sep 2 20:50:00 2001]. Otros pueden ser varinomicima, nigericina, gramicidina, dinitrofenol[Author ID1: at Fri Aug 31 02:26:00 2001].[Author ID1: at Fri Aug 31 02:28:00 2001] [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID0: at]

[Author ID0: at]

El [Author ID1: at Fri Aug 31 02:28:00 2001]−−>**mecanismo de [Author ID1: at Fri Aug 31 02:28:00 2001]**[Author ID1: at Fri Aug 31 16:40:00 2001]−−>**formación[Author ID1: at Fri Aug 31 02:30:00 2001]**[Author ID1: at Fri Aug 31 16:40:00 2001]−−> **de [Author ID1: at Fri Aug 31 02:28:00 2001]**[Author ID1: at Fri Aug 31 16:40:00 2001]−−>**ATP[Author ID1: at Fri Aug 31 02:30:00 2001]**[Author ID1: at Fri Aug 31 16:40:00 2001] [Author ID1: at Fri Aug 31 02:28:00 2001]es a [Author ID1: at Fri Aug 31 02:29:00 2001]través[Author ID1: at Fri Aug 31 02:30:00 2001] de la [Author ID1: at Fri Aug 31 02:29:00 2001]teoría[Author ID1: at Fri Aug 31 02:31:00 2001] quimiosm[Author ID1: at Fri Aug 31 02:29:00 2001]ó[Author ID1: at Fri Aug 31 02:31:00 2001]tica [Author ID1: at Fri Aug 31 02:29:00 2001]propuesta[Author ID1: at Fri Aug 31 02:31:00 2001] por Michel, valida también para la síntesis de[Author ID1: at Fri Aug 31 02:29:00 2001] [Author ID1: at Fri Aug 31 02:31:00 2001]ATP por las bacterias y p[Author ID1: at Fri Aug 31 02:29:00 2001]o[Author ID1: at Fri Aug 31 02:31:00 2001]r el q se sintetiza ATP en las mitocondrias como el q se da en los cloroplastos.[Author ID1: at Fri Aug 31 02:29:00 2001][Author ID0: at]

Paralelo al transporte de e[Author ID1: at Fri Aug 31 11:48:00 2001]−[Author ID1: at Fri Aug 31 11:55:00 2001] se produce una [Author ID1: at Fri Aug 31 11:48:00 2001]acumulación[Author ID1: at Fri Aug 31 11:49:00 2001] [Author ID1: at Fri Aug 31 11:48:00 2001]de H[Author ID1: at Fri Aug 31 11:49:00 2001]+[Author ID1: at Fri Aug 31 11:55:00 2001] entre los dos lados de una membrana (mitocondrial, Tilacoide, bacteroide).[Author ID0: at]

El [Author ID1: at Fri Aug 31 11:49:00 2001]principio [Author ID1: at Fri Aug 31 11:50:00 2001]básico[Author ID1: at Fri Aug 31 11:54:00 2001] de quimiosmosiss indica q la distribución asimétrica de H[Author ID1: at Fri Aug 31 11:50:00 2001]+[Author ID1: at Fri Aug 31 11:55:00 2001] es la fuerza q se utiliza para la [Author ID1: at Fri Aug 31 11:50:00 2001]síntesis[Author ID1: at Fri Aug 31 11:51:00 2001] [Author ID1: at Fri Aug 31 11:50:00 2001]de ATP a partir de ADP+P[Author ID1: at Fri Aug 31 11:51:00 2001]i[Author ID1: at Fri Aug 31 11:51:00 2001]. También se establece una diferencia de carga entre los dos lados de la membrana [Author ID1: at Fri Aug 31 11:51:00 2001]además[Author ID1: at Fri Aug 31 11:54:00 2001] del gradiente [Author ID1: at Fri Aug 31 11:51:00 2001]químico[Author ID1: at Fri Aug 31 11:52:00 2001].[Author ID1: at Fri Aug 31 11:51:00 2001] Esta [Author ID1: at Fri Aug 31 11:52:00 2001]diferencia[Author ID1: at Fri Aug 31 11:54:00 2001] electroquímica es la fuente de [Author ID1: at Fri Aug 31 11:52:00 2001]energía[Author ID1: at Fri Aug 31 11:54:00 2001] par[Author ID1: at Fri Aug 31 11:52:00 2001]a[Author ID1: at Mon Sep 3 16:04:00 2001] q se de la síntesis de ATP.[Author ID1: at Fri Aug 31 11:52:00 2001] [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 13:37:00 2001]

−−>**([Author ID1: at Fri Aug 31 13:37:00 2001]**[Author ID1: at Fri Aug 31 13:38:00 2001]−−>**Fig.[Author ID1: at Fri Aug 31 13:38:00 2001]**[Author ID1: at Fri Aug 31 13:38:00 2001]−−> **8.36)[Author ID1: at Fri Aug 31 13:37:00 2001]**[Author ID1: at Fri Aug 31 13:38:00 2001]−−> **[Author ID1: at Tue Aug 28 18:53:00 2001]**[Author ID1: at Fri Aug 31 13:38:00 2001]−−>Factor de acoplamiento de [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 13:38:00 2001]la [Author ID1: at Fri Aug 31 13:38:00 2001]−−>**ATP[Author ID1: at Fri Aug 31 13:38:00 2001]**[Author ID1: at Fri Aug 31 16:42:00 2001]−−>**asa[Author ID1: at Fri Aug 31 13:38:00 2001]**[Author ID1: at Fri Aug 31 16:42:00 2001]−−> **[Author ID1: at Fri Aug 31 13:59:00 2001]**[Author ID1: at Fri Aug 31 16:42:00 2001]se da la síntesis de ATP a partir de ADP+P[Author ID1: at Fri Aug 31 13:59:00 2001]i[Author ID1: at Fri Aug 31 14:00:00 2001]. Este complejo con un [Author ID1: at Fri Aug 31 14:31:00 2001]Pm[Author ID1: at Fri Aug 31 14:32:00 2001] 400 Kda tiene dos componentes: [Author ID1: at Fri Aug 31 14:31:00 2001]−−>una [Author ID1: at Fri Aug 31 14:31:00 2001][Author ID1: at Fri Aug 31 16:42:00 2001]−−>porción[Author ID1: at Fri Aug 31 14:32:00 2001][Author ID1: at Fri Aug 31 16:42:00 2001]−−> [Author ID1: at Fri Aug 31 14:31:00 2001][Author ID1: at Fri Aug 31 16:42:00 2001]−−>hidrófoba[Author ID1: at Fri Aug 31 14:32:00 2001][Author ID1: at Fri Aug 31 16:42:00 2001] inmersa en la membrana tilacoidal q representa el canal por donde salen H[Author ID1: at Fri Aug 31 14:31:00 2001]+[Author ID1: at Fri Aug 31 14:32:00 2001]−−>

[Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 13:38:00 2001]y [Author ID1: at Fri Aug 31 14:33:00 2001]−−>otra hidrófila[Author ID1: at Fri Aug 31 14:33:00 2001][Author ID1: at Fri Aug 31 16:42:00 2001] hacia el exterior del estroma donde esta el centro activo y donde se une[Author ID1: at Fri Aug 31 14:33:00 2001]n[Author ID1: at Fri Aug 31 14:34:00 2001] el ADP y el P[Author ID1: at Fri Aug 31 14:33:00 2001]i[Author ID1: at Fri Aug 31 14:34:00 2001] para la síntesis [Author ID1: at Fri Aug 31 14:34:00 2001]−−> de ATP.[Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 13:38:00 2001] L[Author ID1: at Fri Aug 31 14:34:00 2001]a [Author ID1: at Fri Aug 31 14:35:00 2001]energía[Author ID1: at Fri Aug 31 14:37:00 2001] necesaria para la síntesis de ATP tiene dos componentes: uno [Author ID1: at Fri Aug 31 14:35:00 2001]químico[Author ID1: at Fri Aug 31 14:36:00 2001] [Author ID1: at Fri Aug 31 14:35:00 2001]q es un componente electroquímico de H[Author ID1: at Fri Aug 31 14:36:00 2001]+[Author ID1: at Fri Aug 31 14:36:00 2001] debido a la variación de pH y otro [Author ID1: at Fri Aug 31 14:36:00 2001]eléctrico[Author ID1: at Fri Aug 31 14:37:00 2001] transmembranal.[Author ID1: at Fri Aug 31 14:36:00 2001]−−> [Author ID1: at Tue Aug 28 18:53:00 2001][Author ID1: at Fri Aug 31 13:38:00 2001][Author ID0: at]

En la síntesis de ATP de cloroplastos es [Author ID1: at Fri Aug 31 14:38:00 2001]más[Author ID1: at Mon Sep 3 15:37:00 2001] [Author ID1: at Fri Aug 31 14:38:00 2001]importante[Author ID1: at Fri Aug 31 14:42:00 2001] el gradiente de pH, en mitocondrias es [Author ID1: at Fri Aug 31 14:38:00 2001]más[Author ID1: at Mon Sep 3 15:37:00 2001] importante el gradiente [Author ID1: at Fri Aug 31 14:38:00 2001]eléctrico[Author ID1: at Fri Aug 31 14:42:00 2001].[Author ID1: at Fri Aug 31 14:38:00 2001][Author ID0: at]

Cada 4 H[Author ID1: at Fri Aug 31 14:39:00 2001]+[Author ID1: at Fri Aug 31 14:39:00 2001] q salen de la ATP[Author ID1: at Fri Aug 31 14:39:00 2001]asa[Author ID1: at Fri Aug 31 14:40:00 2001] se produce la síntesis de un ATP.[Author ID0: at]

La ATP[Author ID1: at Fri Aug 31 14:40:00 2001]asa[Author ID1: at Fri Aug 31 14:40:00 2001] se localiza en los tilacoides estromales.[Author ID0: at]

Los H[Author ID1: at Fri Aug 31 14:40:00 2001]+[Author ID1: at Fri Aug 31 14:40:00 2001] tienen q viajar por el lumen hasta llegar al estroma para fo[Author ID1: at Fri Aug 31 14:40:00 2001]rmar el ATP.[Author ID1: at Fri Aug 31 14:41:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Fri Aug 31 14:41:00 2001]

−−>**Tema 8[Author ID1: at Fri Aug 31 14:41:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−> **[Author ID1: at Fri Aug 31 14:42:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**fijación[Author ID1: at Fri Aug 31 14:43:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−> **del [Author ID1: at Fri Aug 31 14:42:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**anhídrido[Author ID1: at Fri Aug 31 14:43:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−> **[Author ID1: at Fri Aug 31 14:42:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001]−−>**carbónico[Author ID1: at Fri Aug 31 14:43:00 2001]**[Author ID1: at Fri Aug 31 14:44:00 2001] **CO[Author ID1: at Fri Aug 31 16:36:00 2001]2[Author ID1: at Fri Aug 31 16:36:00 2001]**−−>**[Author ID1: at Fri Aug 31 14:43:00 2001]**[Author ID1: at Fri Aug 31 16:36:00 2001]

[Author ID1: at Fri Aug 31 14:44:00 2001]

−−>[Author ID1: at Fri Aug 31 14:43:00 2001][Author ID1: at Fri Aug 31 14:44:00 2001]

En el sentido estricto, el [Author ID1: at Fri Aug 31 14:44:00 2001]único[Author ID1: at Fri Aug 31 14:48:00

2001] proceso [Author ID1: at Fri Aug 31 14:44:00 2001]luminoso[Author ID1: at Fri Aug 31 14:48:00 2001] es la [Author ID1: at Fri Aug 31 14:44:00 2001]captación[Author ID1: at Fri Aug 31 14:45:00 2001] [Author ID1: at Fri Aug 31 14:44:00 2001]de la radiación.[Author ID0: at]

La utilización del NADPH y el ATP para la reducción del CO[Author ID1: at Fri Aug 31 14:45:00 2001]2[Author ID1: at Fri Aug 31 14:45:00 2001] a CH q requiere un gasto de 3 ATP se ha denominado [Author ID1: at Fri Aug 31 14:46:00 2001]**fase oscura[Author ID1: at Fri Aug 31 14:46:00 2001]** porque se puede dar en el laboratorio, si se le añade el ATP. [Author ID1: at Fri Aug 31 14:46:00 2001]Lo q ocurre es q muchas enzimas de Calvin se activa[Author ID1: at Fri Aug 31 14:47:00 2001]n[Author ID1: at Mon Sep 3 13:34:00 2001] cuando son [Author ID1: at Fri Aug 31 14:47:00 2001]iluminados[Author ID1: at Fri Aug 31 14:48:00 2001] los cloroplastos[Author ID1: at Fri Aug 31 14:47:00 2001] [Author ID1: at Fri Aug 31 14:48:00 2001]por eso no se puede decir q la fase oscura sea [Author ID1: at Fri Aug 31 14:49:00 2001]independiente[Author ID1: at Fri Aug 31 14:53:00 2001] de la luz.[Author ID1: at Fri Aug 31 14:49:00 2001] Las enzimas[Author ID1: at Mon Sep 3 13:40:00 2001] [Author ID1: at Mon Sep 3 13:42:00 2001]activadas tienen grupos disulfuro q se reducen a dos grupos [Author ID1: at Mon Sep 3 13:40:00 2001]sulfhidrilo cuando son activados por la luz blanca.[Author ID1: at Mon Sep 3 13:41:00 2001][Author ID1: at Fri Aug 31 14:49:00 2001]

[Author ID1: at Fri Aug 31 14:50:00 2001]

[Author ID1: at Mon Sep 3 11:27:00 2001]

Hay tres etapas:[Author ID0: at]

- Reducción e iluminación de moléculas [Author ID1: at Fri Aug 31 14:50:00 2001]orgánicas[Author ID1: at Fri Aug 31 14:53:00 2001].[Author ID1: at Fri Aug 31 14:50:00 2001]−−>[Author ID1: at Fri Aug 31 14:50:00 2001][Author ID1: at Fri Aug 31 14:46:00 2001]
- Reducción[Author ID1: at Fri Aug 31 14:51:00 2001] [Author ID1: at Fri Aug 31 14:50:00 2001]propiamente dicha de los intermediarios.[Author ID1: at Fri Aug 31 14:51:00 2001]−−>[Author ID1: at Fri Aug 31 14:51:00 2001][Author ID1: at Fri Aug 31 14:46:00 2001]
- Redistribución[Author ID1: at Fri Aug 31 14:52:00 2001] o transformación de los productos 1º de la [Author ID1: at Fri Aug 31 14:51:00 2001]fotosíntesis[Author ID1: at Fri Aug 31 14:52:00 2001] pa[Author ID1: at Fri Aug 31 14:51:00 2001]r[Author ID1: at Fri Aug 31 14:53:00 2001]a regenerar [Author ID1: at Fri Aug 31 14:51:00 2001]el aceptor 1º del C.[Author ID1: at Fri Aug 31 14:52:00 2001]−−>[Author ID1: at Fri Aug 31 16:25:00 2001][Author ID1: at Fri Aug 31 14:46:00 2001]

[Author ID0: at]

Salvo [Author ID1: at Fri Aug 31 16:25:00 2001]algún[Author ID1: at Fri Aug 31 16:29:00 2001] tipo de bacterias fotosintéticas todos los organismos vegetales tienen la 2ª y 3ª etapa.[Author ID1: at Fri Aug 31 16:25:00 2001]

Las diferencias [Author ID1: at Fri Aug 31 16:26:00 2001]están[Author ID1: at Fri Aug 31 16:29:00 2001] en el modo de la fijación del CO[Author ID1: at Fri Aug 31 16:26:00 2001]2[Author ID1: at Fri Aug 31 16:26:00 2001]:[Author ID1: at Fri Aug 31 16:26:00 2001]

- C[Author ID1: at Fri Aug 31 16:27:00 2001]3[Author ID1: at Fri Aug 31 16:27:00 2001] obtienen [Author ID1: at Fri Aug 31 16:27:00 2001]fosfoglicerato.[Author ID1: at Fri Aug 31 16:29:00 2001] [Author ID1: at Fri Aug 31 16:43:00 2001]−−>[Author ID1: at Fri Aug 31 16:29:00 2001][Author

ID1: at Fri Aug 31 16:26:00 2001]

- C[Author ID1: at Fri Aug 31 16:29:00 2001]4[Author ID1: at Fri Aug 31 16:29:00 2001] obtienen compuestos de 4 C (asp[Author ID1: at Fri Aug 31 16:29:00 2001]á[Author ID1: at Tue Sep 4 12:24:00 2001]rtico, malato).[Author ID1: at Fri Aug 31 16:29:00 2001]−−>[Author ID1: at Fri Aug 31 16:29:00 2001][Author ID1: at Fri Aug 31 16:26:00 2001]
- CAM se produce la fijación de CO[Author ID1: at Fri Aug 31 16:29:00 2001]2[Author ID1: at Fri Aug 31 16:30:00 2001] durante la noche, se almacena en forma de malato en la vacuola y se da la reducción durante el [Author ID1: at Fri Aug 31 16:30:00 2001]día[Author ID1: at Fri Aug 31 16:31:00 2001].[Author ID1: at Fri Aug 31 16:30:00 2001]−−>[Author ID1: at Fri Aug 31 16:30:00 2001][Author ID1: at Fri Aug 31 16:26:00 2001]

La [Author ID1: at Fri Aug 31 16:30:00 2001]fase oscura se da en el estroma con el CO[Author ID1: at Fri Aug 31 16:31:00 2001]2[Author ID1: at Fri Aug 31 16:32:00 2001] [Author ID1: at Fri Aug 31 16:32:00 2001]atmosférico[Author ID1: at Fri Aug 31 16:36:00 2001], ATP y NADH. Se requiere luz para activar enzimas para q se de todo el proceso de fijación.[Author ID1: at Fri Aug 31 16:32:00 2001][Author ID0: at]

Según como se de la entrada de CO[Author ID1: at Fri Aug 31 16:44:00 2001]2[Author ID1: at Fri Aug 31 16:45:00 2001] por la hoja hasta el lugar de carboxilación da lugar a [Author ID1: at Fri Aug 31 16:45:00 2001]−−>tres tipos de fotosíntesis[Author ID1: at Fri Aug 31 16:45:00 2001][Author ID1: at Fri Aug 31 16:46:00 2001]:[Author ID1: at Fri Aug 31 16:45:00 2001][Author ID1: at Fri Aug 31 16:46:00 2001]

- −−>**Ciclo de Calvin[Author ID1: at Fri Aug 31 16:46:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001] o ciclo reductor de pentosas P o C. [Author ID1: at Fri Aug 31 16:46:00 2001]−−>**C[Author ID1: at Fri Aug 31 16:47:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−>**3[Author ID1: at Fri Aug 31 16:47:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001] [Author ID1: at Fri Aug 31 16:47:00 2001]porque[Author ID1: at Fri Aug 31 16:50:00 2001] el primer producto de la carboxilación son dos moléculas de 3PGA.[Author ID1: at Fri Aug 31 16:47:00 2001][Author ID1: at Fri Aug 31 17:06:00 2001]

[Author ID1: at Fri Aug 31 16:48:00 2001]

RuBP + CO[Author ID1: at Fri Aug 31 16:48:00 2001]2[Author ID1: at Fri Aug 31 16:48:00 2001] [Author ID1: at Fri Aug 31 16:48:00 2001] 2 (3 PGA)[Author ID1: at Fri Aug 31 16:52:00 2001][Author ID1: at Fri Aug 31 17:06:00 2001]

[Author ID1: at Fri Aug 31 16:56:00 2001]

- −−>**M[Author ID1: at Fri Aug 31 17:01:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−>**etabolismo[Author ID1: at Fri Aug 31 16:58:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−> **C[Author ID1: at Fri Aug 31 16:56:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−>**4[Author ID1: at Fri Aug 31 16:57:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]: se obtienen [Author ID1: at Fri Aug 31 16:57:00 2001]ácidos[Author ID1: at Fri Aug 31 16:58:00 2001] dicarbox[Author ID1: at Fri Aug 31 16:57:00 2001]í[Author ID1: at Fri Aug 31 16:58:00 2001]licos de 4 [Author ID1: at Fri Aug 31 16:57:00 2001]átomos[Author ID1: at Fri Aug 31 16:58:00 2001] de carbono. El C se va a fijar sobre el PEP y el C se fija en forma de bicarbonato.[Author ID1: at Fri Aug 31 16:57:00 2001] Hay una separación espacial entre la fijación y reducción de CO[Author ID1: at Fri Aug 31 17:03:00 2001]2[Author ID1: at Fri Aug 31 17:03:00 2001].[Author ID1: at Fri Aug 31 17:06:00 2001]

[Author ID1: at Fri Aug 31 16:57:00 2001]

PEP + [Author ID1: at Fri Aug 31 16:59:00 2001]−−>HCO[Author ID1: at Fri Aug 31 16:59:00 2001][Author ID1: at Fri Aug 31 16:59:00 2001]3 [Author ID1: at Fri Aug 31 16:59:00 2001]−[Author ID1: at Fri Aug 31 16:59:00 2001] [Author ID1: at Fri Aug 31 17:00:00 2001] OAA Malato[Author ID1: at Fri Aug 31 17:00:00

2001][Author ID1: at Fri Aug 31 17:06:00 2001]

[Author ID1: at Fri Aug 31 17:00:00 2001]

- −−>**CAM, metabolismo [Author ID1: at Fri Aug 31 17:01:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−>**ácido[Author ID1: at Fri Aug 31 17:07:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]−−> **de las crasulaceas[Author ID1: at Fri Aug 31 17:01:00 2001]**[Author ID1: at Mon Sep 3 11:38:00 2001]: el C se fija sobre el PEP en forma de bicarbonato para dar OAA y luego se reduce a mala[Author ID1: at Fri Aug 31 17:01:00 2001]to. Hay una separación temporal entre la fijación y la [Author ID1: at Fri Aug 31 17:04:00 2001]reducción[Author ID1: at Fri Aug 31 17:05:00 2001] [Author ID1: at Fri Aug 31 17:04:00 2001]del CO[Author ID1: at Fri Aug 31 17:05:00 2001]2[Author ID1: at Fri Aug 31 17:05:00 2001], por la noche fijan el CO[Author ID1: at Fri Aug 31 17:05:00 2001]2[Author ID1: at Fri Aug 31 17:05:00 2001] y el malato es acumulado en la vacuola y durante el [Author ID1: at Fri Aug 31 17:05:00 2001]día[Author ID1: at Fri Aug 31 17:08:00 2001] se da la refijaci[Author ID1: at Fri Aug 31 17:05:00 2001]ó[Author ID1: at Fri Aug 31 17:07:00 2001]n del CO[Author ID1: at Fri Aug 31 17:05:00 2001]2[Author ID1: at Fri Aug 31 17:06:00 2001].[Author ID1: at Fri Aug 31 17:06:00 2001][Author ID1: at Fri Aug 31 17:07:00 2001]

−−>[Author ID1: at Fri Aug 31 16:54:00 2001][Author ID1: at Fri Aug 31 17:06:00 2001]

[Author ID1: at Fri Aug 31 17:07:00 2001]PEP + HCO[Author ID1: at Fri Aug 31 17:06:00 2001]3 [Author ID1: at Fri Aug 31 17:06:00 2001]− [Author ID1: at Fri Aug 31 17:06:00 2001] OAA Malato[Author ID1: at Fri Aug 31 17:06:00 2001][Author ID0: at]

[Author ID1: at Fri Aug 31 17:08:00 2001]

−−>[Author ID1: at Fri Aug 31 14:53:00 2001][Author ID1: at Fri Aug 31 16:45:00 2001]

Ciclo de Calvin[Author ID1: at Fri Aug 31 17:21:00 2001]

1ª etapa[Author ID1: at Fri Aug 31 17:22:00 2001] carboxilación[Author ID1: at Fri Aug 31 17:35:00 2001]:[Author ID1: at Fri Aug 31 17:22:00 2001] [Author ID1: at Fri Aug 31 17:22:00 2001]−−>**(Hoja 44 [Author ID1: at Fri Aug 31 17:23:00 2001]**[Author ID1: at Fri Aug 31 17:24:00 2001]−−>**Fig.[Author ID1: at Fri Aug 31 17:24:00 2001]**[Author ID1: at Fri Aug 31 17:24:00 2001]−−> **9.3)[Author ID1: at Fri Aug 31 17:23:00 2001]**[Author ID1: at Fri Aug 31 17:24:00 2001] [Author ID1: at Fri Aug 31 17:24:00 2001]el CO[Author ID1: at Fri Aug 31 17:22:00 2001]2 [Author ID1: at Fri Aug 31 17:22:00 2001]se fija sobre la RuBP por la [Author ID1: at Fri Aug 31 17:22:00 2001]RUBISCO[Author ID1: at Fri Aug 31 17:23:00 2001] [Author ID1: at Fri Aug 31 17:22:00 2001]formándose un intermediario [Author ID1: at Fri Aug 31 17:23:00 2001]inestable[Author ID1: at Fri Aug 31 17:24:00 2001] para dar 2 [Author ID1: at Fri Aug 31 17:23:00 2001]moléculas[Author ID1: at Fri Aug 31 17:24:00 2001] de 3 PGA[Author ID1: at Fri Aug 31 17:23:00 2001].[Author ID1: at Fri Aug 31 17:24:00 2001]−−>[Author ID1: at Fri Aug 31 14:53:00 2001][Author ID1: at Fri Aug 31 17:22:00 2001]

2ª etapa[Author ID1: at Fri Aug 31 17:25:00 2001] reducción[Author ID1: at Fri Aug 31 17:35:00 2001]−−>**:[Author ID1: at Fri Aug 31 17:25:00 2001]**[Author ID1: at Fri Aug 31 17:26:00 2001]−−> **(Hoja 45)[Author ID1: at Fri Aug 31 17:25:00 2001]**[Author ID1: at Fri Aug 31 17:26:00 2001] etapa reductora. En [Author ID1: at Fri Aug 31 17:26:00 2001]una 1ª etapa se fosforila gastándose las 2/3 partes del ATP y se reduce gastándose todo el poder reductor por la 3PGA deshidrogenasa NADP dependiente.[Author ID1: at Fri Aug 31 17:27:00 2001][Author ID1: at Fri Aug 31 17:34:00 2001]

[Author ID1: at Fri Aug 31 17:37:00 2001]De las 6 [Author ID1: at Fri Aug 31 17:29:00 2001]moléculas[Author ID1: at Fri Aug 31 17:35:00 2001] de G3P solo una triosa−P se considera como

producto del ciclo donde se utiliza para la [Author ID1: at Fri Aug 31 17:29:00 2001]síntesis[Author ID1: at Fri Aug 31 17:30:00 2001] [Author ID1: at Fri Aug 31 17:29:00 2001]de sacarosa. El resto, mediante 10 reacciones regeneran las 3 [Author ID1: at Fri Aug 31 17:30:00 2001]moléculas[Author ID1: at Fri Aug 31 17:36:00 2001] de 5C sobre las q el C se fija.[Author ID1: at Fri Aug 31 17:30:00 2001]−−>[Author ID1: at Fri Aug 31 14:52:00 2001][Author ID1: at Fri Aug 31 17:29:00 2001]

3ª etapa regeneración:[Author ID1: at Fri Aug 31 17:37:00 2001] [Author ID1: at Fri Aug 31 17:38:00 2001] una vez generado el G3P hay q regenerar la RuBP, por medio de una [Author ID1: at Fri Aug 31 17:38:00 2001]isomerización[Author ID1: at Fri Aug 31 17:43:00 2001].[Author ID1: at Fri Aug 31 17:38:00 2001]

Se condensan 2 [Author ID1: at Fri Aug 31 17:40:00 2001]moléculas[Author ID1: at Fri Aug 31 17:43:00 2001] de G3P y DHAP por una aldolasa para dar Fructosa 1,6[Author ID1: at Fri Aug 31 17:40:00 2001]−[Author ID1: at Mon Sep 3 12:10:00 2001]BP[Author ID1: at Fri Aug 31 17:40:00 2001],[Author ID1: at Fri Aug 31 17:41:00 2001] q es hidrolizada [Author ID1: at Mon Sep 3 12:03:00 2001]mediante[Author ID1: at Mon Sep 3 12:10:00 2001] una fosfatasa [Author ID1: at Mon Sep 3 12:03:00 2001]liberando[Author ID1: at Mon Sep 3 12:10:00 2001] un P dando Fructosa[Author ID1: at Mon Sep 3 12:03:00 2001]−[Author ID1: at Mon Sep 3 12:10:00 2001]6P[Author ID1: at Mon Sep 3 12:03:00 2001]. Este P se tiene q [Author ID1: at Mon Sep 3 12:04:00 2001]liberar[Author ID1: at Mon Sep 3 12:10:00 2001] para q el ciclo luminoso pueda mantenerse.[Author ID0: at]

Por [Author ID1: at Mon Sep 3 12:04:00 2001]una transcetolasa se da la transferencia del carbono C[Author ID1: at Mon Sep 3 12:05:00 2001]1 [Author ID1: at Mon Sep 3 12:05:00 2001]y [Author ID1: at Mon Sep 3 12:05:00 2001]C[Author ID1: at Mon Sep 3 12:06:00 2001]2[Author ID1: at Mon Sep 3 12:06:00 2001] de la Fructosa 6P sobre otra molécula de G3P.[Author ID0: at]

A continuación una segunda [Author ID1: at Mon Sep 3 12:06:00 2001]aldolasa[Author ID1: at Mon Sep 3 12:07:00 2001] [Author ID1: at Mon Sep 3 12:06:00 2001]condensa el [Author ID1: at Mon Sep 3 12:07:00 2001]Eritrosa−[Author ID1: at Mon Sep 3 12:09:00 2001]4P con una DHAP para dar una molécula de 7C, la Sedoheptulosa 1,7−BP.[Author ID1: at Mon Sep 3 12:07:00 2001] Por los siguientes paso[Author ID1: at Fri Aug 31 17:41:00 2001]s[Author ID1: at Mon Sep 3 12:09:00 2001] se [Author ID1: at Fri Aug 31 17:41:00 2001]llega[Author ID1: at Fri Aug 31 17:43:00 2001] una ribulosa en forma ceto, q [Author ID1: at Fri Aug 31 17:41:00 2001]habrá[Author ID1: at Fri Aug 31 17:43:00 2001] q fosforilar mediante la Ribulosa 5−Pkinasa.[Author ID1: at Fri Aug 31 17:41:00 2001][Author ID1: at Fri Aug 31 17:42:00 2001]

[Author ID1: at Mon Sep 3 12:36:00 2001]

[Author ID1: at Mon Sep 3 12:30:00 2001]

−−>6CO[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>2[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>18ATP[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>12(NA[Author ID1: at Mon Sep 3 12:30:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>DPH+H[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>)[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:36:00 2001]−−>>>>>>>>>[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:36:00 2001]−−>Hexosa[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:36:00

2001]−−>P[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>18ADP[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>P[Author ID1: at Mon Sep 3 12:31:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>i[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>12NADP[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:34:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001] [Author ID1: at Mon Sep 3 12:35:00 2001]−−>H[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>+[Author ID1: at Mon Sep 3 12:32:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]−−>[Author ID1: at Mon Sep 3 12:20:00 2001][Author ID1: at Mon Sep 3 12:35:00 2001]

[Author ID1: at Mon Sep 3 12:36:00 2001]

Enzimas q actúan en el ciclo.[Author ID1: at Mon Sep 3 12:13:00 2001][Author ID1: at Mon Sep 3 12:14:00 2001]

Rubisco (irreversible), 3−fosfoglicerato qu[Author ID1: at Mon Sep 3 12:14:00 2001]inasa, Gliceraldehido 3p−deshidro[Author ID1: at Mon Sep 3 12:15:00 2001]genasa[Author ID1: at Mon Sep 3 12:20:00 2001], Trio[Author ID1: at Mon Sep 3 12:15:00 2001]sa P isomerasa, Aldolasa, Fructosa 1,6−BP fosfatasa (irreversible), Transcetolasa, Sedoheptulosa 1,7−BP [Author ID1: at Mon Sep 3 12:16:00 2001]fosfatasa (irreversible), Transcetolasa, Ribulosa 5P e[Author ID1: at Mon Sep 3 12:17:00 2001]pimerasa, Ribulosa 5P isomerasa, Ribulosa 5P kinasa (irreversible).[Author ID1: at Mon Sep 3 12:18:00 2001]−−>[Author ID1: at Fri Aug 31 17:42:00 2001][Author ID1: at Mon Sep 3 12:14:00 2001]

[Author ID1: at Mon Sep 3 12:20:00 2001]

Capacidad autocatalítica del ciclo.[Author ID1: at Fri Aug 31 17:43:00 2001][Author ID1: at Fri Aug 31 17:44:00 2001]

Las 5/6 partes de las triosas sirven par[Author ID1: at Fri Aug 31 17:44:00 2001]a[Author ID1: at Mon Sep 3 16:04:00 2001] regenerar el aceptor, solo 1/6 parte se usa para la [Author ID1: at Fri Aug 31 17:44:00 2001]síntesis[Author ID1: at Fri Aug 31 17:45:00 2001] [Author ID1: at Fri Aug 31 17:44:00 2001]de sacarosa o almidón en los cloroplastos.[Author ID1: at Fri Aug 31 17:45:00 2001][Author ID0: at]

[Author ID1: at Fri Aug 31 21:23:00 2001]

[Author ID0: at]

[Author ID1: at Mon Sep 3 12:36:00 2001]

Eficiencia [Author ID1: at Fri Aug 31 21:23:00 2001]termodinámica[Author ID1: at Fri Aug 31 21:24:00 2001]

La mayor perdida [Author ID1: at Fri Aug 31 21:24:00 2001]energética[Author ID1: at Fri Aug 31 21:28:00 2001] se produce en el proceso de formación del ATP y del NADPH[Author ID1: at Fri Aug 31 21:24:00 2001] durante las [Author ID1: at Fri Aug 31 21:28:00 2001]reacción[Author ID1: at Fri Aug 31 21:29:00 2001] luminosas y no tanto en la fase oscur[Author ID1: at Fri Aug 31 21:28:00 2001]a ([Author ID1: at Fri

Aug 31 21:29:00 2001]−−>Ciclo[Author ID1: at Fri Aug 31 21:29:00 2001][Author ID1: at Mon Sep 3 12:38:00 2001] de Calvin).[Author ID1: at Fri Aug 31 21:29:00 2001]

La elevada eficacia de la fase oscura implica q las reaccione[Author ID1: at Fri Aug 31 21:30:00 2001]s[Author ID1: at Mon Sep 3 12:37:00 2001] del Ciclo de [Author ID1: at Fri Aug 31 21:30:00 2001]Calvin[Author ID1: at Fri Aug 31 21:31:00 2001] [Author ID1: at Fri Aug 31 21:30:00 2001]tengan q estar [Author ID1: at Fri Aug 31 21:31:00 2001]bien[Author ID1: at Fri Aug 31 21:35:00 2001] reguladas para mantener este elevado rendimiento. El control de [Author ID1: at Fri Aug 31 21:31:00 2001]todo[Author ID1: at Fri Aug 31 21:35:00 2001] el proceso se lleva a cabo a dos niveles:[Author ID1: at Fri Aug 31 21:31:00 2001]

- Control de los niveles [Author ID1: at Fri Aug 31 21:32:00 2001]enzimáticos[Author ID1: at Fri Aug 31 21:35:00 2001]: control de los genes nucleares y cloropl[Author ID1: at Fri Aug 31 21:32:00 2001]á[Author ID1: at Fri Aug 31 21:35:00 2001]sticos q participan en la [Author ID1: at Fri Aug 31 21:32:00 2001]síntesis[Author ID1: at Fri Aug 31 21:33:00 2001] [Author ID1: at Fri Aug 31 21:32:00 2001]de los enzimas. Este control [Author ID1: at Fri Aug 31 21:33:00 2001]genético[Author ID1: at Fri Aug 31 21:35:00 2001] es a largo plazo.[Author ID1: at Fri Aug 31 21:33:00 2001]−−>[Author ID1: at Fri Aug 31 21:33:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]
- Control de la [Author ID1: at Fri Aug 31 21:33:00 2001]actividad[Author ID1: at Fri Aug 31 21:34:00 2001] [Author ID1: at Fri Aug 31 21:33:00 2001]de estos enzimas:[Author ID1: at Fri Aug 31 21:34:00 2001] hay 4 modos:[Author ID1: at Fri Aug 31 21:37:00 2001]−−>[Author ID1: at Fri Aug 31 21:37:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]
- M[Author ID1: at Fri Aug 31 21:42:00 2001]ovimientos iónicos entre el interior del lumen el estroma cloroplástico q hacen q [Author ID1: at Fri Aug 31 21:38:00 2001]varíe[Author ID1: at Fri Aug 31 21:39:00 2001] el pH del estroma.[Author ID1: at Fri Aug 31 21:38:00 2001]−−>[Author ID1: at Fri Aug 31 21:39:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]
- P[Author ID1: at Fri Aug 31 21:42:00 2001]aralelo a esto hay salida de iones MG dándose la carbamilaci[Author ID1: at Fri Aug 31 21:39:00 2001]ó[Author ID1: at Fri Aug 31 21:41:00 2001]n.[Author ID1: at Fri Aug 31 21:39:00 2001]−−>[Author ID1: at Fri Aug 31 21:39:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]
- R[Author ID1: at Fri Aug 31 21:42:00 2001]egulación de[Author ID1: at Fri Aug 31 21:40:00 2001]l[Author ID1: at Mon Sep 3 13:24:00 2001] sistema a [Author ID1: at Fri Aug 31 21:40:00 2001]través[Author ID1: at Fri Aug 31 21:41:00 2001] de la luz po[Author ID1: at Fri Aug 31 21:40:00 2001]r[Author ID1: at Fri Aug 31 21:41:00 2001] [Author ID1: at Fri Aug 31 21:40:00 2001]oxidorreducción[Author ID1: at Fri Aug 31 21:41:00 2001] del enlace [Author ID1: at Fri Aug 31 21:40:00 2001]de S[Author ID1: at Mon Sep 3 13:26:00 2001] entre[Author ID1: at Fri Aug 31 21:40:00 2001] [Author ID1: at Fri Aug 31 21:41:00 2001]Cys adyacentes.[Author ID1: at Fri Aug 31 21:40:00 2001]−−>[Author ID1: at Fri Aug 31 21:40:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]
- A[Author ID1: at Fri Aug 31 21:42:00 2001] [Author ID1: at Fri Aug 31 21:40:00 2001]través[Author ID1: at Fri Aug 31 21:41:00 2001] de la [Author ID1: at Fri Aug 31 21:40:00 2001]compartimentación[Author ID1: at Fri Aug 31 21:41:00 2001].[Author ID1: at Fri Aug 31 21:40:00 2001]−−>[Author ID1: at Fri Aug 31 17:43:00 2001][Author ID1: at Fri Aug 31 21:24:00 2001]

  −−>[Author ID1: at Fri Aug 31 14:43:00 2001][Author ID1: at Fri Aug 31 17:43:00 2001]

  (Hoja 48 Fig. 10.6)[Author ID1: at Fri Aug 31 21:56:00 2001] [Author ID1: at Fri Aug 31 22:01:00 2001]Cuando se produce la iluminación se da el transporte de e[Author ID1: at

Fri Aug 31 21:44:00 2001]−[Author ID1: at Fri Aug 31 21:44:00 2001] y carga de H[Author ID1: at Fri Aug 31 21:51:00 2001]+[Author ID1: at Fri Aug 31 21:51:00 2001] el lumen por tanto la entrada de H[Author ID1: at Fri Aug 31 21:51:00 2001]+[Author ID1: at Fri Aug 31 21:51:00 2001] hace q el lumen se acidifique y el estroma se alcalinice. E[Author ID1: at Fri Aug 31 21:52:00 2001]sto implica una mayor eficiencia de enzimas como la RUBISCO, la [Author ID1: at Fri Aug 31 21:53:00 2001]Fructosa[Author ID1: at Fri Aug 31 21:56:00 2001] 1,6 [Author ID1: at Fri Aug 31 21:53:00 2001]BP−[Author ID1: at Fri Aug 31 22:01:00 2001]fosfatasa y la fosfor[Author ID1: at Fri Aug 31 21:53:00 2001]r[Author ID1: at Fri Aug 31 21:56:00 2001]ibulokinasa.[Author ID1: at Fri Aug 31 21:53:00 2001][Author ID0: at]

Paralelamente a la entrada de H[Author ID1: at Fri Aug 31 21:54:00 2001]+[Author ID1: at Fri Aug 31 21:54:00 2001] hay una salida de Mg[Author ID1: at Fri Aug 31 21:54:00 2001]2+[Author ID1: at Fri Aug 31 21:55:00 2001] del lumen al estroma. Este participa en la [Author ID1: at Fri Aug 31 21:55:00 2001]activación[Author ID1: at Fri Aug 31 21:56:00 2001] de la RUBISCO mediante la carbamilaci[Author ID1: at Fri Aug 31 21:55:00 2001]ó[Author ID1: at Fri Aug 31 21:56:00 2001]n.[Author ID1: at Fri Aug 31 21:55:00 2001] [Author ID1: at Fri Aug 31 21:52:00 2001]La rubisco en oscuridad se une con azucares bifosforilados y se inactiva.[Author ID0: at]

La [Author ID1: at Tue Sep 4 22:32:00 2001]RUBISCO activasa rompe los enlaces de la RUBISCO con los azucares par[Author ID1: at Tue Sep 4 22:33:00 2001]a[Author ID1: at Tue Sep 4 22:34:00 2001] q se pueda dar la [Author ID1: at Tue Sep 4 22:33:00 2001]activación[Author ID1: at Tue Sep 4 22:34:00 2001].[Author ID1: at Tue Sep 4 22:33:00 2001][Author ID1: at Fri Aug 31 21:59:00 2001]

(Hoja 49 [Author ID1: at Fri Aug 31 22:00:00 2001]Fig.[Author ID1: at Fri Aug 31 22:01:00 2001] 9.7c)[Author ID1: at Fri Aug 31 22:00:00 2001] [Author ID1: at Fri Aug 31 22:01:00 2001]existen 4 [Author ID1: at Fri Aug 31 22:01:00 2001]−−>**enzimas de Ciclo de Calvin q en oscuridad [Author ID1: at Fri Aug 31 22:01:00 2001]**[Author ID1: at Mon Sep 3 12:48:00 2001]−−>**están[Author ID1: at Fri Aug 31 22:03:00 2001]**[Author ID1: at Mon Sep 3 12:48:00 2001]−−> **inactivadas[Author ID1: at Fri Aug 31 22:01:00 2001]**[Author ID1: at Mon Sep 3 12:48:00 2001] porque se dan puentes de S entre las Cys. [Author ID1: at Fri Aug 31 22:01:00 2001]Estas son:[Author ID1: at Fri Aug 31 22:03:00 2001][Author ID1: at Mon Sep 3 13:53:00 2001]

RUBISCO (se une a azucares bifosforilados par[Author ID1: at Mon Sep 3 13:55:00 2001]a[Author ID1: at Mon Sep 3 16:04:00 2001] inactivarse)[Author ID1: at Mon Sep 3 13:55:00 2001][Author ID1: at Mon Sep 3 13:56:00 2001]

Gliceraldehido 3P desH[Author ID1: at Fri Aug 31 22:03:00 2001]asa[Author ID1: at Fri Aug 31 22:03:00 2001][Author ID1: at Fri Aug 31 22:05:00 2001]

Fructosa 1,6 BP−fosfatasa[Author ID1: at Fri Aug 31 22:04:00 2001][Author ID1: at Fri Aug 31 22:05:00 2001]

S[Author ID1: at Fri Aug 31 22:06:00 2001]edoheptulosa 1,7 BP−fosfatasa[Author ID1: at Fri Aug 31 22:04:00 2001][Author ID1: at Fri Aug 31 22:05:00 2001]

P−ribulokinasa.[Author ID1: at Fri Aug 31 22:04:00 2001][Author ID0: at]

[Author ID0: at]

En 1980se[Author ID1: at Mon Sep 3 13:57:00 2001] [Author ID1: at Mon Sep 3 13:58:00 2001]descubrió[Author ID1: at Mon Sep 3 14:05:00 2001] el [Author ID1: at Mon Sep 3 13:58:00 2001]sistema[Author ID1: at Mon Sep 3 14:05:00 2001] de transferencia de e[Author ID1: at Mon Sep 3 13:58:00 2001]−[Author ID1: at Mon Sep 3 14:23:00 2001] del PS I a enzimas q se activan por la luz.[Author ID0: at]

El PS I [Author ID1: at Mon Sep 3 13:58:00 2001]origina la reducción de la ferredoxina. La tiorredoxina mediante la ferredoxin−tiorredoxin reductasa transfier[Author ID1: at Mon Sep 3 13:59:00 2001]e los e[Author ID1: at Mon Sep 3 14:00:00 2001]−[Author ID1: at Mon Sep 3 14:00:00 2001] de la ferredoxina a la tioferredoxina reducida.[Author ID0: at]

La tiorredoxina los transfiere a los enzimas diana [Author ID1: at Mon Sep 3 14:00:00 2001]rompiéndose los puentes de S y activándose los enzimas. Por la noche se inactivan formándose los puentes de S.[Author ID1: at Mon Sep 3 14:01:00 2001][Author ID0: at]

Moléculas como el glutatión en oscuridad [Author ID1: at Mon Sep 3 14:02:00 2001]están[Author ID1: at Mon Sep 3 14:05:00 2001] oxidadas y se reduce tomando los e[Author ID1: at Mon Sep 3 14:02:00 2001]−[Author ID1: at Mon Sep 3 14:03:00 2001] de los enzimas q estaban activados. A su vez el glutatión reducido se puede reoxidar mediante el des[Author ID1: at Mon Sep 3 14:03:00 2001]hidroascorbico q se transforma en ascórbico.[Author ID1: at Mon Sep 3 14:04:00 2001][Author ID0: at]

[Author ID1: at Fri Aug 31 22:06:00 2001]

Síntesis[Author ID1: at Fri Aug 31 22:07:00 2001] [Author ID1: at Fri Aug 31 22:06:00 2001]de sacarosa y almidón[Author ID1: at Fri Aug 31 22:07:00 2001][Author ID1: at Sat Sep 1 00:45:00 2001]

Dado q parten de triosas [Author ID1: at Sat Sep 1 00:46:00 2001]fosfato[Author ID1: at Sat Sep 1 00:48:00 2001] ambos procesos son competitivos. [Author ID1: at Sat Sep 1 00:46:00 2001]

El [Author ID1: at Sat Sep 1 00:47:00 2001]−−>almidón[Author ID1: at Sat Sep 1 00:48:00 2001][Author ID1: at Sat Sep 1 00:52:00 2001] se sintetiza en el cloroplasto[Author ID1: at Sat Sep 1 00:47:00 2001] pues se ve q se acumula ahí.[Author ID0: at]

La [Author ID1: at Sat Sep 1 00:50:00 2001]−−>sacarosa[Author ID1: at Sat Sep 1 00:50:00 2001][Author ID1: at Sat Sep 1 00:52:00 2001] se sintetiza en la [Author ID1: at Sat Sep 1 00:50:00 2001]región[Author ID1: at Sat Sep 1 00:54:00 2001] [Author ID1: at Sat Sep 1 00:50:00 2001]citoplasmática[Author ID1: at Sat Sep 1 00:51:00 2001] [Author ID1: at Sat Sep 1 00:50:00 2001]donde se encuentran 2 enzimas de su síntesis, Sacarosa P−sintasa y Sacarosa P−fosfatasa.[Author ID1: at Sat Sep 1 00:51:00 2001]−−>[Author ID1: at Fri Aug 31 22:07:00 2001][Author ID1: at Sat Sep 1 00:45:00 2001]

Síntesis de [Author ID1: at Sat Sep 1 00:52:00 2001]almidón[Author ID1: at Sat Sep 1 00:54:00 2001]:[Author ID1: at Sat Sep 1 00:52:00 2001] [Author ID1: at Sat Sep 1 00:54:00 2001]**(Hoja 51 tabla 9.7)[Author ID1: at Sat Sep 1 00:55:00 2001]** por una aldolasa se condensan dos triosa P para dar Fructos[Author ID1: at Sat Sep 1 00:56:00 2001]a[Author ID1: at Sat Sep 1 00:57:00 2001] 1,6[Author ID1: at Sat Sep 1 00:56:00 2001]−[Author ID1: at Sat Sep 1 00:57:00 2001]BP[Author ID1: at Sat Sep 1 00:56:00 2001] q es hidrolizada par[Author ID1: at Sat Sep 1 00:57:00 2001]a[Author ID1: at Mon Sep 3 16:04:00 2001] liberar el P[Author ID1: at Sat Sep 1 00:57:00 2001]i[Author ID1: at Sat Sep 1 00:57:00

2001] del C[Author ID1: at Sat Sep 1 00:57:00 2001]1[Author ID1: at Sat Sep 1 00:57:00 2001]. este P se utiliza para la síntesis de [Author ID1: at Sat Sep 1 00:57:00 2001]más[Author ID1: at Mon Sep 3 15:37:00 2001] ATP.[Author ID1: at Sat Sep 1 00:57:00 2001]

Los enzimas 2 y3 sirven tanto para la síntesis de sacarosa como la del [Author ID1: at Sat Sep 1 00:58:00 2001]almidón[Author ID1: at Sat Sep 1 01:13:00 2001]. Son isoenzimas ([Author ID1: at Sat Sep 1 00:58:00 2001]proteínas[Author ID1: at Sat Sep 1 01:13:00 2001] con la misma [Author ID1: at Sat Sep 1 00:58:00 2001]función[Author ID1: at Sat Sep 1 01:13:00 2001] codificadas por genes distintos).[Author ID1: at Sat Sep 1 00:58:00 2001]

La Fructosa 1,6−BP fosfatasa esta regulada por el [Author ID1: at Sat Sep 1 00:59:00 2001]sistema[Author ID1: at Sat Sep 1 01:13:00 2001] tiorredoxina y va a ser insensible a la [Author ID1: at Sat Sep 1 00:59:00 2001]fructosa[Author ID1: at Sat Sep 1 01:13:00 2001] 2,6[Author ID1: at Sat Sep 1 00:59:00 2001]−BP.[Author ID0: at]

La [Author ID1: at Sat Sep 1 01:00:00 2001]hexosa P−[Author ID1: at Mon Sep 3 15:15:00 2001]isomerasa transforma la Fructosa [Author ID1: at Sat Sep 1 01:00:00 2001]6P en glucosa 6P[Author ID1: at Sat Sep 1 01:01:00 2001].[Author ID1: at Sat Sep 1 01:02:00 2001] [Author ID1: at Sat Sep 1 01:01:00 2001]M[Author ID1: at Sat Sep 1 01:02:00 2001]ediante la ADP glucosapirofosforilasa con gasto de ATP[Author ID1: at Sat Sep 1 01:01:00 2001] se libera el P[Author ID1: at Sat Sep 1 01:02:00 2001]i[Author ID1: at Sat Sep 1 01:02:00 2001] dando la glucosa + [Author ID1: at Sat Sep 1 01:02:00 2001]PP[Author ID1: at Sat Sep 1 01:03:00 2001]i[Author ID1: at Sat Sep 1 01:03:00 2001],[Author ID0: at]

Mediante la [Author ID1: at Sat Sep 1 01:03:00 2001]almidón[Author ID1: at Sat Sep 1 01:12:00 2001] sintetasa esta molécula de glucosa es unida a una cadena de [Author ID1: at Sat Sep 1 01:03:00 2001]almidón[Author ID1: at Sat Sep 1 01:12:00 2001]. [Author ID0: at]

El punto de control esta en la [Author ID1: at Sat Sep 1 01:03:00 2001]reacción[Author ID1: at Sat Sep 1 01:12:00 2001] catalizada por el enzima ADP glucosa pirofosfatasa q controla los niveles [Author ID1: at Sat Sep 1 01:03:00 2001]intracelulares[Author ID1: at Sat Sep 1 01:04:00 2001] [Author ID1: at Sat Sep 1 01:03:00 2001]de 3PGA.[Author ID0: at]

Cuando el cociente 3PGA/P[Author ID1: at Sat Sep 1 01:04:00 2001]i [Author ID1: at Sat Sep 1 01:05:00 2001]−−>es alto el enzima esta activado.[Author ID0: at][Author ID0: at]

−−>[Author ID1: at Sat Sep 1 01:05:00 2001][Author ID1: at Sat Sep 1 01:05:00 2001]

S[Author ID1: at Sat Sep 1 01:05:00 2001]−−>íntesis de sacarosa[Author ID1: at Sat Sep 1 01:05:00 2001][Author ID1: at Sat Sep 1 01:05:00 2001]:[Author ID1: at Sat Sep 1 01:05:00 2001] [Author ID1: at Sat Sep 1 01:05:00 2001]**(Hoja 52 tabla 9.8)[Author ID1: at Sat Sep 1 01:05:00 2001]** cuando las triosa P salen al citoplasma se da una condensación por la aldolasa para dar la Fructosa 1,6−BP q mediante la [Author ID1: at Sat Sep 1 01:06:00 2001]fosfatasa[Author ID1: at Sat Sep 1 01:07:00 2001] [Author ID1: at Sat Sep 1 01:06:00 2001]se libera el P[Author ID1: at Sat Sep 1 01:07:00 2001]i[Author ID1: at Sat Sep 1 01:07:00 2001] para q regrese al cloroplasto.[Author ID0: at]

Mediante una isomerasa tenemos la glucosa [Author ID1: at Sat Sep 1 01:07:00 2001]6P.[Author ID0: at]

La fosfoglucomutasa [Author ID1: at Sat Sep 1 01:08:00 2001]transfiere[Author ID1: at Sat

Sep 1 01:11:00 2001] el P del C[Author ID1: at Sat Sep 1 01:08:00 2001]6[Author ID1: at Sat Sep 1 01:08:00 2001] al C[Author ID1: at Sat Sep 1 01:08:00 2001]1[Author ID1: at Sat Sep 1 01:09:00 2001] y tenemos la glucosa 1P.[Author ID0: at]

Esta se une al UTP para dar UDP glucosa + P[Author ID1: at Sat Sep 1 01:09:00 2001]i[Author ID1: at Sat Sep 1 01:09:00 2001] q por la pirofosfatasa se libera el PP[Author ID1: at Sat Sep 1 01:09:00 2001]i[Author ID1: at Sat Sep 1 01:10:00 2001].[Author ID0: at]

Mediante la sacarosa fosfosintasa se une una[Author ID1: at Sat Sep 1 01:10:00 2001] [Author ID1: at Sat Sep 1 01:11:00 2001]fructosa al UDP glucosa originando el UDP sacarosa 6P. Mediante la sacarosa P [Author ID1: at Sat Sep 1 01:10:00 2001]fosfatasa[Author ID1: at Sat Sep 1 01:11:00 2001] [Author ID1: at Sat Sep 1 01:10:00 2001]se libera el P[Author ID1: at Sat Sep 1 01:11:00 2001]i[Author ID1: at Sat Sep 1 01:11:00 2001].[Author ID1: at Sat Sep 1 01:11:00 2001][Author ID0: at]

[Author ID1: at Sat Sep 1 01:13:00 2001]

Regulación del Ciclo de Calvin[Author ID1: at Sat Sep 1 01:13:00 2001]

Cuando el cociente Triosa P / P[Author ID1: at Sat Sep 1 01:14:00 2001]i[Author ID1: at Sat Sep 1 01:14:00 2001] es alto = [Author ID1: at Sat Sep 1 01:14:00 2001]síntesis[Author ID1: at Sat Sep 1 01:15:00 2001] [Author ID1: at Sat Sep 1 01:14:00 2001]de almidón.[Author ID1: at Sat Sep 1 01:15:00 2001][Author ID1: at Sat Sep 1 01:23:00 2001]

[Author ID0: at]

Cuando el cociente Triosa P / P[Author ID1: at Sat Sep 1 01:15:00 2001]i[Author ID1: at Sat Sep 1 01:15:00 2001] [Author ID1: at Sat Sep 1 01:15:00 2001](en el citoplasma)[Author ID1: at Mon Sep 10 21:49:00 2001]disminuye = las Triosas P salen la citoplasma [Author ID1: at Sat Sep 1 01:15:00 2001]dándose[Author ID1: at Sat Sep 1 01:16:00 2001] [Author ID1: at Sat Sep 1 01:15:00 2001]la síntesis de sacarosa.[Author ID1: at Sat Sep 1 01:16:00 2001][Author ID1: at Sat Sep 1 01:23:00 2001]

[Author ID0: at]

La regulación de síntesis de sacarosa esta [Author ID1: at Sat Sep 1 01:16:00 2001]basada[Author ID1: at Sat Sep 1 01:21:00 2001] en los niveles de [Author ID1: at Sat Sep 1 01:16:00 2001]fructosa[Author ID1: at Sat Sep 1 01:21:00 2001] 2,6−BP (favorece la [Author ID1: at Sat Sep 1 01:16:00 2001]glucólisis[Author ID1: at Sat Sep 1 01:32:00 2001], por tanto inhibe la [Author ID1: at Sat Sep 1 01:16:00 2001]síntesis[Author ID1: at Sat Sep 1 01:32:00 2001] [Author ID1: at Sat Sep 1 01:16:00 2001]de sacarosa[Author ID1: at Sat Sep 1 01:32:00 2001] ya q ambos compiten por la [Author ID1: at Sat Sep 1 01:34:00 2001]fructosa[Author ID1: at Sat Sep 1 01:35:00 2001] 6−P del citosol[Author ID1: at Sat Sep 1 01:34:00 2001])[Author ID1: at Sat Sep 1 01:32:00 2001][Author ID1: at Sat Sep 1 01:16:00 2001]

Cuando los niveles son altos el enzima q da lugar a ella se inhibe parando la síntesis de sacarosa.[Author ID1: at Sat Sep 1 01:17:00 2001]

Cuando los niveles de Triosa P aumentan se inhibe la formación de fructosa 2,6−BP favoreciendo la síntesis de sacarosa.[Author ID1: at Sat Sep 1 01:18:00 2001]

Cuando el cociente Triosa P / P[Author ID1: at Sat Sep 1 01:19:00 2001]i[Author ID1: at Sat Sep 1 01:19:00 2001] es alto [Author ID1: at Sat Sep 1 01:19:00 2001](en el cloroplasto)[Author ID1: at Mon Sep 10 21:50:00 2001]= los niveles de fructosa 2,6−BP son bajos (se sintetiza sacarosa)[Author ID1: at Sat Sep 1 01:19:00 2001].[Author ID1: at Sat Sep 1 01:36:00 2001][Author ID0: at]

En la planta hay una serie de [Author ID1: at Mon Sep 3 15:27:00 2001]polisacáridos[Author ID1: at Mon Sep 3 15:31:00 2001] de reserva. Son los fructanos: [Author ID1: at Mon Sep 3 15:27:00 2001]polisacáridos[Author ID1: at Mon Sep 3 15:31:00 2001] m[Author ID1: at Mon Sep 3 15:27:00 2001]á[Author ID1: at Mon Sep 3 15:36:00 2001]s cortos formados por la [Author ID1: at Mon Sep 3 15:27:00 2001]adición[Author ID1: at Mon Sep 3 15:31:00 2001] de nuevas [Author ID1: at Mon Sep 3 15:27:00 2001]fructosas[Author ID1: at Mon Sep 3 15:32:00 2001] sobre una [Author ID1: at Mon Sep 3 15:27:00 2001]molécula[Author ID1: at Mon Sep 3 15:28:00 2001] [Author ID1: at Mon Sep 3 15:27:00 2001]de sacarosa preexistente.[Author ID0: at]

Hay dos tipos según el tipo de enlace ent[Author ID1: at Mon Sep 3 15:28:00 2001]re las fructosas q [Author ID1: at Mon Sep 3 15:29:00 2001]se van añadiendo a la sacarosa preexistente[Author ID1: at Mon Sep 3 15:30:00 2001], [Author ID1: at Mon Sep 3 15:31:00 2001]−−>**Inulina [Author ID1: at Mon Sep 3 15:31:00 2001]**[Author ID1: at Mon Sep 3 15:31:00 2001]y[Author ID1: at Mon Sep 3 15:31:00 2001]−−> **Flevina[Author ID1: at Mon Sep 3 15:31:00 2001]**[Author ID1: at Mon Sep 3 15:31:00 2001]. [Author ID1: at Mon Sep 3 15:30:00 2001]−−>**(Hoja 54)[Author ID1: at Mon Sep 3 15:30:00 2001]**[Author ID1: at Mon Sep 3 15:31:00 2001]**[Author ID1: at Mon Sep 3 15:32:00 2001]**

El enzima q lleva la transferencia de la fructosa es la transfructosidasa.[Author ID1: at Mon Sep 3 15:32:00 2001]

Es un mecanismo de adaptación al [Author ID1: at Mon Sep 3 15:33:00 2001]frío[Author ID1: at Mon Sep 3 15:34:00 2001] q permite mantener la fotosíntesis activa.[Author ID1: at Mon Sep 3 15:33:00 2001]−−>[Author ID1: at Mon Sep 3 15:30:00 2001][Author ID1: at Mon Sep 3 15:32:00 2001]

[Author ID0: at]

[Author ID1: at Sat Sep 1 01:37:00 2001]

Tema 9 otras [Author ID1: at Sat Sep 1 01:37:00 2001]vías[Author ID1: at Sat Sep 1 01:38:00 2001] de[Author ID1: at Sat Sep 1 01:37:00 2001] fijación[Author ID1: at Sat Sep 1 01:38:00 2001] y [Author ID1: at Sat Sep 1 01:37:00 2001]asimilación[Author ID1: at Sat Sep 1 01:38:00 2001] [Author ID1: at Sat Sep 1 01:37:00 2001]fotosintética del Carbono[Author ID0: at]

[Author ID1: at Sat Sep 1 01:38:00 2001]

El metabolismo C[Author ID1: at Sat Sep 1 01:38:00 2001]4 [Author ID1: at Sat Sep 1 01:39:00 2001]−−>y CAM[Author ID1: at Sat Sep 1 01:39:00 2001][Author ID1: at Sat Sep 1 01:39:00 2001] difieren en cuanto al mecanismo de conducción del CO[Author ID1: at Sat Sep 1 01:39:00 2001]2[Author ID1: at Sat Sep 1 01:40:00 2001] hacia el interior.[Author ID1: at Sat Sep 1 01:40:00 2001]

Difieren[Author ID1: at Sat Sep 1 01:41:00 2001] de un modo espacial en cuanto al lugar de

[Author ID1: at Sat Sep 1 01:40:00 2001]fijación[Author ID1: at Sat Sep 1 01:41:00 2001] [Author ID1: at Sat Sep 1 01:40:00 2001]y reducción del CO[Author ID1: at Sat Sep 1 01:41:00 2001]2[Author ID1: at Sat Sep 1 01:41:00 2001] y de un modo temporal.[Author ID0: at]

Mediante [Author ID1: at Sat Sep 1 01:41:00 2001]esto han conseguido desarrollar mecanismos alternativos para adaptarse a determinados h[Author ID1: at Sat Sep 1 01:42:00 2001]á[Author ID1: at Mon Sep 3 21:34:00 2001]bitats.[Author ID0: at]

En [Author ID1: at Sat Sep 1 01:42:00 2001]las C[Author ID1: at Sat Sep 1 01:43:00 2001]4[Author ID1: at Sat Sep 1 01:43:00 2001] se vio q los primeros productos q se [Author ID1: at Sat Sep 1 01:43:00 2001]obtenían[Author ID1: at Sat Sep 1 01:44:00 2001] [Author ID1: at Sat Sep 1 01:43:00 2001]no eran 3PGA. Sino q [Author ID1: at Sat Sep 1 01:44:00 2001]aparecían[Author ID1: at Sat Sep 1 01:54:00 2001] [Author ID1: at Sat Sep 1 01:44:00 2001]a[Author ID1: at Mon Sep 3 21:35:00 2001]c. dicarboxílicos, básicamente malato y aspartato.[Author ID1: at Sat Sep 1 01:44:00 2001]

[Author ID0: at]

Cuando se compara la [Author ID1: at Sat Sep 1 01:45:00 2001]anatomía[Author ID1: at Sat Sep 1 01:54:00 2001] de las plantas C[Author ID1: at Sat Sep 1 01:45:00 2001]3[Author ID1: at Sat Sep 1 01:45:00 2001] y C[Author ID1: at Sat Sep 1 01:45:00 2001]4[Author ID1: at Sat Sep 1 01:45:00 2001] hay [Author ID1: at Sat Sep 1 01:45:00 2001]características[Author ID1: at Sat Sep 1 01:46:00 2001] [Author ID1: at Sat Sep 1 01:45:00 2001]diferenciales:[Author ID1: at Sat Sep 1 01:46:00 2001]

En las C[Author ID1: at Sat Sep 1 01:47:00 2001]3[Author ID1: at Sat Sep 1 01:47:00 2001]: [Author ID1: at Sat Sep 1 01:47:00 2001]hacia el [Author ID1: at Sat Sep 1 01:47:00 2001]envés[Author ID1: at Sat Sep 1 01:54:00 2001] [Author ID1: at Sat Sep 1 01:47:00 2001]existe[Author ID1: at Sat Sep 1 01:54:00 2001] una estructura formada [Author ID1: at Sat Sep 1 01:47:00 2001]por[Author ID1: at Sat Sep 1 01:54:00 2001] [Author ID1: at Sat Sep 1 01:47:00 2001]células[Author ID1: at Sat Sep 1 01:48:00 2001] [Author ID1: at Sat Sep 1 01:47:00 2001]prácticamente [Author ID1: at Sat Sep 1 01:48:00 2001]esféricas[Author ID1: at Sat Sep 1 01:54:00 2001] con un diámetro de 50 m q dejan [Author ID1: at Sat Sep 1 01:48:00 2001]espacios[Author ID1: at Sat Sep 1 01:49:00 2001] [Author ID1: at Sat Sep 1 01:48:00 2001]aéreos[Author ID1: at Sat Sep 1 01:54:00 2001] entre ellas [Author ID1: at Sat Sep 1 01:49:00 2001]formando[Author ID1: at Sat Sep 1 01:54:00 2001] el mesófilo esponjoso o lagunar. Los espacios [Author ID1: at Sat Sep 1 01:49:00 2001]aéreos[Author ID1: at Sat Sep 1 01:54:00 2001] [Author ID1: at Sat Sep 1 01:49:00 2001]están[Author ID1: at Sat Sep 1 01:54:00 2001] [Author ID1: at Sat Sep 1 01:49:00 2001]asociado[Author ID1: at Sat Sep 1 01:54:00 2001] a los [Author ID1: at Sat Sep 1 01:49:00 2001]estomas[Author ID1: at Sat Sep 1 01:53:00 2001].[Author ID1: at Sat Sep 1 01:49:00 2001]

Por encima tenemos [Author ID1: at Sat Sep 1 01:50:00 2001]una capa[Author ID1: at Sat Sep 1 01:53:00 2001] o varias [Author ID1: at Sat Sep 1 01:50:00 2001]capas[Author ID1: at Sat Sep 1 01:53:00 2001] de células piramidales o prismáticas colocadas con el eje m[Author ID1: at Sat Sep 1 01:50:00 2001]ayor [Author ID1: at Sat Sep 1 01:50:00 2001]perpendicular[Author ID1: at Sat Sep 1 01:53:00 2001] a la [Author ID1: at Sat Sep 1 01:50:00 2001]epidermis[Author ID1: at Sat Sep 1 01:53:00 2001], sin espacios [Author ID1: at Sat Sep 1 01:50:00 2001]aéreos[Author ID1: at Sat Sep 1 01:53:00 2001]. [Author ID1: at Sat Sep 1 01:50:00 2001]Es el mesófilo es empalizada. Ambas son células [Author ID1: at

Sat Sep 1 01:51:00 2001]clorofílicas[Author ID1: at Sat Sep 1 01:53:00 2001] y su estructura y [Author ID1: at Sat Sep 1 01:51:00 2001]función[Author ID1: at Sat Sep 1 01:53:00 2001] van a ser similares.[Author ID1: at Sat Sep 1 01:51:00 2001]

Las células q rodean al xilema y floema no son cloroplásticas.[Author ID1: at Sat Sep 1 01:52:00 2001]

−−>**(Hoja 56 [Author ID1: at Sat Sep 1 01:52:00 2001]**[Author ID1: at Sat Sep 1 01:53:00 2001]−−>**Fig.[Author ID1: at Sat Sep 1 01:53:00 2001]**[Author ID1: at Sat Sep 1 01:53:00 2001]−−> **9.10)[Author ID1: at Sat Sep 1 01:52:00 2001]**[Author ID1: at Sat Sep 1 01:53:00 2001] Las células q rodean al [Author ID1: at Sat Sep 1 01:52:00 2001]xilema y floema en plantas C[Author ID1: at Sat Sep 1 01:53:00 2001]4[Author ID1: at Sat Sep 1 01:53:00 2001] sí son [Author ID1: at Sat Sep 1 01:53:00 2001]cloroplásticas.[Author ID0: at]

[Author ID0: at]

La [Author ID1: at Sat Sep 1 01:55:00 2001]anatomía[Author ID1: at Sat Sep 1 01:58:00 2001] en corona de [Author ID1: at Sat Sep 1 01:55:00 2001]−−>**plantas C[Author ID1: at Sat Sep 1 01:55:00 2001]**[Author ID1: at Sat Sep 1 16:21:00 2001]−−>**4[Author ID1: at Sat Sep 1 01:56:00 2001]**[Author ID1: at Sat Sep 1 16:21:00 2001] [Author ID1: at Sat Sep 1 16:17:00 2001]van a ser células grandes y[Author ID1: at Sat Sep 1 01:56:00 2001] [Author ID1: at Sat Sep 1 01:59:00 2001]gruesa q envuelven los haces conductores. Son las células de la [Author ID1: at Sat Sep 1 01:56:00 2001]v[Author ID1: at Sat Sep 1 01:59:00 2001]aina.[Author ID1: at Sat Sep 1 01:56:00 2001]

Radi[Author ID1: at Sat Sep 1 01:57:00 2001]a[Author ID1: at Sat Sep 1 01:58:00 2001]lmente a estas células hay células [Author ID1: at Sat Sep 1 01:57:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] pequeñas q forman las células del mesófilo.[Author ID0: at]

Existen dos tipos de [Author ID1: at Sat Sep 1 01:57:00 2001]células[Author ID1: at Sat Sep 1 01:58:00 2001] [Author ID1: at Sat Sep 1 01:57:00 2001]distintas q tienen cloroplastos diferentes.[Author ID1: at Sat Sep 1 01:58:00 2001][Author ID1: at Sat Sep 1 15:55:00 2001]

Diferencias[Author ID1: at Sat Sep 1 15:57:00 2001] entre las células de la vaina y [Author ID1: at Sat Sep 1 15:55:00 2001]células[Author ID1: at Sat Sep 1 15:56:00 2001] [Author ID1: at Sat Sep 1 15:55:00 2001]del mesófilo[Author ID1: at Sat Sep 1 15:56:00 2001]

−−>**Células de la vaina[Author ID1: at Sat Sep 1 15:56:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−> **[Author ID1: at Sat Sep 1 16:00:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−> **[Author ID1: at Sat Sep 1 16:02:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−> **[Author ID1: at Sat Sep 1 16:00:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−>**Células[Author ID1: at Sat Sep 1 16:01:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−> **[Author ID1: at Sat Sep 1 16:00:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−>**del [Author ID1: at Sat Sep 1 16:01:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−>**mesófilo[Author ID1: at Sat Sep 1 16:02:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]−−>**[Author ID1: at Sat Sep 1 15:56:00 2001]**[Author ID1: at Sat Sep 1 16:08:00 2001]

−−>Paredes gruesas [Author ID1: at Sat Sep 1 15:56:00 2001][Author ID1: at Sat Sep 1

15:56:00 2001](células grandes)[Author ID1: at Sat Sep 1 15:57:00 2001] Paredes finas ([Author ID1: at Sat Sep 1 16:02:00 2001]células[Author ID1: at Sat Sep 1 16:03:00 2001] [Author ID1: at Sat Sep 1 16:02:00 2001]pequeñas)[Author ID1: at Sat Sep 1 16:03:00 2001][Author ID0: at]

Numerosos plasmodesmos[Author ID1: at Sat Sep 1 15:57:00 2001] Menos plasmodesmos[Author ID1: at Sat Sep 1 16:03:00 2001][Author ID0: at]

Cloroplastos [Author ID1: at Sat Sep 1 15:57:00 2001]grandes[Author ID1: at Sat Sep 1 16:07:00 2001] [Author ID1: at Sat Sep 1 16:03:00 2001]C[Author ID1: at Sat Sep 1 16:06:00 2001]loroplastos [Author ID1: at Sat Sep 1 16:03:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] pequeños [Author ID1: at Sat Sep 1 16:03:00 2001][Author ID0: at]

Acumulas [Author ID1: at Sat Sep 1 15:57:00 2001]almidón[Author ID1: at Sat Sep 1 16:07:00 2001] No acumulan [Author ID1: at Sat Sep 1 16:04:00 2001]almidón[Author ID1: at Sat Sep 1 16:07:00 2001][Author ID0: at]

P[Author ID1: at Sat Sep 1 15:57:00 2001]o[Author ID1: at Sat Sep 1 16:07:00 2001]c[Author ID1: at Sat Sep 1 15:57:00 2001]o[Author ID1: at Sat Sep 1 16:07:00 2001]s o [Author ID1: at Sat Sep 1 15:57:00 2001]ningún[Author ID1: at Sat Sep 1 16:07:00 2001] gran[Author ID1: at Sat Sep 1 15:57:00 2001]a[Author ID1: at Sat Sep 1 15:58:00 2001] [Author ID1: at Sat Sep 1 16:04:00 2001] [Author ID1: at Sat Sep 1 16:07:00 2001]Abundantes grana[Author ID1: at Sat Sep 1 16:05:00 2001][Author ID0: at]

Poco PS II [Author ID1: at Sat Sep 1 15:58:00 2001] PS II / PS I elevada[Author ID1: at Sat Sep 1 16:05:00 2001][Author ID0: at]

No fotolisis del agua[Author ID1: at Sat Sep 1 15:58:00 2001] [Author ID1: at Sat Sep 1 16:05:00 2001]Fotolisis del agua[Author ID1: at Sat Sep 1 16:06:00 2001][Author ID1: at Sat Sep 1 15:58:00 2001]

Fosforilación[Author ID1: at Sat Sep 1 16:07:00 2001] [Author ID1: at Sat Sep 1 15:58:00 2001]cíclica[Author ID1: at Sat Sep 1 15:59:00 2001] [Author ID1: at Sat Sep 1 16:06:00 2001]Fosforilación[Author ID1: at Sat Sep 1 16:07:00 2001] lineal[Author ID1: at Sat Sep 1 16:06:00 2001][Author ID1: at Sat Sep 1 15:58:00 2001]

Poca reducción NADP[Author ID1: at Sat Sep 1 15:59:00 2001] Reducción NADP[Author ID1: at Sat Sep 1 16:06:00 2001][Author ID0: at]

Abundantes [Author ID1: at Sat Sep 1 15:59:00 2001]mitocondrias[Author ID1: at Sat Sep 1 16:07:00 2001][Author ID0: at]

Abundantes [Author ID1: at Sat Sep 1 15:59:00 2001]peroxisomas[Author ID1: at Sat Sep 1 16:08:00 2001]

[Author ID1: at Sat Sep 1 16:09:00 2001]

Características de las plantas C[Author ID1: at Sat Sep 1 16:09:00 2001]4[Author ID1: at Sat Sep 1 16:09:00 2001] [Author ID1: at Mon Sep 3 18:23:00 2001]−−>(respecto a las C[Author ID1: at Mon Sep 3 18:23:00 2001][Author ID1: at Mon Sep 3 18:24:00 2001]−−>3[Author ID1: at Mon Sep 3 18:23:00 2001][Author ID1: at Mon Sep 3 18:24:00 2001]−−>)[Author ID1: at Mon Sep 3 18:23:00 2001][Author ID1: at Mon Sep 3 18:24:00

2001]−−>**[Author ID1: at Sat Sep 1 16:09:00 2001]**[Author ID1: at Mon Sep 3 18:23:00 2001]

- ◊ −−>Anatomía[Author ID1: at Sat Sep 1 16:10:00 2001][Author ID1: at Sat Sep 1 16:10:00 2001]−−> f[Author ID1: at Sat Sep 1 16:09:00 2001][Author ID1: at Sat Sep 1 16:10:00 2001]−−>oliar característica[Author ID1: at Sat Sep 1 16:10:00 2001][Author ID1: at Sat Sep 1 16:10:00 2001] (cloroplastos dim[Author ID1: at Sat Sep 1 16:10:00 2001]ó[Author ID1: at Sat Sep 1 16:13:00 2001]rficos) [Author ID1: at Sat Sep 1 16:10:00 2001]−−>[Author ID1: at Sat Sep 1 16:10:00 2001][Author ID1: at Sat Sep 1 16:10:00 2001]
- ◊ Mayor afinidad por el CO[Author ID1: at Sat Sep 1 16:10:00 2001]2[Author ID1: at Sat Sep 1 16:10:00 2001] (no tienen [Author ID1: at Mon Sep 3 18:25:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001])[Author ID1: at Mon Sep 3 18:25:00 2001]−−>[Author ID1: at Sat Sep 1 16:11:00 2001][Author ID1: at Sat Sep 1 16:10:00 2001]
- ◊ Menor resistencia a la difusión del CO2[Author ID1: at Sat Sep 1 16:11:00 2001]−−>[Author ID1: at Sat Sep 1 16:11:00 2001][Author ID1: at Sat Sep 1 16:11:00 2001]
- ◊ −−>Alto valor fotosintético[Author ID1: at Sat Sep 1 16:11:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]
- ◊ E[Author ID1: at Sat Sep 1 16:13:00 2001]−−>levadas t[Author ID1: at Sat Sep 1 16:11:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]a[Author ID1: at Sat Sep 1 16:13:00 2001]−−>sas de crecimiento[Author ID1: at Sat Sep 1 16:11:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]−−>[Author ID1: at Sat Sep 1 16:13:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]
- ◊ F[Author ID1: at Sat Sep 1 16:13:00 2001]−−>otosíntesis con intensidades[Author ID1: at Sat Sep 1 16:13:00 2001][Author ID1: at Sat Sep 1 16:13:00 2001] [Author ID1: at Sat Sep 1 16:13:00 2001]luminosas elevadas[Author ID1: at Sat Sep 1 16:13:00 2001]−−>[Author ID1: at Sat Sep 1 16:13:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]
- ◊ Marcada eficiencia en el uso del agua[Author ID1: at Sat Sep 1 16:13:00 2001]−−>[Author ID1: at Sat Sep 1 16:14:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]
- ◊ Resistencia a altas temperaturas[Author ID1: at Sat Sep 1 16:14:00 2001]−−>[Author ID1: at Sat Sep 1 16:14:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]
- ◊ Adaptación a ambientes salinos[Author ID1: at Sat Sep 1 16:14:00 2001] (capaces de acumular [Author ID1: at Sat Sep 1 16:15:00 2001]ácidos[Author ID1: at Sat Sep 1 16:25:00 2001] dicarboxílicos en la vacuola aumentando el potencial [Author ID1: at Sat Sep 1 16:15:00 2001]osmótico[Author ID1: at Sat Sep 1 16:25:00 2001] y [Author ID1: at Sat Sep 1 16:15:00 2001]así[Author ID1: at Sat Sep 1 16:25:00 2001] poder tirar con [Author ID1: at Sat Sep 1 16:15:00 2001]más[Author ID1: at Mon Sep 3 15:36:00 2001] fuerza del agua por la [Author ID1: at Sat Sep 1 16:15:00 2001]raíz[Author ID1: at Sat Sep 1 16:25:00 2001]).[Author ID1: at Sat Sep 1 16:16:00 2001]−−>[Author ID1: at Sat Sep 1 16:26:00 2001][Author ID1: at Sat Sep 1 16:12:00 2001]

[Author ID0: at]

La existencia de dos tipos de células in las plantas C[Author ID1: at Sat Sep 1 16:26:00 2001]4[Author ID1: at Sat Sep 1 16:26:00 2001] implica la necesidad de q coparticipen en procesos de fijación y reducción del CO[Author ID1: at Sat Sep 1 16:27:00 2001]2[Author ID1: at Sat Sep 1 16:27:00 2001].[Author ID1: at Sat Sep 1 16:27:00 2001]

(Hoja [Author ID1: at Sat Sep 1 16:27:00 2001]57 [Author ID1: at Sat Sep 1 16:28:00 2001]Fig.[Author ID1: at Mon Sep 3 11:35:00 2001] 9.11)[Author ID1: at Sat Sep 1 16:28:00 2001] Se puede dividir el proceso en 4 etapas.[Author ID1: at Sat Sep 1 16:28:00 2001]

- el CO[Author ID1: at Sat Sep 1 16:29:00 2001]2[Author ID1: at Sat Sep 1 16:29:00 2001] q entra por los estomas a las células del mesófilo es fijado en forma de bicarbonato sobre el PEP[Author ID1: at Sat Sep 1 16:29:00 2001]−−>[Author ID1: at Sat Sep 1 16:29:00 2001][Author ID1: at Sat Sep 1 16:28:00 2001]
- los [Author ID1: at Sat Sep 1 16:29:00 2001]ácidos[Author ID1: at Sat Sep 1 16:33:00 2001] dicarbox[Author ID1: at Sat Sep 1 16:29:00 2001]í[Author ID1: at Sat Sep 1 16:33:00 2001]licos son [Author ID1: at Sat Sep 1 16:29:00 2001]transferidos[Author ID1: at Sat Sep 1 16:33:00 2001] por los plasmodesmos a las [Author ID1: at Sat Sep 1 16:29:00 2001]células[Author ID1: at Sat Sep 1 16:33:00 2001] de la vaina[Author ID1: at Sat Sep 1 16:30:00 2001]−−>[Author ID1: at Sat Sep 1 16:30:00 2001][Author ID1: at Sat Sep 1 16:28:00 2001]
- aquí se da la [Author ID1: at Sat Sep 1 16:30:00 2001]descarboxilación[Author ID1: at Sat Sep 1 16:31:00 2001].[Author ID1: at Sat Sep 1 16:30:00 2001] El CO[Author ID1: at Sat Sep 1 16:31:00 2001]2[Author ID1: at Sat Sep 1 16:31:00 2001] es refijado por Calvin mediante la RUBISCO [Author ID1: at Sat Sep 1 16:31:00 2001]liberando[Author ID1: at Sat Sep 1 16:33:00 2001] un compuesto de 3 C. [Author ID1: at Sat Sep 1 16:31:00 2001]Estos productos vuelven a las células del mesófilo[Author ID1: at Sat Sep 1 16:32:00 2001]−−>[Author ID1: at Sat Sep 1 16:32:00 2001][Author ID1: at Sat Sep 1 16:28:00 2001]
- los [Author ID1: at Sat Sep 1 16:32:00 2001]productos[Author ID1: at Sat Sep 1 16:33:00 2001] de 3 C[Author ID1: at Sat Sep 1 16:32:00 2001] se utilizan pata [Author ID1: at Sat Sep 1 16:33:00 2001]regenerar[Author ID1: at Sat Sep 1 16:34:00 2001] el acep[Author ID1: at Sat Sep 1 16:33:00 2001]tor 1º[Author ID1: at Sat Sep 1 16:34:00 2001]−−>[Author ID1: at Sat Sep 1 16:34:00 2001][Author ID1: at Sat Sep 1 16:28:00 2001]

[Author ID0: at]

[Author ID1: at Sat Sep 1 16:34:00 2001]

E[Author ID1: at Sat Sep 1 16:35:00 2001]xisten tres [Author ID1: at Sat Sep 1 16:34:00 2001]subtipos[Author ID1: at Sat Sep 1 16:35:00 2001] de plantas C[Author ID1: at Sat Sep 1 16:34:00 2001]4[Author ID1: at Sat Sep 1 16:35:00 2001]

−−>Subtipo NADP−ME[Author ID1: at Sat Sep 1 16:35:00 2001][Author ID1: at Sat Sep 1 16:36:00 2001]

−−>Subtipo NAD−ME[Author ID0: at][Author ID0: at]

−−>Subtipo PEP−carboxikinasa[Author ID1: at Sat Sep 1 16:36:00 2001][Author ID1: at Sat Sep 1 16:36:00 2001][Author ID1: at Mon Aug 27 14:44:00 2001]

[Author ID0: at]

[Author ID1: at Mon Sep 3 18:33:00 2001]

- −−>**Subtipo[Author ID1: at Mon Sep 3 18:34:00 2001]**[Author ID1: at Mon Sep 3 18:35:00 2001] **NADP−EM (Hoja 58)[Author ID1: at Mon Sep 3 18:35:00 2001]**−−>**[Author ID1: at Mon Sep 3 18:35:00 2001]**[Author

ID1: at Mon Sep 3 18:35:00 2001]

E[Author ID1: at Mon Sep 3 18:36:00 2001]−−>n los tres tipos el primer proceso de la [Author ID1: at Mon Sep 3 18:35:00 2001][Author ID1: at Mon Sep 3 18:36:00 2001]−−>fijación del C se da en las células del mesófilo, en concreto, en el citoplasma.[Author ID0: at][Author ID0: at]

−−>Mediante[Author ID1: at Mon Sep 3 18:36:00 2001][Author ID1: at Mon Sep 3 18:36:00 2001] la PEP carboxilasa[Author ID1: at Mon Sep 3 18:37:00 2001] (en el citoplasma del [Author ID1: at Mon Sep 3 23:54:00 2001]mesófilo[Author ID1: at Mon Sep 3 23:55:00 2001])[Author ID1: at Mon Sep 3 23:54:00 2001] se [Author ID1: at Mon Sep 3 18:37:00 2001]obtiene[Author ID1: at Mon Sep 3 18:52:00 2001] el OA q es el primer producto. Este OA es [Author ID1: at Mon Sep 3 18:37:00 2001]introducido[Author ID1: at Mon Sep 3 18:52:00 2001] en el cloroplasto[Author ID1: at Mon Sep 3 18:37:00 2001] de la célula del [Author ID1: at Mon Sep 3 21:57:00 2001]mesófilo[Author ID1: at Tue Sep 4 23:08:00 2001] donde es [Author ID1: at Mon Sep 3 18:37:00 2001]reducido[Author ID1: at Mon Sep 3 18:52:00 2001] a malato mediante la Malato desH[Author ID1: at Mon Sep 3 18:37:00 2001]asa[Author ID1: at Mon Sep 3 18:38:00 2001] NADP dependiente.[Author ID0: at]

El malato a [Author ID1: at Mon Sep 3 18:38:00 2001]través[Author ID1: at Mon Sep 3 18:52:00 2001] de los plasmodesmos es [Author ID1: at Mon Sep 3 18:38:00 2001]transportado[Author ID1: at Mon Sep 3 18:52:00 2001] al cloroplasto de la [Author ID1: at Mon Sep 3 18:38:00 2001]célula[Author ID1: at Mon Sep 3 18:52:00 2001] de la vaina donde se da la [Author ID1: at Mon Sep 3 18:38:00 2001]descarboxilación[Author ID1: at Mon Sep 3 18:39:00 2001] [Author ID1: at Mon Sep 3 18:38:00 2001]oxidativa catalizada por la NADP−EM (enzima [Author ID1: at Mon Sep 3 18:39:00 2001]málica[Author ID1: at Tue Sep 4 23:49:00 2001] NADP dependiente)[Author ID0: at]

Se forma pirúvico y se obtiene NADPH[Author ID1: at Mon Sep 3 18:39:00 2001]. Este grupo no tiene apilamientos granales por lo q no se puede dar transporte de e[Author ID1: at Mon Sep 3 18:40:00 2001]−[Author ID1: at Mon Sep 3 18:40:00 2001] y este NADPH q se obtiene es el q va a ser necesario en [Author ID1: at Mon Sep 3 18:40:00 2001]el Ciclo de Calvin.[Author ID0: at]

El CO[Author ID1: at Mon Sep 3 18:41:00 2001]2[Author ID1: at Mon Sep 3 18:41:00 2001] q se libera es refijado por Calvin.[Author ID0: at]

El [Author ID1: at Mon Sep 3 18:41:00 2001]pirúvico[Author ID1: at Mon Sep 3 18:42:00 2001] [Author ID1: at Mon Sep 3 18:41:00 2001]regresa al cloroplasto de la [Author ID1: at Mon Sep 3 18:42:00 2001]célula[Author ID1: at Mon Sep 3 18:53:00 2001] del mesófilo donde se usa para regenerar el PEP mediante la Piruvato ortofosfato dikinasa. [Author ID1: at Mon Sep 3 18:42:00 2001]Acoplada a esta [Author ID1: at Mon Sep 3 18:43:00 2001]reacción[Author ID1: at Mon Sep 3 18:53:00 2001] hay dos reacciones catalizadas por los enzimas adenilatokinasa y pirofosfatasa.[Author ID0: at]

[Author ID1: at Mon Sep 3 18:43:00 2001]

- **Subtipo NAD−EM[Author ID1: at Mon Sep 3 18:44:00 2001]−−>[Author ID1: at Mon Sep 3 18:44:00 2001]**[Author ID1: at Mon Sep 3 18:41:00 2001]

El bicarbonato se fija sobre el PEP dando[Author ID1: at Mon Sep 3 18:45:00 2001] [Author ID1: at Mon Sep 3 21:38:00 2001]OA[Author ID1: at Mon Sep 3 18:45:00 2001] (por la PEP carboxilasa)[Author ID1: at Tue Sep 4 00:10:00 2001]. Este sufre un proceso de

transaminaci[Author ID1: at Mon Sep 3 18:45:00 2001]ó[Author ID1: at Mon Sep 3 18:53:00 2001]n con el glutamato para dar ceto[Author ID1: at Mon Sep 3 18:45:00 2001]glutarato y aspartato, en una [Author ID1: at Mon Sep 3 18:46:00 2001]reacción[Author ID1: at Mon Sep 3 18:53:00 2001] catalizada por la [Author ID1: at Mon Sep 3 18:46:00 2001]Aspartato aminotransferasa[Author ID1: at Tue Sep 4 00:05:00 2001].[Author ID0: at]

Este aspartato es el q se transfiere a las [Author ID1: at Mon Sep 3 18:46:00 2001]células[Author ID1: at Mon Sep 3 18:47:00 2001] [Author ID1: at Mon Sep 3 18:46:00 2001]de[Author ID1: at Mon Sep 3 18:47:00 2001] [Author ID1: at Mon Sep 3 21:44:00 2001]l[Author ID1: at Mon Sep 3 18:47:00 2001]a vaina[Author ID1: at Mon Sep 3 21:44:00 2001].[Author ID0: at]

El aspartato es introducido en las mitocondrias[Author ID1: at Mon Sep 3 18:47:00 2001] de las células de la vaina[Author ID1: at Mon Sep 3 21:30:00 2001], es desaminado a OA mediante la misma enzima en sentido contrario. [Author ID1: at Mon Sep 3 18:47:00 2001]El oxoglutarato es reducido a malato[Author ID1: at Mon Sep 3 18:48:00 2001] mediante la Malato desH[Author ID1: at Tue Sep 4 23:47:00 2001]asa[Author ID1: at Tue Sep 4 23:47:00 2001] [Author ID1: at Tue Sep 4 23:47:00 2001]NAD dependiente,[Author ID1: at Tue Sep 4 23:48:00 2001] obteniendo NADH. El malato se descarboxila oxidativamente[Author ID1: at Mon Sep 3 18:48:00 2001] [Author ID1: at Mon Sep 3 21:29:00 2001](mediante la NAD−EM [Author ID1: at Mon Sep 3 21:28:00 2001](enzima [Author ID1: at Tue Sep 4 23:48:00 2001]málica[Author ID1: at Tue Sep 4 23:49:00 2001] NAD dependiente)[Author ID1: at Tue Sep 4 23:48:00 2001] [Author ID1: at Tue Sep 4 23:49:00 2001]q esta en la mitocondria de la [Author ID1: at Mon Sep 3 21:28:00 2001]célula[Author ID1: at Mon Sep 3 21:32:00 2001] de la vaina)[Author ID1: at Mon Sep 3 21:28:00 2001] liberando CO[Author ID1: at Mon Sep 3 18:48:00 2001]2[Author ID1: at Mon Sep 3 18:49:00 2001] y formando pirúvico[Author ID1: at Mon Sep 3 18:49:00 2001],[Author ID1: at Mon Sep 3 21:29:00 2001] q sale de la mitocondri[Author ID1: at Mon Sep 3 21:28:00 2001]a[Author ID1: at Mon Sep 3 21:29:00 2001] de la [Author ID1: at Mon Sep 3 21:28:00 2001]célula[Author ID1: at Mon Sep 3 21:33:00 2001] de la vaina[Author ID1: at Mon Sep 3 21:28:00 2001] al citoplasma de la célula de la vaina[Author ID1: at Mon Sep 3 21:31:00 2001]. Al mismo tiempo el NADPH consumido sirve de aceptor de e[Author ID1: at Mon Sep 3 18:49:00 2001]−[Author ID1: at Mon Sep 3 18:49:00 2001] en la descarboxilación oxidativa.[Author ID0: at]

El CO[Author ID1: at Mon Sep 3 18:50:00 2001]2[Author ID1: at Mon Sep 3 18:50:00 2001] entra en el cloroplasto[Author ID1: at Mon Sep 3 18:50:00 2001] de la célula de la vaina[Author ID1: at Mon Sep 3 22:00:00 2001] donde es refijado por [Author ID1: at Mon Sep 3 18:50:00 2001]Calvin[Author ID1: at Mon Sep 3 18:51:00 2001].[Author ID1: at Mon Sep 3 18:50:00 2001] [Author ID0: at]

El pirúvico tiene q ser conducido a las células del mesófilo, pero tiene q regresar como aa, por lo q es transaminado a Ala mediante el enzima alanina[Author ID1: at Mon Sep 3 18:51:00 2001] [Author ID1: at Mon Sep 3 18:54:00 2001]aminotransferasa[Author ID1: at Mon Sep 3 18:51:00 2001] en el citosol de la célula de la vaina[Author ID1: at Mon Sep 3 22:00:00 2001].[Author ID1: at Mon Sep 3 18:51:00 2001][Author ID0: at]

La Ala pasa al citoplasma de las [Author ID1: at Mon Sep 3 18:56:00 2001]células[Author ID1: at Mon Sep 3 19:00:00 2001] del mesófilo donde es desaminado por el mismo enzima en sentido contrario.[Author ID1: at Mon Sep 3 18:56:00 2001]

El piruvato entra en el cloroplasto[Author ID1: at Mon Sep 3 18:57:00 2001] de la célula del

[Author ID1: at Mon Sep 3 22:01:00 2001]mesófilo[Author ID1: at Tue Sep 4 23:07:00 2001] y mediante los enzimas PEP carboxilasa, Piruvato ortofosfato[Author ID1: at Mon Sep 3 18:57:00 2001] [Author ID1: at Mon Sep 3 23:32:00 2001]dikinasa y Pirofosfatasa es transformado a PEP.[Author ID1: at Mon Sep 3 18:57:00 2001][Author ID0: at]

[Author ID1: at Mon Sep 3 18:58:00 2001]

- **Subtipo PEP [Author ID1: at Mon Sep 3 18:58:00 2001]carboxikinasa[Author ID1: at Mon Sep 3 19:00:00 2001]**−−>[Author ID1: at Mon Sep 3 19:00:00 2001][Author ID1: at Mon Sep 3 19:00:00 2001]

−−>La primera par[Author ID1: at Mon Sep 3 19:00:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]t[Author ID1: at Mon Sep 3 22:14:00 2001]−−>e del proceso es igual q en el caso anterior.[Author ID0: at][Author ID0: at]

−−>El aspartato pasa al citoplasma de las [Author ID1: at Mon Sep 3 19:00:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−−>células[Author ID1: at Mon Sep 3 19:01:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−−> [Author ID1: at Mon Sep 3 19:00:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−−>de la vaina y aquí es desaminado a OA y este sufre la descarboxilación por la PEP[Author ID1: at Mon Sep 3 19:01:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−[Author ID1: at Mon Sep 3 23:57:00 2001]−−>carboxikinasa con gasto de ATP liberándose [Author ID1: at Mon Sep 3 19:01:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−−>CO[Author ID1: at Mon Sep 3 19:02:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]−−>2[Author ID1: at Mon Sep 3 19:02:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001] y con formación de PEP. El CO[Author ID1: at Mon Sep 3 19:02:00 2001]2[Author ID1: at Mon Sep 3 19:02:00 2001] es refijado por [Author ID1: at Mon Sep 3 19:02:00 2001]Calvin en el cloroplasto de la célula de la vaina[Author ID1: at Mon Sep 3 22:15:00 2001]. Hay 2 posibilidades:[Author ID1: at Mon Sep 3 19:02:00 2001]

- Q el PEP vuelva como tal.[Author ID1: at Mon Sep 3 19:03:00 2001]−−>[Author ID1: at Mon Sep 3 19:03:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]
- Q regrese como aa con lo q el PEP[Author ID1: at Mon Sep 3 19:03:00 2001] [Author ID1: at Mon Sep 3 19:05:00 2001]mediante la Piruvatokinasa[Author ID1: at Mon Sep 3 19:03:00 2001] (citoplasma de la célula de la vaina)[Author ID1: at Mon Sep 3 23:49:00 2001] [Author ID1: at Mon Sep 3 19:03:00 2001]produciendo[Author ID1: at Mon Sep 3 19:04:00 2001] [Author ID1: at Mon Sep 3 19:03:00 2001]ATP da pirúvico. Este se transamina a Ala q vuelve a las células del mesófilo donde se des[Author ID1: at Mon Sep 3 19:04:00 2001]a[Author ID1: at Mon Sep 3 19:06:00 2001]mina a [Author ID1: at Mon Sep 3 19:04:00 2001]pirúvico[Author ID1: at Mon Sep 3 19:05:00 2001] [Author ID1: at Mon Sep 3 19:04:00 2001]y este por la Piruvato ortofosfato dikinasa da PEP [Author ID1: at Mon Sep 3 19:05:00 2001]cerrando[Author ID1: at Mon Sep 3 19:06:00 2001] el ciclo.[Author ID1: at Mon Sep 3 19:05:00 2001]−−>[Author ID1: at Mon Sep 3 19:06:00 2001][Author ID1: at Mon Sep 3 19:02:00 2001]

[Author ID1: at Mon Sep 3 19:07:00 2001]

Regulación del metabolismo C[Author ID1: at Mon Sep 3 19:07:00 2001]4[Author ID1: at Mon Sep 3 19:07:00 2001] (Hoja 60 [Author ID1: at Mon Sep 3 19:07:00 2001]Fig.[Author ID1: at Mon Sep 3 19:08:00 2001] 9.13)[Author ID1: at Mon Sep 3 19:07:00 2001][Author ID1: at Mon Sep 3 19:08:00 2001]

Las Malato de H[Author ID1: at Mon Sep 3 19:08:00 2001]asas[Author ID1: at Mon Sep 3 19:08:00 2001] [Author ID1: at Mon Sep 3 19:08:00 2001]están[Author ID1: at Mon Sep 3 19:19:00 2001] reguladas por el sistema ferredoxina [Author ID1: at Mon Sep 3 19:08:00 2001]tioferredoxina rompiendo los puentes de S por la luz.[Author ID0: at]

Los enzimas del Ciclo de Calvin de las células de la vaina es lo mismo q en la [Author ID1: at Mon Sep 3 19:09:00 2001]regulación[Author ID1: at Mon Sep 3 19:10:00 2001] [Author ID1: at Mon Sep 3 19:09:00 2001]del metabolismo C[Author ID1: at Mon Sep 3 19:10:00 2001]3[Author ID1: at Mon Sep 3 19:10:00 2001].[Author ID0: at]

El control de la Piruvatofosfatodikinasa es mediante un proceso de [Author ID1: at Mon Sep 3 19:10:00 2001]fosforilación[Author ID1: at Mon Sep 3 19:18:00 2001] [Author ID1: at Mon Sep 3 19:10:00 2001]−[Author ID1: at Mon Sep 3 19:11:00 2001] [Author ID1: at Mon Sep 3 19:19:00 2001]desfosforilación[Author ID1: at Mon Sep 3 23:22:00 2001] [Author ID1: at Mon Sep 3 19:10:00 2001]catalizadas por las proteinkinasas y pirofosfatasas.[Author ID0: at]

El enzima [Author ID1: at Mon Sep 3 19:11:00 2001]Piruvato[Author ID1: at Mon Sep 3 19:12:00 2001] [Author ID1: at Mon Sep 3 19:11:00 2001]ortofosfatokinasa fosforila un residuo de treonina con ADP en oscuridad estando el enzima [Author ID1: at Mon Sep 3 19:12:00 2001]inactivo[Author ID1: at Mon Sep 3 19:18:00 2001].[Author ID0: at]

El residuo de His [Author ID1: at Mon Sep 3 19:12:00 2001]también[Author ID1: at Mon Sep 3 19:18:00 2001] [Author ID1: at Mon Sep 3 19:12:00 2001]sufre un proceso de [Author ID1: at Mon Sep 3 19:13:00 2001]fosforilación[Author ID1: at Mon Sep 3 19:18:00 2001] [Author ID1: at Mon Sep 3 19:19:00 2001]−desfosforilaci[Author ID1: at Mon Sep 3 19:14:00 2001]ó[Author ID1: at Mon Sep 3 23:22:00 2001]n.[Author ID0: at]

En presencia de luz la pirofosforilasa [Author ID1: at Mon Sep 3 19:14:00 2001]desfosforila[Author ID1: at Mon Sep 3 19:15:00 2001] [Author ID1: at Mon Sep 3 19:14:00 2001]la treonina y la His puede fosforilarse con esto de ATP [Author ID1: at Mon Sep 3 19:15:00 2001]activándose[Author ID1: at Mon Sep 3 19:16:00 2001] [Author ID1: at Mon Sep 3 19:15:00 2001]el enzima.[Author ID0: at]

La PEP carboxilasa es [Author ID1: at Mon Sep 3 19:16:00 2001]inhibida[Author ID1: at Mon Sep 3 19:17:00 2001] por sus productos: malato, aspartato y OA. A su vez es activada por el [Author ID1: at Mon Sep 3 19:16:00 2001]pirúvico[Author ID1: at Mon Sep 3 19:17:00 2001] [Author ID1: at Mon Sep 3 19:16:00 2001]y glucosa 6P q aumenta la afinidad de la PEP carboxilasa por el PEP[Author ID1: at Mon Sep 3 19:17:00 2001]. La [Author ID1: at Mon Sep 3 19:19:00 2001]alcalinización[Author ID1: at Mon Sep 3 19:20:00 2001] del medio [Author ID1: at Mon Sep 3 19:19:00 2001]también aumenta la afinidad por el PEP. El malato acidifica el medio disminuyendo el afinidad por el PEP.[Author ID1: at Mon Sep 3 19:20:00 2001]

La luz activa una proteinkinasa q fosforila un residuo de Ser y el enzima fosforilado es [Author ID1: at Mon Sep 3 19:21:00 2001]activo[Author ID1: at Mon Sep 3 19:22:00 2001].[Author ID1: at Mon Sep 3 19:21:00 2001][Author ID0: at]

En oscuridad se desfosforila por la pirofosfatasa inactivándose.[Author ID1: at Mon Sep 3 19:22:00 2001][Author ID0: at]

Cuando aumenta el pH y la concentración del medio[Author ID1: at Mon Sep 3 19:24:00

2001],[Author ID1: at Mon Sep 3 19:25:00 2001] aumenta la actividad del sistema p[Author ID1: at Mon Sep 3 19:24:00 2001]orque la PEP carboxilasa se asocia formando tetrámeros.[Author ID0: at]

Cuando aumenta el pH se rompe la formación de los[Author ID1: at Mon Sep 3 19:25:00 2001] tetrámeros u los monómeros son los q llevan a cabo la catálisis del sistema.[Author ID1: at Mon Sep 3 19:26:00 2001][Author ID1: at Mon Sep 3 11:35:00 2001]

[Author ID0: at]

[Author ID0: at]

El hecho de q la RUBISCO catalice la fijación de CO[Author ID1: at Mon Sep 3 19:30:00 2001]2[Author ID1: at Mon Sep 3 19:30:00 2001] y O[Author ID1: at Mon Sep 3 19:30:00 2001]2[Author ID1: at Mon Sep 3 19:30:00 2001] [Author ID1: at Mon Sep 3 19:30:00 2001] de manera competitiva, [Author ID1: at Tue Sep 4 18:17:00 2001]conlleva el q se de el proceso de la [Author ID1: at Mon Sep 3 19:30:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001].[Author ID1: at Mon Sep 3 19:30:00 2001][Author ID0: at]

Las plantas C[Author ID1: at Mon Sep 3 19:31:00 2001]3[Author ID1: at Mon Sep 3 19:31:00 2001] tienen tasas altas de [Author ID1: at Mon Sep 3 19:31:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001].[Author ID0: at]

Las plantas C[Author ID1: at Mon Sep 3 19:31:00 2001]4[Author ID1: at Mon Sep 3 19:31:00 2001] apenas tienen [Author ID1: at Mon Sep 3 19:32:00 2001]Fotorrespiración (porque el CO[Author ID1: at Tue Sep 4 18:36:00 2001]2 [Author ID1: at Tue Sep 4 18:36:00 2001]−−>se fija[Author ID1: at Tue Sep 4 18:36:00 2001][Author ID1: at Tue Sep 4 18:37:00 2001] [Author ID1: at Tue Sep 4 18:36:00 2001]en las células de la vaina y ah[Author ID1: at Tue Sep 4 18:36:00 2001]í, la concentración del CO[Author ID1: at Tue Sep 4 18:37:00 2001]2[Author ID1: at Tue Sep 4 18:37:00 2001] es mayor q la del O[Author ID1: at Tue Sep 4 18:37:00 2001]2[Author ID1: at Tue Sep 4 18:37:00 2001])[Author ID1: at Tue Sep 4 18:37:00 2001].[Author ID0: at]

[Author ID0: at]

En el proceso [Author ID1: at Mon Sep 3 19:32:00 2001]fotorrespiratorio[Author ID1: at Tue Sep 4 17:51:00 2001] la planta intenta recuperar parte del C q se ha transformado en [Author ID1: at Mon Sep 3 19:32:00 2001]2P−glicolato.[Author ID0: at]

En [Author ID1: at Mon Sep 3 19:33:00 2001]algún[Author ID1: at Mon Sep 3 19:36:00 2001] paso del proceso se pierde CO[Author ID1: at Mon Sep 3 19:33:00 2001]2[Author ID1: at Mon Sep 3 19:33:00 2001] q inicialmente se [Author ID1: at Mon Sep 3 19:33:00 2001]había[Author ID1: at Mon Sep 3 19:37:00 2001] fijado.[Author ID0: at]

La [Author ID1: at Mon Sep 3 19:33:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] [Author ID1: at Mon Sep 3 19:33:00 2001]es muy dependiente de la temperatura. Cuando aumenta la [Author ID1: at Mon Sep 3 19:34:00 2001]Tª[Author ID1: at Mon Sep 3 19:37:00 2001] la tasa de [Author ID1: at Mon Sep 3 19:34:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] [Author ID1: at Mon Sep 3 19:34:00 2001]también[Author ID1: at Mon Sep 3 19:37:00 2001] aumenta porque la [Author ID1: at Mon Sep 3 19:34:00 2001]RUBISCO[Author ID1: at Mon Sep 3 19:35:00 2001] [Author ID1: at Mon Sep 3 19:34:00 2001]depende de las concentraciones de los

solutos.[Author ID1: at Tue Sep 4 18:25:00 2001][Author ID1: at Mon Sep 3 19:35:00 2001]

[Author ID1: at Mon Sep 3 19:37:00 2001]

−−>La [Author ID1: at Mon Sep 3 19:37:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−>afinidad[Author ID1: at Mon Sep 3 19:38:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−> del CO[Author ID1: at Mon Sep 3 19:37:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−>2[Author ID1: at Mon Sep 3 19:38:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−> es mayor, pero se da una mayor concentración de O[Author ID1: at Mon Sep 3 19:38:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−>2[Author ID1: at Mon Sep 3 19:38:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−>. [Author ID1: at Mon Sep 3 19:38:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]Con temperaturas altas la [Author ID1: at Tue Sep 4 18:25:00 2001]proporción[Author ID1: at Tue Sep 4 18:27:00 2001] O[Author ID1: at Tue Sep 4 18:26:00 2001]2[Author ID1: at Tue Sep 4 18:26:00 2001] / CO[Author ID1: at Tue Sep 4 18:26:00 2001]2[Author ID1: at Tue Sep 4 18:26:00 2001] [Author ID1: at Tue Sep 4 18:26:00 2001]cloroplásticos disueltos [Author ID1: at Tue Sep 4 18:28:00 2001]es mayor[Author ID1: at Tue Sep 4 18:26:00 2001] (el CO[Author ID1: at Tue Sep 4 18:31:00 2001]2 [Author ID1: at Tue Sep 4 18:31:00 2001]−−>se disuelve mejor con el frió)[Author ID1: at Tue Sep 4 18:31:00 2001][Author ID1: at Tue Sep 4 18:31:00 2001]−−>,[Author ID1: at Tue Sep 4 18:26:00 2001][Author ID1: at Tue Sep 4 18:31:00 2001] por lo que se fija más O[Author ID1: at Tue Sep 4 18:26:00 2001]2[Author ID1: at Tue Sep 4 18:26:00 2001] q a[Author ID1: at Tue Sep 4 18:26:00 2001] temperaturas bajas. [Author ID1: at Tue Sep 4 18:27:00 2001]−−>[Author ID1: at Mon Sep 3 19:28:00 2001][Author ID1: at Tue Sep 4 18:26:00 2001]

−−>Las tasas[Author ID1: at Mon Sep 3 19:42:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001] de transpiración aumentan con la [Author ID1: at Mon Sep 3 19:42:00 2001]Tª[Author ID1: at Mon Sep 3 19:45:00 2001] dado q la demanda evaporativa es elevada.[Author ID1: at Mon Sep 3 19:42:00 2001][Author ID0: at]

Para evitar esto la planta cierra los estomas con lo q las [Author ID1: at Mon Sep 3 19:43:00 2001]t[Author ID1: at Tue Sep 4 17:55:00 2001]asas de [Author ID1: at Mon Sep 3 19:43:00 2001]fotosíntesis[Author ID1: at Mon Sep 3 19:45:00 2001] en las plantas C[Author ID1: at Mon Sep 3 19:43:00 2001]3[Author ID1: at Mon Sep 3 19:43:00 2001] se ven disminuidas.[Author ID1: at Mon Sep 3 19:43:00 2001]

En las C[Author ID1: at Mon Sep 3 19:44:00 2001]4[Author ID1: at Mon Sep 3 19:44:00 2001] el [Author ID1: at Mon Sep 3 19:44:00 2001]enzima[Author ID1: at Mon Sep 3 19:45:00 2001] encargado de la carboxilación tiene mayor afinidad por el sustrato q la [Author ID1: at Mon Sep 3 19:44:00 2001]RUBISCO.[Author ID0: at]

Con la carboxilación los niveles de CO[Author ID1: at Mon Sep 3 19:45:00 2001]2[Author ID1: at Mon Sep 3 19:45:00 2001] aumentan mucho con lo q el cociente CO[Author ID1: at Mon Sep 3 19:45:00 2001]2[Author ID1: at Mon Sep 3 19:46:00 2001] / O[Author ID1: at Mon Sep 3 19:46:00 2001]2[Author ID1: at Mon Sep 3 19:46:00 2001] es muy elevado y no se va a dar la [Author ID1: at Mon Sep 3 19:46:00 2001]oxigenación[Author ID1: at Mon Sep 3 19:53:00 2001] por lo q los niveles de [Author ID1: at Mon Sep 3 19:46:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] [Author ID1: at Mon Sep 3 19:46:00 2001]van a ser casi [Author ID1: at Mon Sep 3 19:47:00 2001]inexistentes[Author ID1: at Mon Sep 3 19:53:00 2001].[Author ID0: at]

Esto también les permite tener mayor eficiencia en el uso del agua con elevadas tasas de

fijación de CO[Author ID1: at Mon Sep 3 19:47:00 2001]2[Author ID1: at Mon Sep 3 19:48:00 2001] aunque tengan los [Author ID1: at Mon Sep 3 19:48:00 2001]estomas[Author ID1: at Mon Sep 3 19:53:00 2001] casi cerrados y con la [Author ID1: at Mon Sep 3 19:48:00 2001]mínima[Author ID1: at Mon Sep 3 19:53:00 2001] perdida de agua.[Author ID0: at]

[Author ID0: at]

Las C[Author ID1: at Mon Sep 3 19:48:00 2001]4[Author ID1: at Mon Sep 3 19:48:00 2001] también tienen elevada eficiencia en el uso del [Author ID1: at Mon Sep 3 19:48:00 2001]nitrógeno[Author ID1: at Mon Sep 3 19:53:00 2001]. [Author ID1: at Mon Sep 3 19:48:00 2001]Con la misma cantidad de N se da mayor desarrollo en plantas C[Author ID1: at Mon Sep 3 19:49:00 2001]4.[Author ID1: at Mon Sep 3 19:50:00 2001]

−−>Las[Author ID1: at Mon Sep 3 20:53:00 2001][Author ID1: at Mon Sep 3 19:50:00 2001]−−> plantas C[Author ID1: at Mon Sep 3 19:50:00 2001][Author ID1: at Mon Sep 3 19:50:00 2001]3[Author ID1: at Mon Sep 3 19:50:00 2001] tienen q usar gran cantidad de[Author ID1: at Mon Sep 3 19:50:00 2001]l[Author ID1: at Mon Sep 3 19:51:00 2001] N [Author ID1: at Mon Sep 3 19:50:00 2001](40−70%)[Author ID1: at Mon Sep 3 19:51:00 2001]para sintetizar la [Author ID1: at Mon Sep 3 19:50:00 2001]RUBISCO. Las C[Author ID1: at Mon Sep 3 19:51:00 2001]4[Author ID1: at Mon Sep 3 19:51:00 2001] transforman en [Author ID1: at Mon Sep 3 19:51:00 2001]RUBISCO[Author ID1: at Mon Sep 3 19:52:00 2001] [Author ID1: at Mon Sep 3 19:51:00 2001]el 20% del N, el resto lo usan para la síntesis de [Author ID1: at Mon Sep 3 19:52:00 2001]proteínas[Author ID1: at Mon Sep 3 19:53:00 2001] estructurales.[Author ID1: at Mon Sep 3 19:52:00 2001][Author ID0: at]

Existe una diferencia en cuanto a la [Author ID1: at Mon Sep 3 20:12:00 2001]discriminación[Author ID1: at Mon Sep 3 20:14:00 2001] isotópica de L entre el C[Author ID1: at Mon Sep 3 20:12:00 2001]12[Author ID1: at Mon Sep 3 20:12:00 2001] y C[Author ID1: at Mon Sep 3 20:12:00 2001]13[Author ID1: at Mon Sep 3 20:12:00 2001]. [Author ID1: at Mon Sep 3 20:12:00 2001]Las[Author ID1: at Mon Sep 3 20:53:00 2001] [Author ID1: at Mon Sep 3 20:13:00 2001]plantas[Author ID1: at Mon Sep 3 20:14:00 2001] C[Author ID1: at Mon Sep 3 20:13:00 2001]3[Author ID1: at Mon Sep 3 20:13:00 2001] discriminan altamente a favor del C[Author ID1: at Mon Sep 3 20:13:00 2001]12[Author ID1: at Mon Sep 3 20:13:00 2001],[Author ID1: at Mon Sep 3 20:13:00 2001] mientras q en las C[Author ID1: at Mon Sep 3 20:14:00 2001]4[Author ID1: at Mon Sep 3 20:14:00 2001] se discrimina menos y se encuentran porcentajes [Author ID1: at Mon Sep 3 20:14:00 2001]más[Author ID1: at Mon Sep 3 20:53:00 2001] altos de C[Author ID1: at Mon Sep 3 20:14:00 2001]13[Author ID1: at Mon Sep 3 20:14:00 2001].[Author ID1: at Mon Sep 3 20:14:00 2001][Author ID0: at]

[Author ID1: at Mon Sep 3 20:15:00 2001]

Coste [Author ID1: at Mon Sep 3 20:15:00 2001]energético del metabolismo C[Author ID1: at Mon Sep 3 20:16:00 2001]4[Author ID1: at Mon Sep 3 20:16:00 2001] respecto del C[Author ID1: at Mon Sep 3 20:16:00 2001]3[Author ID1: at Mon Sep 3 20:16:00 2001][Author ID1: at Mon Sep 3 20:16:00 2001]

Las plantas C[Author ID1: at Mon Sep 3 20:16:00 2001]3[Author ID1: at Mon Sep 3 20:16:00 2001] para fijar un m[Author ID1: at Mon Sep 3 20:16:00 2001]ol de CO[Author ID1: at Mon Sep 3 20:17:00 2001]2[Author ID1: at Mon Sep 3 20:17:00 2001] consumen 2 NADPH y 3 ATP para dar carbohidratos.[Author ID1: at Mon Sep 3 20:17:00 2001][Author ID0: at]

Las C[Author ID1: at Mon Sep 3 20:18:00 2001]4[Author ID1: at Mon Sep 3 20:18:00 2001]:[Author ID0: at]

El subtipo NADP−EM,[Author ID1: at Mon Sep 3 20:19:00 2001] gracias al [Author ID1: at Mon Sep 3 20:20:00 2001]trasvase[Author ID1: at Mon Sep 3 20:23:00 2001] del malato obtiene e[Author ID1: at Mon Sep 3 20:20:00 2001]l poder reductor. Se piensa q el 50% del poder reductor necesario proviene de este modo. Esto implica q un 50% del 3PGA tiene q ser [Author ID1: at Mon Sep 3 20:21:00 2001]transferido[Author ID1: at Mon Sep 3 20:23:00 2001] a [Author ID1: at Mon Sep 3 20:21:00 2001]células[Author ID1: at Mon Sep 3 20:22:00 2001] [Author ID1: at Mon Sep 3 20:21:00 2001]del mesófilo donde si hay PS II para generar el poder reductor necesario.[Author ID1: at Mon Sep 3 20:22:00 2001] [Author ID1: at Mon Sep 3 20:18:00 2001]P[Author ID1: at Mon Sep 3 20:23:00 2001]ara fijar un CO[Author ID1: at Mon Sep 3 20:18:00 2001]2[Author ID1: at Mon Sep 3 20:18:00 2001] requieren 2 NADPH y 5 ATP[Author ID1: at Mon Sep 3 20:18:00 2001].[Author ID0: at]

El [Author ID1: at Mon Sep 3 20:19:00 2001]subtipo [Author ID1: at Mon Sep 3 20:23:00 2001]NAD−EM[Author ID1: at Mon Sep 3 20:19:00 2001] no necesita devolver parte del [Author ID1: at Mon Sep 3 20:23:00 2001]3PGA por tanto se requieren 2 NADPH y [Author ID1: at Mon Sep 3 20:24:00 2001]5 ATP.[Author ID0: at]

En el subtipo PEP [Author ID1: at Mon Sep 3 20:28:00 2001]carboxikinasa 2 NADPH y en cuanto al ATP, se requiere 1 A[Author ID1: at Mon Sep 3 20:29:00 2001]TP en la [Author ID1: at Mon Sep 3 20:31:00 2001]reacción[Author ID1: at Mon Sep 3 20:35:00 2001] de la PEP carboxikinasa, si vuelve como PEP se ahorran 2 ATP y por tanto s[Author ID1: at Mon Sep 3 20:31:00 2001]ólo se necesitan 4 ATP.[Author ID0: at]

Si vuelve como aa se requieren 3 ATP por [Author ID1: at Mon Sep 3 20:32:00 2001]Calvin[Author ID1: at Mon Sep 3 20:33:00 2001],[Author ID1: at Mon Sep 3 20:32:00 2001] 2 por la piruvato ortofosfa[Author ID1: at Mon Sep 3 20:33:00 2001]t[Author ID1: at Tue Sep 4 18:45:00 2001]odikinasa con la adenilatokinasa, [Author ID1: at Mon Sep 3 20:33:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] otro de la PEP [Author ID1: at Mon Sep 3 20:33:00 2001]carboxikinasa[Author ID1: at Mon Sep 3 20:34:00 2001],[Author ID1: at Mon Sep 3 20:33:00 2001] q no se [Author ID1: at Mon Sep 3 20:34:00 2001]necesitaría[Author ID1: at Mon Sep 3 20:35:00 2001] si se regenerase el ATP al pasar de PEP a [Author ID1: at Mon Sep 3 20:34:00 2001]pirúvico[Author ID1: at Mon Sep 3 20:35:00 2001].[Author ID1: at Mon Sep 3 20:34:00 2001][Author ID0: at]

De todas formas el metabolismo C[Author ID1: at Mon Sep 3 20:35:00 2001]4[Author ID1: at Mon Sep 3 20:36:00 2001] es más costoso q el C[Author ID1: at Mon Sep 3 20:36:00 2001]3[Author ID1: at Mon Sep 3 20:36:00 2001].[Author ID0: at]

[Author ID0: at]

La capacidad de concentración de CO[Author ID1: at Mon Sep 3 20:36:00 2001]2[Author ID1: at Mon Sep 3 20:36:00 2001], ausencia de [Author ID1: at Mon Sep 3 20:36:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001], capacidad de tener desarrollo a [Author ID1: at Mon Sep 3 20:37:00 2001]Tª[Author ID1: at Mon Sep 3 20:38:00 2001] más alta y tener estomas más cerrados, son las [Author ID1: at Mon Sep 3 20:37:00 2001]características[Author ID1: at Mon Sep 3 20:38:00 2001] [Author ID1: at Mon Sep 3 20:37:00 2001]q permiten a las plantas C[Author ID1: at Mon Sep 3 20:38:00 2001]4[Author ID1: at Mon Sep 3 20:38:00 2001] una mejor eficiencia en el uso del agua.[Author ID1: at Mon Sep 3 20:38:00 2001]−−>[Author ID1: at Mon Sep 3 19:42:00

2001][Author ID1: at Mon Sep 3 20:38:00 2001]

−−>
[Author ID1: at Mon Sep 3 19:28:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]−−>[Author ID1: at Mon Sep 3 19:28:00 2001][Author ID1: at Mon Sep 3 19:42:00 2001]

[Author ID0: at]

[Author ID1: at Mon Sep 3 20:40:00 2001]

Tema 10 fotosíntesis en plantas con metabolismo ácido de las [Author ID1: at Mon Sep 3 20:40:00 2001]crasulaceas[Author ID0: at]

[Author ID1: at Mon Sep 3 20:41:00 2001]

−−>**En las plantas CAM[Author ID1: at Mon Sep 3 20:41:00 2001]**[Author ID1: at Mon Sep 3 20:41:00 2001]**, para q funcione la [Author ID1: at Mon Sep 3 20:42:00 2001]fotólisis[Author ID1: at Mon Sep 3 20:45:00 2001] del agua es[Author ID1: at Mon Sep 3 20:42:00 2001] [Author ID1: at Mon Sep 3 20:45:00 2001]preciso q los productos de la fase luminosa sean consumidos según se van formando[Author ID1: at Mon Sep 3 20:42:00 2001] pues de otro modo se [Author ID1: at Mon Sep 3 20:43:00 2001]inhibiría[Author ID1: at Mon Sep 3 20:44:00 2001] el proceso.[Author ID0: at]**

Estas plantas pueden reasimilar el CO[Author ID1: at Mon Sep 3 20:43:00 2001]2[Author ID1: at Mon Sep 3 20:43:00 2001] q liberan por la [Author ID1: at Mon Sep 3 20:43:00 2001]respiración[Author ID1: at Mon Sep 3 20:44:00 2001].[Author ID1: at Mon Sep 3 20:43:00 2001] Son plantas con desarrollo muy lento y es un metabolismo de supervivencia de desarrollo.[Author ID1: at Mon Sep 3 20:44:00 2001][Author ID0: at]

Se caracterizan por tener hojas carnosas c[Author ID1: at Tue Sep 4 12:44:00 2001]on una relación superficie−volumen baja, son plantas suculentas o crasas.[Author ID0: at]

Fijan el CO[Author ID1: at Tue Sep 4 12:45:00 2001]2[Author ID1: at Tue Sep 4 12:45:00 2001] por la noche, acumulando malato en la vacuola.[Author ID0: at]

[Author ID0: at]

El metabolismo CAM es una variante [Author ID1: at Tue Sep 4 12:46:00 2001]de cómo[Author ID1: at Tue Sep 4 12:47:00 2001] [Author ID1: at Tue Sep 4 12:46:00 2001]las plantas pueden fijar CO[Author ID1: at Tue Sep 4 12:47:00 2001]2[Author ID1: at Tue Sep 4 12:47:00 2001] a partir del Ciclo de Calvin.[Author ID1: at Tue Sep 4 12:47:00 2001][Author ID0: at]

[Author ID0: at]

La [Author ID1: at Tue Sep 4 12:48:00 2001]anatomía[Author ID1: at Tue Sep 4 12:53:00 2001] de las CAM es característica:[Author ID1: at Tue Sep 4 12:48:00 2001]

Anatomía[Author ID1: at Tue Sep 4 12:53:00 2001]:[Author ID1: at Tue Sep 4 12:48:00 2001]

- −−>**Ausencia de células en empalizada[Author ID1: at Tue Sep 4 12:48:00 2001]**[Author ID1: at Tue Sep 4 12:49:00 2001]−−>**[Author ID1: at Tue Sep 4 12:49:00 2001]**[Author ID1: at Tue Sep 4 12:49:00 2001]
- **Abundante mesófilo esponjoso (incluso las células de la vaina)[Author ID1: at Tue Sep 4 12:49:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:49:00 2001]**[Author ID1: at Tue Sep 4 12:49:00 2001]
- **Contienen [Author ID1: at Tue Sep 4 12:49:00 2001]cloroplastos[Author ID1: at Tue Sep 4 12:53:00 2001] y grandes vacuolas[Author ID1: at Tue Sep 4 12:49:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:49:00 2001]**[Author ID1: at Tue Sep 4 12:49:00 2001]

[Author ID1: at Tue Sep 4 12:50:00 2001]

Hoja:[Author ID1: at Tue Sep 4 12:50:00 2001]

- **Tamaño reducido[Author ID1: at Tue Sep 4 12:50:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:50:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Limbo [Author ID1: at Tue Sep 4 12:50:00 2001]coriáceo[Author ID1: at Tue Sep 4 12:53:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:50:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Gruesas cutículas impermeables[Author ID1: at Tue Sep 4 12:50:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:50:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Tricomas [Author ID1: at Tue Sep 4 12:50:00 2001]inertes[Author ID1: at Tue Sep 4 12:53:00 2001] llenos de a[Author ID1: at Tue Sep 4 12:50:00 2001]ire[Author ID1: at Tue Sep 4 12:51:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:51:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Gran desarrollo de haces vasculares (reducción de la transpiración)[Author ID1: at Tue Sep 4 12:51:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:51:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Aparición[Author ID1: at Tue Sep 4 12:53:00 2001] de suculencia (acumula y retiene agua)[Author ID1: at Tue Sep 4 12:51:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:51:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]
- **Hojas transformadas en espinas[Author ID1: at Tue Sep 4 12:52:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:53:00 2001]**[Author ID1: at Tue Sep 4 12:50:00 2001]

[Author ID1: at Tue Sep 4 12:53:00 2001]

Tallo:[Author ID1: at Tue Sep 4 12:53:00 2001][Author ID1: at Tue Sep 4 12:54:00 2001]

- **Tejido lignificado y suberizado[Author ID1: at Tue Sep 4 12:54:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:54:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]
- **Suculencia similar a la de las hojas[Author ID1: at Tue Sep 4 12:54:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:54:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]
- **Tallos fotosintéticos[Author ID1: at Tue Sep 4 12:54:00 2001]**−−>**[Author ID1: at Tue Sep 4 12:54:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]

[Author ID1: at Tue Sep 4 12:54:00 2001]

−−>**Raíces[Author ID1: at Tue Sep 4 12:57:00 2001]**[Author ID1: at Tue Sep 4 12:57:00 2001]−−>**:[Author ID1: at Tue Sep 4 12:54:00 2001]**[Author ID1: at Tue Sep 4 12:57:00

2001]

- ◊ **Alta [Author ID1: at Tue Sep 4 12:55:00 2001]relación[Author ID1: at Tue Sep 4 12:57:00 2001] [Author ID1: at Tue Sep 4 12:55:00 2001]órganos[Author ID1: at Tue Sep 4 12:57:00 2001] [Author ID1: at Tue Sep 4 12:55:00 2001]hipogeos / epigeos[Author ID1: at Tue Sep 4 12:58:00 2001]−−>[Author ID1: at Tue Sep 4 12:55:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]
- ◊ **Raíces[Author ID1: at Tue Sep 4 12:57:00 2001] horizontales ramificadas (para [Author ID1: at Tue Sep 4 12:55:00 2001]captación[Author ID1: at Tue Sep 4 12:56:00 2001] [Author ID1: at Tue Sep 4 12:55:00 2001]de lluvias ocasionales)[Author ID1: at Tue Sep 4 12:56:00 2001]−−>[Author ID1: at Tue Sep 4 12:56:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]
- ◊ **Raíces[Author ID1: at Tue Sep 4 12:57:00 2001] muy profundad (para llegar a la capa freática)[Author ID1: at Tue Sep 4 12:56:00 2001]−−>[Author ID1: at Tue Sep 4 12:56:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]
- ◊ **Raramente suculencia [Author ID1: at Tue Sep 4 12:56:00 2001]radical[Author ID1: at Tue Sep 4 12:57:00 2001]−−>[Author ID1: at Tue Sep 4 13:08:00 2001]**[Author ID1: at Tue Sep 4 12:54:00 2001]

[Author ID1: at Tue Sep 4 13:08:00 2001]

En algunas plantas la suculencia es aparente. En otros casos no es tan aparente[Author ID1: at Tue Sep 4 13:09:00 2001] y hay q buscarla a nivel celular, grandes vacuolas donde acumulan agua y [Author ID1: at Tue Sep 4 14:11:00 2001]ácidos[Author ID1: at Tue Sep 4 14:13:00 2001] [Author ID1: at Tue Sep 4 14:11:00 2001]orgánicos[Author ID0: at]

Células grandes, pared delgada, citoplasma parietal (contra la pared de la [Author ID1: at Tue Sep 4 14:13:00 2001]célula[Author ID1: at Tue Sep 4 14:18:00 2001]), numero d[Author ID1: at Tue Sep 4 14:13:00 2001]e cloroplastos normal (granales y agranales), ricos en [Author ID1: at Tue Sep 4 14:14:00 2001]almidón[Author ID1: at Tue Sep 4 14:18:00 2001], mitocondrias y [Author ID1: at Tue Sep 4 14:14:00 2001]peroxisomas[Author ID1: at Tue Sep 4 14:15:00 2001].[Author ID1: at Tue Sep 4 14:14:00 2001][Author ID1: at Tue Sep 4 14:15:00 2001]

Índice[Author ID1: at Tue Sep 4 14:18:00 2001] de suculencia del mesófilo:[Author ID1: at Tue Sep 4 14:15:00 2001] SM > 1 = CAM[Author ID1: at Tue Sep 4 14:16:00 2001][Author ID1: at Tue Sep 4 14:19:00 2001]

[Author ID1: at Tue Sep 4 14:15:00 2001]

−−>**SM = CH (gr)[Author ID1: at Tue Sep 4 14:15:00 2001]**[Author ID1: at Tue Sep 4 14:18:00 2001]−−> **/ clorofila (mg)[Author ID1: at Tue Sep 4 14:16:00 2001]**[Author ID1: at Tue Sep 4 14:18:00 2001]**[Author ID1: at Tue Sep 4 14:18:00 2001]**

[Author ID1: at Tue Sep 4 14:19:00 2001]

Las plantas con metabolismo CMA tienen menos estomas aunque del mismo tamaño q en C[Author ID1: at Tue Sep 4 14:19:00 2001]3[Author ID1: at Tue Sep 4 14:19:00 2001]. normalmente [Author ID1: at Tue Sep 4 14:20:00 2001]están[Author ID1: at Tue Sep 4 14:29:00 2001] hundidos en la hipodermis formando los estromas en cripta para evitar las perdidas de agua.[Author ID1: at Tue Sep 4 14:20:00 2001]

Algunas plantas con [Author ID1: at Tue Sep 4 14:21:00 2001]metabolismo[Author ID1: at Tue Sep 4 14:30:00 2001] C[Author ID1: at Tue Sep 4 14:21:00 2001]3[Author ID1: at Tue Sep 4 14:21:00 2001] frente a [Author ID1: at Tue Sep 4 14:21:00 2001]estrés[Author ID1: at Tue Sep 4 14:30:00 2001] hídrico fuerte pueden adaptarse el metabolismo CAM con un aumento en los ni[Author ID1: at Tue Sep 4 14:21:00 2001]veles de [Author ID1: at Tue Sep 4 14:22:00 2001]ácido[Author ID1: at Tue Sep 4 14:30:00 2001] abscísico (ABA) q cierran los estomas.[Author ID1: at Tue Sep 4 14:22:00 2001][Author ID0: at]

Adaptadas a climas muy [Author ID1: at Tue Sep 4 14:23:00 2001]áridos[Author ID1: at Tue Sep 4 14:29:00 2001]. Maximizan la eficiencia en el uso del agua.[Author ID1: at Tue Sep 4 14:23:00 2001]

El metabolismo CAM tiene similitudes con el C[Author ID1: at Tue Sep 4 14:24:00 2001]4[Author ID1: at Tue Sep 4 14:24:00 2001].[Author ID0: at]

Los enzimas [Author ID1: at Tue Sep 4 14:24:00 2001]fijadores[Author ID1: at Tue Sep 4 14:29:00 2001] iniciales son los mismos. [Author ID1: at Tue Sep 4 14:24:00 2001]En el C[Author ID1: at Tue Sep 4 14:25:00 2001]4[Author ID1: at Tue Sep 4 14:25:00 2001] hay dimorfismo entre las células de la vaina y mesófilo, cosa q no ocurre en el metabolismo CAM. [Author ID1: at Tue Sep 4 14:25:00 2001]Además[Author ID1: at Tue Sep 4 14:29:00 2001] en el metabolismo C[Author ID1: at Tue Sep 4 14:26:00 2001]4[Author ID1: at Tue Sep 4 14:26:00 2001] hay una separación espacial entre la fijación y reducción del CO[Author ID1: at Tue Sep 4 14:26:00 2001]2[Author ID1: at Tue Sep 4 14:26:00 2001].[Author ID0: at]

En el metabolismo CAM hay [Author ID1: at Tue Sep 4 14:26:00 2001]separación[Author ID1: at Tue Sep 4 14:27:00 2001] [Author ID1: at Tue Sep 4 14:26:00 2001]temporal, se fija el CO[Author ID1: at Tue Sep 4 14:27:00 2001]2[Author ID1: at Tue Sep 4 14:27:00 2001] por la noche y se reduce a carbohidratos por el [Author ID1: at Tue Sep 4 14:27:00 2001]día[Author ID1: at Tue Sep 4 14:29:00 2001].[Author ID0: at]

Por [Author ID1: at Tue Sep 4 14:27:00 2001]la noche se abren los estoma, entra el CO[Author ID1: at Tue Sep 4 14:28:00 2001]2[Author ID1: at Tue Sep 4 14:28:00 2001] y en el citoplasma de las células del mesófilo es fijado en forma de [Author ID1: at Tue Sep 4 14:28:00 2001]bicarbonato sobre PEP[Author ID1: at Tue Sep 4 14:29:00 2001] para dar OA.[Author ID0: at]

El PEP deriva de la [Author ID1: at Tue Sep 4 14:32:00 2001]degradación[Author ID1: at Tue Sep 4 14:33:00 2001] [Author ID1: at Tue Sep 4 14:32:00 2001]nocturna de los glucanos por la glucólisis.[Author ID0: at]

Durante el [Author ID1: at Tue Sep 4 14:33:00 2001]día[Author ID1: at Tue Sep 4 14:36:00 2001] la planta cierra los estomas. El malato sale de la vacuola y es decarboxilado en el citoplasma por los sistemas descarbo[Author ID1: at Tue Sep 4 14:33:00 2001]xilantes: la Malato desH[Author ID1: at Tue Sep 4 14:34:00 2001]asa[Author ID1: at Tue Sep 4 14:34:00 2001] NADP dependiente[Author ID1: at Tue Sep 4 14:34:00 2001], la NAD dependiente y la PEP carboxikinasa.[Author ID0: at]

[Author ID0: at]

Las plantas CAM al igual q las C[Author ID1: at Tue Sep 4 14:35:00 2001]4[Author ID1: at Tue Sep 4 14:35:00 2001] no manifiestan [Author ID1: at Tue Sep 4 14:35:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] [Author ID1: at Tue Sep 4 14:35:00 2001]aparente.[Author ID1: at Tue Sep 4 14:36:00 2001][Author ID0: at]

[Author ID1: at Tue Sep 4 14:39:00 2001]

Regulación[Author ID1: at Tue Sep 4 14:40:00 2001]

El proceso de fijación del CO[Author ID1: at Tue Sep 4 14:40:00 2001]2[Author ID1: at Tue Sep 4 14:40:00 2001] por la PEP carboxilasa y la descarboxilación del malato se da en el citoplasma.[Author ID1: at Tue Sep 4 14:40:00 2001]

La PEP carboxilasa va a estar activa por la noche e inactiva por el [Author ID1: at Tue Sep 4 14:41:00 2001]día[Author ID1: at Tue Sep 4 14:54:00 2001].[Author ID1: at Tue Sep 4 14:41:00 2001] Con la descarboxilasa ocurre al [Author ID1: at Tue Sep 4 14:42:00 2001]revés[Author ID1: at Tue Sep 4 14:54:00 2001].[Author ID1: at Tue Sep 4 14:42:00 2001]

(Hoja 63 [Author ID1: at Tue Sep 4 14:42:00 2001]Fig.[Author ID1: at Tue Sep 4 14:54:00 2001] 15.7)[Author ID1: at Tue Sep 4 14:42:00 2001] La regulación de la[Author ID1: at Tue Sep 4 14:42:00 2001] [Author ID1: at Tue Sep 4 14:54:00 2001]PEP carboxikinasa esta [Author ID1: at Tue Sep 4 14:42:00 2001]coordinada por la [Author ID1: at Tue Sep 4 14:43:00 2001]acción[Author ID1: at Tue Sep 4 14:54:00 2001] de la proteinkinasa q se activa por la noche y se [Author ID1: at Tue Sep 4 14:43:00 2001]inactiva[Author ID1: at Tue Sep 4 14:54:00 2001] por el d[Author ID1: at Tue Sep 4 14:43:00 2001]ía[Author ID1: at Tue Sep 4 14:54:00 2001].[Author ID0: at]

Por la noche se foforila un residuo de Serina de la PEP [Author ID1: at Tue Sep 4 14:43:00 2001]carboxilasa[Author ID1: at Tue Sep 4 14:44:00 2001] [Author ID1: at Tue Sep 4 14:43:00 2001]q activa el enzima. Durante el [Author ID1: at Tue Sep 4 14:44:00 2001]día[Author ID1: at Tue Sep 4 14:54:00 2001] se desfosforila inactivándose. Esta inactivación viene determinada por el producto de la [Author ID1: at Tue Sep 4 14:44:00 2001]fijación[Author ID1: at Tue Sep 4 14:45:00 2001] [Author ID1: at Tue Sep 4 14:44:00 2001], el malato.[Author ID0: at]

La constante de inhibición del malato durante el [Author ID1: at Tue Sep 4 14:46:00 2001]día[Author ID1: at Tue Sep 4 14:54:00 2001] es de 0.3 milimolar y durante la noche es 3 milimolar con lo q durante la noche aunque aumenten los niveles de malato no se inactiva porque se acumula [Author ID1: at Tue Sep 4 14:46:00 2001]rápidamente[Author ID1: at Tue Sep 4 14:53:00 2001] en la vacuola.[Author ID1: at Tue Sep 4 14:46:00 2001]

Durante el [Author ID1: at Tue Sep 4 14:47:00 2001]día[Author ID1: at Tue Sep 4 14:53:00 2001] como sale de la vacuola la [Author ID1: at Tue Sep 4 14:47:00 2001]concentración[Author ID1: at Tue Sep 4 14:48:00 2001] [Author ID1: at Tue Sep 4 14:47:00 2001]es alta y la PEP carboxilasa se inactiva.[Author ID0: at]

También hay [Author ID1: at Tue Sep 4 14:48:00 2001]regulación[Author ID1: at Tue Sep 4 14:53:00 2001] de todo el metabolismo CAM frente a un [Author ID1: at Tue Sep 4 14:48:00 2001]estrés[Author ID1: at Tue Sep 4 14:49:00 2001] [Author ID1: at Tue

Sep 4 14:48:00 2001]hídrico.[Author ID0: at]

La síntesis de ABA durante el [Author ID1: at Tue Sep 4 14:49:00 2001]día[Author ID1: at Tue Sep 4 14:53:00 2001] obliga a la planta a cerrar lo estomas. Es una regulación a largo plazo. En [Author ID1: at Tue Sep 4 14:49:00 2001]las bacterias fotosintéticas se ha visto q pueden fijar el CO[Author ID1: at Tue Sep 4 14:50:00 2001]2[Author ID1: at Tue Sep 4 14:50:00 2001] mediante el CAT en sentido contrario (en sentido reductivo, no oxidativo).[Author ID1: at Tue Sep 4 14:50:00 2001]

−−>**(Ho[Author ID1: at Tue Sep 4 14:51:00 2001]**[Author ID1: at Tue Sep 4 14:54:00 2001]−−>**j[Author ID1: at Tue Sep 4 14:54:00 2001]**[Author ID1: at Tue Sep 4 14:54:00 2001]−−>**a 66)[Author ID1: at Tue Sep 4 14:51:00 2001]**[Author ID1: at Tue Sep 4 14:54:00 2001] **Fijan 4 [Author ID1: at Tue Sep 4 14:51:00 2001]moléculas[Author ID1: at Tue Sep 4 14:53:00 2001] de CO[Author ID1: at Tue Sep 4 14:51:00 2001]2[Author ID1: at Tue Sep 4 14:52:00 2001]. la obtención de OA se lleva a cabo por la PEP carboxikinasa.[Author ID0: at]**

Cada 4 [Author ID1: at Tue Sep 4 14:52:00 2001]moléculas[Author ID1: at Tue Sep 4 14:53:00 2001] de CO[Author ID1: at Tue Sep 4 14:52:00 2001]2[Author ID1: at Tue Sep 4 14:53:00 2001] q se fijan pierden una y obtienen pirúvico.[Author ID1: at Tue Sep 4 14:53:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Tue Sep 4 15:53:00 2001]

Tema 11 [Author ID1: at Tue Sep 4 15:53:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001][Author ID0: at]

[Author ID1: at Tue Sep 4 15:53:00 2001]

Ciclo C[Author ID1: at Tue Sep 4 15:53:00 2001]2[Author ID1: at Tue Sep 4 15:54:00 2001] o Ciclo del Glioxalato.[Author ID0: at]

Esta ligado al Ciclo de Calvin debido a q la RUBISCO [Author ID1: at Tue Sep 4 15:54:00 2001]además[Author ID1: at Tue Sep 4 15:57:00 2001] de fija CO[Author ID1: at Tue Sep 4 15:54:00 2001]2[Author ID1: at Tue Sep 4 18:32:00 2001], [Author ID1: at Tue Sep 4 15:54:00 2001]también[Author ID1: at Tue Sep 4 15:57:00 2001] fija O[Author ID1: at Tue Sep 4 15:54:00 2001]2[Author ID1: at Tue Sep 4 15:55:00 2001].[Author ID0: at]

Cuando funciona como oxigenasa se origina el proceso de [Author ID1: at Tue Sep 4 15:55:00 2001]Fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001].[Author ID1: at Tue Sep 4 15:55:00 2001] Las tasas de [Author ID1: at Tue Sep 4 15:59:00 2001]fotosíntesis[Author ID1: at Tue Sep 4 16:02:00 2001] aumentan cuando la concentración de O[Author ID1: at Tue Sep 4 15:59:00 2001]2[Author ID1: at Tue Sep 4 15:59:00 2001] es menor.[Author ID1: at Tue Sep 4 15:59:00 2001]

Las mayores tasa de desprendimiento de CO[Author ID1: at Tue Sep 4 16:00:00 2001]2[Author ID1: at Tue Sep 4 16:00:00 2001] dependen de la luz es lo q se[Author ID1: at Tue Sep 4 16:00:00 2001] da[Author ID1: at Tue Sep 4 17:26:00 2001] a conocer como [Author ID1: at Tue Sep 4 16:00:00 2001]fotorrespiración[Author ID1: at Tue Sep

4 16:46:00 2001].[Author ID0: at]

La disminución de l[Author ID1: at Tue Sep 4 16:00:00 2001]a [Author ID1: at Tue Sep 4 16:01:00 2001]fotosíntesis,[Author ID1: at Tue Sep 4 16:02:00 2001] como consecuencia de este proceso, se debe a dos causas.[Author ID1: at Tue Sep 4 16:01:00 2001]:[Author ID1: at Tue Sep 4 16:03:00 2001]

- **P[Author ID1: at Tue Sep 4 16:04:00 2001]roceso liberador de CO[Author ID1: at Tue Sep 4 16:03:00 2001]2[Author ID1: at Tue Sep 4 16:03:00 2001] independiente a la [Author ID1: at Tue Sep 4 16:03:00 2001]respiración[Author ID1: at Tue Sep 4 16:04:00 2001] [Author ID1: at Tue Sep 4 16:03:00 2001]mitocondrial.[Author ID1: at Tue Sep 4 16:04:00 2001]−−>[Author ID1: at Tue Sep 4 16:04:00 2001]**[Author ID1: at Tue Sep 4 16:00:00 2001]
- **Inhibición de las tasas de fijación de CO[Author ID1: at Tue Sep 4 16:04:00 2001]2[Author ID1: at Tue Sep 4 16:04:00 2001].[Author ID1: at Tue Sep 4 16:04:00 2001]−−>[Author ID1: at Tue Sep 4 16:05:00 2001]**[Author ID1: at Tue Sep 4 16:00:00 2001]

[Author ID1: at Tue Sep 4 16:05:00 2001]

−−>**Podemos definir la [Author ID1: at Tue Sep 4 16:05:00 2001]**[Author ID1: at Tue Sep 4 17:27:00 2001]−−>**fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001]**[Author ID1: at Tue Sep 4 17:27:00 2001] **como la liberación de CO[Author ID1: at Tue Sep 4 16:05:00 2001]2[Author ID1: at Tue Sep 4 16:05:00 2001] dependiente de la luz q tiene lugar en [Author ID1: at Tue Sep 4 16:05:00 2001]orgánulos[Author ID1: at Tue Sep 4 16:07:00 2001] [Author ID1: at Tue Sep 4 16:05:00 2001]fotosintéticos[Author ID1: at Tue Sep 4 16:06:00 2001] [Author ID1: at Tue Sep 4 16:05:00 2001]debido a un proceso de descarboxilación oxidativa del glicolato y q se inhibe a bajas [O[Author ID1: at Tue Sep 4 16:06:00 2001]2[Author ID1: at Tue Sep 4 16:07:00 2001]].[Author ID1: at Tue Sep 4 16:07:00 2001]**

A la hora de determinar las tasas de [Author ID1: at Tue Sep 4 16:08:00 2001]fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] tenemos el problema de q es[Author ID1: at Tue Sep 4 16:08:00 2001] [Author ID1: at Tue Sep 4 16:20:00 2001]difícil[Author ID1: at Tue Sep 4 16:21:00 2001] determinar las tasas de [Author ID1: at Tue Sep 4 16:08:00 2001]fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001], por lo q se da un balance.[Author ID0: at]

Un modo de abordar la [Author ID1: at Tue Sep 4 16:09:00 2001]medición[Author ID1: at Tue Sep 4 16:21:00 2001] es colocar la planta en un recinto cerrado con una [Author ID1: at Tue Sep 4 16:09:00 2001]atmósfera[Author ID1: at Tue Sep 4 16:21:00 2001] sin CO[Author ID1: at Tue Sep 4 16:09:00 2001]2[Author ID1: at Tue Sep 4 16:10:00 2001] y la ponemos en oscuridad por [Author ID1: at Tue Sep 4 16:10:00 2001]infrarrojo[Author ID1: at Tue Sep 4 16:21:00 2001], de modo q podemos medir la tasa de respiración en la fase oscura.[Author ID0: at]

A [Author ID1: at Tue Sep 4 16:10:00 2001]continuación iluminamos en esta [Author ID1: at Tue Sep 4 16:11:00 2001]cámara[Author ID1: at Tue Sep 4 16:21:00 2001] y medimos la tasa de desprendimiento de CO[Author ID1: at Tue Sep 4 16:11:00 2001]2[Author ID1: at Tue Sep 4 16:11:00 2001]. nos da un valor. Si hacemos la diferencia entre los dos valores nos da un resultado debido a la luz.[Author ID1: at Tue Sep 4 16:11:00 2001]

Estas medidas tienen q tomarse en tiempos cortos pues el CO[Author ID1: at Tue Sep 4 16:12:00 2001]2[Author ID1: at Tue Sep 4 16:12:00 2001] formado va a ser [Author ID1: at Tue Sep 4 16:12:00 2001]rápidamente[Author ID1: at Tue Sep 4 16:20:00 2001] refijado por [Author ID1: at Tue Sep 4 16:12:00 2001]Calvin[Author ID1: at Tue Sep 4 16:13:00 2001].[Author ID1: at Tue Sep 4 16:12:00 2001][Author ID0: at]

[Author ID0: at]

Una segunda forma de medirlo es [Author ID1: at Tue Sep 4 16:13:00 2001]usando[Author ID1: at Tue Sep 4 16:20:00 2001] isótopos de C.[Author ID0: at]

Se pone la [Author ID1: at Tue Sep 4 16:13:00 2001]planta[Author ID1: at Tue Sep 4 16:20:00 2001] en una [Author ID1: at Tue Sep 4 16:14:00 2001]atmósfera[Author ID1: at Tue Sep 4 16:20:00 2001] con C* en presencia de luz. Se deja fotosintetizar y pasado un tiempo se pasa a una [Author ID1: at Tue Sep 4 16:14:00 2001]atmósfera[Author ID1: at Tue Sep 4 16:20:00 2001] con C[Author ID1: at Tue Sep 4 16:14:00 2001]12[Author ID1: at Tue Sep 4 16:14:00 2001].[Author ID0: at]

Cuando ha estado en [Author ID1: at Tue Sep 4 16:15:00 2001]atmósfera[Author ID1: at Tue Sep 4 16:20:00 2001] con C[Author ID1: at Tue Sep 4 16:15:00 2001]14[Author ID1: at Tue Sep 4 16:15:00 2001] ha formado carbohidratos con C[Author ID1: at Tue Sep 4 16:15:00 2001]14[Author ID1: at Tue Sep 4 16:15:00 2001], cuando se pone con C[Author ID1: at Tue Sep 4 16:15:00 2001]12[Author ID1: at Tue Sep 4 16:15:00 2001] pierde CO*[Author ID1: at Tue Sep 4 16:16:00 2001]2[Author ID1: at Tue Sep 4 16:16:00 2001]. si los tiempos son cortos se p[Author ID1: at Tue Sep 4 16:16:00 2001]ueden de[Author ID1: at Tue Sep 4 16:17:00 2001]t[Author ID1: at Tue Sep 4 16:20:00 2001]erminar las tasas de CO[Author ID1: at Tue Sep 4 16:17:00 2001]2[Author ID1: at Tue Sep 4 16:17:00 2001]. el CO*[Author ID1: at Tue Sep 4 16:17:00 2001]2[Author ID1: at Tue Sep 4 16:17:00 2001] proviene de la respiración y la [Author ID1: at Tue Sep 4 16:17:00 2001]fotosíntesis[Author ID1: at Tue Sep 4 16:20:00 2001].[Author ID0: at]

También se puede medir la cantidad de amonio (NH[Author ID1: at Tue Sep 4 16:17:00 2001]4[Author ID1: at Tue Sep 4 16:18:00 2001]) q se desprende en el proceso de [Author ID1: at Tue Sep 4 16:18:00 2001]fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001].[Author ID1: at Tue Sep 4 16:18:00 2001]

[Author ID1: at Tue Sep 4 16:19:00 2001]

Mecanismo de [Author ID1: at Tue Sep 4 16:35:00 2001]fotorrespiración[Author ID1: at Tue Sep 4 16:46:00 2001] (Hoja 71 [Author ID1: at Tue Sep 4 16:35:00 2001]Fig.[Author ID1: at Tue Sep 4 16:36:00 2001] 16.1)[Author ID1: at Tue Sep 4 16:35:00 2001][Author ID1: at Tue Sep 4 16:36:00 2001]

Participan tre[Author ID1: at Tue Sep 4 16:36:00 2001]s[Author ID1: at Tue Sep 4 16:37:00 2001] org[Author ID1: at Tue Sep 4 16:36:00 2001]á[Author ID1: at Tue Sep 4 16:37:00 2001]n[Author ID1: at Tue Sep 4 16:36:00 2001]ulos[Author ID1: at Tue Sep 4 16:37:00 2001]: cloroplasto, mitocondrias y peroxisoma.[Author ID0: at]

Todo el proceso se inicia en el [Author ID1: at Tue Sep 4 16:36:00 2001]cloroplasto[Author ID1: at Tue Sep 4 16:37:00 2001] cuando la [Author ID1: at Tue Sep 4 16:36:00 2001]RUBISCO[Author ID1: at Tue Sep 4 16:37:00 2001] [Author

ID1: at Tue Sep 4 16:36:00 2001]fija O[Author ID1: at Tue Sep 4 16:37:00 2001]2[Author ID1: at Tue Sep 4 16:38:00 2001] [Author ID1: at Tue Sep 4 16:38:00 2001]formándose[Author ID1: at Tue Sep 4 16:42:00 2001] una molécula de · PGA y una molécula de 2−fosfoglicerato. Ya se ha inhibido la [Author ID1: at Tue Sep 4 16:38:00 2001]fotosíntesis[Author ID1: at Tue Sep 4 16:42:00 2001].[Author ID0: at]

Se da la [Author ID1: at Tue Sep 4 16:38:00 2001]oxigenación[Author ID1: at Tue Sep 4 16:42:00 2001] pues todas las [Author ID1: at Tue Sep 4 16:38:00 2001]RUBISCO[Author ID1: at Tue Sep 4 16:39:00 2001] [Author ID1: at Tue Sep 4 16:38:00 2001]tienen actividad oxigenasa.[Author ID0: at]

Si aislamos la UBISCO y medimos la actividad oxigenasa frente a la [Author ID1: at Tue Sep 4 16:39:00 2001]carboxilación[Author ID1: at Tue Sep 4 16:40:00 2001] [Author ID1: at Tue Sep 4 16:39:00 2001]esta es 80 veces superior a la [Author ID1: at Tue Sep 4 16:40:00 2001]oxigenación[Author ID1: at Tue Sep 4 16:42:00 2001], pero la [O[Author ID1: at Tue Sep 4 16:40:00 2001]2[Author ID1: at Tue Sep 4 16:40:00 2001]][Author ID1: at Tue Sep 4 16:41:00 2001] es mucho mayor q la[Author ID1: at Tue Sep 4 16:42:00 2001] del CO[Author ID1: at Tue Sep 4 16:43:00 2001]2[Author ID1: at Tue Sep 4 16:43:00 2001].[Author ID0: at]

Por cada 3 CO[Author ID1: at Tue Sep 4 16:43:00 2001]2[Author ID1: at Tue Sep 4 16:43:00 2001] q se fijan se fija un CO[Author ID1: at Tue Sep 4 16:43:00 2001]2[Author ID1: at Tue Sep 4 16:43:00 2001]. el resto del proceso esta para in[Author ID1: at Tue Sep 4 16:43:00 2001]tentar recuperar los 2 C desviados por la [Author ID1: at Tue Sep 4 16:44:00 2001]fotorrespiración[Author ID1: at Tue Sep 4 16:51:00 2001].[Author ID1: at Tue Sep 4 16:44:00 2001] [Author ID1: at Tue Sep 4 16:50:00 2001][Author ID0: at]

[Author ID1: at Tue Sep 4 16:51:00 2001]

En el cloroplasto[Author ID1: at Tue Sep 4 16:51:00 2001] el fosfoglicolato es desfosforilado a glicolato, por la fosfoglicolato [Author ID1: at Tue Sep 4 16:51:00 2001]fosfatasa[Author ID1: at Tue Sep 4 16:52:00 2001].[Author ID1: at Tue Sep 4 16:51:00 2001] Este, sale del cloroplasto y la [Author ID1: at Tue Sep 4 16:52:00 2001]través[Author ID1: at Tue Sep 4 16:57:00 2001] de un transportador pasa al [Author ID1: at Tue Sep 4 16:52:00 2001]peroxisoma[Author ID1: at Tue Sep 4 16:53:00 2001].[Author ID1: at Tue Sep 4 16:52:00 2001] Aquí el glicolato es oxidado por la glicolato oxidasa. El alcohol del C[Author ID1: at Tue Sep 4 16:53:00 2001]2[Author ID1: at Tue Sep 4 16:53:00 2001] del glicolato es oxidado a [Author ID1: at Tue Sep 4 16:53:00 2001]aldehído[Author ID1: at Tue Sep 4 16:57:00 2001] al mismo tiempo q se produce H[Author ID1: at Tue Sep 4 16:53:00 2001]2[Author ID1: at Tue Sep 4 16:54:00 2001]O[Author ID1: at Tue Sep 4 16:54:00 2001]2[Author ID1: at Tue Sep 4 16:54:00 2001]. se produce O[Author ID1: at Tue Sep 4 16:54:00 2001]2[Author ID1: at Tue Sep 4 17:30:00 2001].[Author ID0: at]

El H[Author ID1: at Tue Sep 4 16:54:00 2001]2[Author ID1: at Tue Sep 4 16:54:00 2001]O[Author ID1: at Tue Sep 4 16:54:00 2001]2[Author ID1: at Tue Sep 4 16:54:00 2001] es t[Author ID1: at Tue Sep 4 16:54:00 2001]oxico por lo q es descompuesto por la catalasa formando[Author ID1: at Tue Sep 4 16:55:00 2001] H[Author ID1: at Tue Sep 4 16:56:00 2001]2[Author ID1: at Tue Sep 4 16:56:00 2001]O[Author ID1: at Tue Sep 4 16:56:00 2001] [Author ID1: at Tue Sep 4 16:56:00 2001] [Author ID1: at Tue Sep 4 16:56:00 2001]−−>y[Author ID1: at Tue Sep 4 16:57:00 2001][Author ID1: at Tue Sep 4

16:57:00 2001] **[Author ID1: at Tue Sep 4 16:57:00 2001]O[Author ID1: at Tue Sep 4 16:58:00 2001]2[Author ID1: at Tue Sep 4 16:58:00 2001].[Author ID0: at]**

El producto obtenido es el glioxalato q por la glioxalato glutamato [Author ID1: at Tue Sep 4 16:58:00 2001]aminotransferasa[Author ID1: at Tue Sep 4 16:59:00 2001] [Author ID1: at Tue Sep 4 16:58:00 2001]se transamina. El glioxalato se transforma en Gly q mediante transportadores pasa a la mitocondria.[Author ID0: at]

Dos Gly sufren distintas[Author ID1: at Tue Sep 4 16:59:00 2001] reacciones. A partir de una Gly se descarboxila oxidativamente, se desamina y el C q queda es [Author ID1: at Tue Sep 4 17:00:00 2001]transferido[Author ID1: at Tue Sep 4 17:02:00 2001] a la otra Gly ara dar Serina[Author ID1: at Tue Sep 4 17:00:00 2001].[Author ID0: at]

Este proceso esta catalizaado por dos sistemas [Author ID1: at Tue Sep 4 17:01:00 2001]enzimático[Author ID1: at Tue Sep 4 17:02:00 2001]:[Author ID0: at]

Gly descarboxilasa y Ser hidroximetil transferasa.[Author ID1: at Tue Sep 4 17:01:00 2001][Author ID0: at]

Se desprende CO[Author ID1: at Tue Sep 4 17:02:00 2001]2[Author ID1: at Tue Sep 4 17:02:00 2001] [Author ID1: at Tue Sep 4 16:57:00 2001]−−>y[Author ID1: at Tue Sep 4 17:03:00 2001][Author ID1: at Tue Sep 4 17:04:00 2001]−−> **amonio[Author ID1: at Tue Sep 4 17:04:00 2001]**[Author ID1: at Tue Sep 4 17:04:00 2001] **(NH[Author ID1: at Tue Sep 4 17:04:00 2001]4[Author ID1: at Tue Sep 4 17:04:00 2001]), el CO[Author ID1: at Tue Sep 4 17:04:00 2001]2[Author ID1: at Tue Sep 4 17:05:00 2001] va al exterior y el amonio se recupera porque la planta tiene [Author ID1: at Tue Sep 4 17:05:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] facilidad para recuperar C q amonio ya q este N es un elemento [Author ID1: at Tue Sep 4 17:05:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] limitante.[Author ID1: at Tue Sep 4 17:05:00 2001]**

Las tasa de e CO[Author ID1: at Tue Sep 4 17:06:00 2001]2[Author ID1: at Tue Sep 4 17:06:00 2001] q se liberan y las tasa de amonio son equimoleculares.[Author ID1: at Tue Sep 4 17:06:00 2001][Author ID0: at]

De cada 4 C producidos por 2 procesos de [Author ID1: at Tue Sep 4 17:09:00 2001]oxigenación[Author ID1: at Tue Sep 4 17:13:00 2001] de la RUBISCO q llegan a la mitocondria como Gly se pueden recuperar 3 de ellos como 3 PGA. [Author ID1: at Tue Sep 4 17:09:00 2001]Se recupera el 75%.[Author ID0: at]

[Author ID0: at]

En algunos casos el glioxalato originado en el [Author ID1: at Tue Sep 4 17:10:00 2001]peroxisoma[Author ID1: at Tue Sep 4 17:11:00 2001] [Author ID1: at Tue Sep 4 17:10:00 2001]puede ser devuelto al cloroplasto y ser reducido de nuevo al glicolato.[Author ID0: at]

Este ciclo lateral lo [Author ID1: at Tue Sep 4 17:11:00 2001]único[Author ID1: at Tue Sep 4 17:12:00 2001] q hace es [Author ID1: at Tue Sep 4 17:11:00 2001]consumir[Author ID1: at Tue Sep 4 17:12:00 2001] [Author ID1: at Tue Sep 4 17:11:00 2001]O[Author ID1: at Tue Sep 4 17:12:00 2001]2[Author ID1: at Tue Sep 4 17:12:00 2001] y poder reductor. En realidad puede considerarse como la reacción inversa de la fotolisis del agua.[Author ID1: at Tue Sep 4 17:12:00 2001][Author ID0: at

]

Las plantas con esta ruta lo q hacen es reoxidar NADH con la misma capacidad con la q la planta es capaz de reducirlo.[Author ID1: at Tue Sep 4 17:13:00 2001]

El glioxalato es toxico para los cloroplastos porque puede producir la oxidación de los grupos S[Author ID1: at Tue Sep 4 17:14:00 2001]H de los enzimas del ciclo de Calvin inactivándolos. [Author ID1: at Tue Sep 4 17:15:00 2001]También[Author ID1: at Tue Sep 4 17:17:00 2001] afecta directamente a la rubisco.[Author ID0: at]

Por esto se piensa q el glioxala[Author ID1: at Tue Sep 4 17:15:00 2001]to no vuelve al cloroplasto. Lo q ocurre es q en el citoplasma hay una glioxalato reductasa q lo reduce a glicolato.[Author ID1: at Tue Sep 4 17:16:00 2001][Author ID0: at]

[Author ID1: at Wed Sep 5 13:49:00 2001]

Consecuencias de la existencia de la [Author ID1: at Wed Sep 5 13:49:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 13:53:00 2001] (Hoja 72 Tabla 9.3)[Author ID1: at Wed Sep 5 13:49:00 2001][Author ID1: at Wed Sep 5 13:53:00 2001]

Para fijar un CO[Author ID1: at Wed Sep 5 13:53:00 2001]2[Author ID1: at Wed Sep 5 13:53:00 2001] se necesitan 3 ATP y 2 NADPH. [Author ID1: at Wed Sep 5 13:53:00 2001]Para fijar un O[Author ID1: at Wed Sep 5 13:54:00 2001]2[Author ID1: at Wed Sep 5 13:54:00 2001] se necesitan 2 ATP y 2.5 NADPH.[Author ID1: at Wed Sep 5 13:54:00 2001]

[Author ID1: at Wed Sep 5 13:55:00 2001]

Descenso de la eficiencia [Author ID1: at Wed Sep 5 13:55:00 2001]fotoquímica[Author ID1: at Wed Sep 5 13:56:00 2001] [Author ID1: at Wed Sep 5 13:55:00 2001]de la fotosíntesis como consecuencia de la fotorrespiración (Hoja 73)[Author ID1: at Wed Sep 5 13:56:00 2001]

La [Author ID1: at Wed Sep 5 13:56:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 14:54:00 2001] hace q baje un 45% la eficiencia de la fase oscura de la [Author ID1: at Wed Sep 5 13:56:00 2001]fotosíntesis[Author ID1: at Wed Sep 5 14:54:00 2001].[Author ID1: at Wed Sep 5 13:56:00 2001]

El rendimiento energético de la reducción de un CO[Author ID1: at Wed Sep 5 13:57:00 2001]2[Author ID1: at Wed Sep 5 13:58:00 2001] por el metabolismo C[Author ID1: at Wed Sep 5 14:55:00 2001]4[Author ID1: at Wed Sep 5 14:56:00 2001] es del 81%, un 27% [Author ID1: at Wed Sep 5 14:56:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] eficiente q las plantas con [Author ID1: at Wed Sep 5 14:56:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:01:00 2001]. [Author ID0: at]

El ciclo C[Author ID1: at Wed Sep 5 14:56:00 2001]2[Author ID1: at Wed Sep 5 14:57:00 2001] funciona con la participación de los tres [Author ID1: at Wed Sep 5 14:57:00 2001]orgánulos[Author ID1: at Wed Sep 5 15:01:00 2001], [Author ID1: at Wed Sep 5 14:57:00 2001]porque[Author ID1: at Wed Sep 5 15:01:00 2001] cuando se estudia la distribución de los enzimas se ve q la [Author ID1: at Wed Sep 5 14:57:00 2001]RUBISCO[Author ID1: at Wed Sep 5 14:58:00 2001] [Author ID1: at Wed Sep 5 14:57:00 2001]glicolatofosfatasa y gliceratokinasa [Author ID1: at Wed Sep 5 14:58:00

2001]están[Author ID1: at Wed Sep 5 15:01:00 2001] en el cloroplasto[Author ID1: at Wed Sep 5 14:58:00 2001]. La glicolato oxidasa, catalas[Author ID1: at Wed Sep 5 14:59:00 2001]a[Author ID1: at Wed Sep 5 15:01:00 2001], hidroxipiruvato reductasa y las transaminasas [Author ID1: at Wed Sep 5 14:59:00 2001]están[Author ID1: at Wed Sep 5 15:01:00 2001] en el peroxisoma. Y la [Author ID1: at Wed Sep 5 14:59:00 2001]Gly hidroximetiltransferasa y Gly descarboxilasa [Author ID1: at Wed Sep 5 15:00:00 2001]están[Author ID1: at Wed Sep 5 15:01:00 2001] en la mitocondria.[Author ID0: at]

[Author ID1: at Wed Sep 5 15:00:00 2001]

Papel [Author ID1: at Wed Sep 5 15:00:00 2001]fisiológico[Author ID1: at Wed Sep 5 15:01:00 2001] de la [Author ID1: at Wed Sep 5 15:00:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:01:00 2001][Author ID1: at Wed Sep 5 15:02:00 2001]

−−>**Consigue recuperar el 75% del C.[Author ID0: at]**[Author ID0: at]

−−>**¿Por q se [Author ID1: at Wed Sep 5 15:02:00 2001]**[Author ID1: at Wed Sep 5 15:02:00 2001]**forma el fosfoglicolato?[Author ID1: at Wed Sep 5 15:02:00 2001]**

Se piensa q la formación de fosfoglicolato se debe a la incapacidad de la RUBSCO para discernir entre el CO[Author ID1: at Wed Sep 5 15:03:00 2001]2[Author ID1: at Wed Sep 5 15:03:00 2001] y el O[Author ID1: at Wed Sep 5 15:03:00 2001]2[Author ID1: at Wed Sep 5 15:04:00 2001].[Author ID0: at]

Evolutivamente cuando los organismos eran capaces de fotosintetizar, la [Author ID1: at Wed Sep 5 15:04:00 2001]atmósfera[Author ID1: at Wed Sep 5 15:06:00 2001] era reductora con lo q no [Author ID1: at Wed Sep 5 15:04:00 2001]había[Author ID1: at Wed Sep 5 15:06:00 2001] problema.[Author ID1: at Wed Sep 5 15:04:00 2001]

Cuando la [Author ID1: at Wed Sep 5 15:05:00 2001]fotosíntesis[Author ID1: at Wed Sep 5 15:06:00 2001] se hace [Author ID1: at Wed Sep 5 15:05:00 2001]oxigenada[Author ID1: at Wed Sep 5 15:06:00 2001] aparece el problema ya q la [Author ID1: at Wed Sep 5 15:05:00 2001]atmósfera[Author ID1: at Wed Sep 5 15:07:00 2001] pasa a ser oxidante u la [Author ID1: at Wed Sep 5 15:05:00 2001]RUBISCO[Author ID1: at Wed Sep 5 15:06:00 2001] [Author ID1: at Wed Sep 5 15:05:00 2001]no puede [Author ID1: at Wed Sep 5 15:06:00 2001]discernir[Author ID1: at Wed Sep 5 15:07:00 2001] entre el CO[Author ID1: at Wed Sep 5 15:06:00 2001]2[Author ID1: at Wed Sep 5 15:06:00 2001] y el O[Author ID1: at Wed Sep 5 15:06:00 2001]2[Author ID1: at Wed Sep 5 15:06:00 2001].[Author ID1: at Wed Sep 5 15:06:00 2001][Author ID1: at Wed Sep 5 15:07:00 2001]

También[Author ID1: at Wed Sep 5 15:11:00 2001] se ha pensado q es [Author ID1: at Wed Sep 5 15:07:00 2001]importante[Author ID1: at Wed Sep 5 15:11:00 2001] para evitar q el exceso de [Author ID1: at Wed Sep 5 15:07:00 2001]producción[Author ID1: at Wed Sep 5 15:08:00 2001] [Author ID1: at Wed Sep 5 15:07:00 2001]de NADPH provoque fotoinhibici[Author ID1: at Wed Sep 5 15:08:00 2001]ó[Author ID1: at Wed Sep 5 15:11:00 2001]n y el exceso de [Author ID1: at Wed Sep 5 15:08:00 2001]energía[Author ID1: at Wed Sep 5 15:11:00 2001] de procesos de fotoo[Author ID1: at Wed Sep 5 15:08:00 2001]xidaci[Author ID1: at Wed Sep 5 15:09:00 2001]ó[Author ID1: at Wed Sep 5 15:11:00 2001]n.[Author ID0: at]

Existen organismos sin [Author ID1: at Wed Sep 5 15:09:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:11:00 2001] q se ven favorecidos por un sistema de [Author ID1: at Wed Sep 5 15:09:00 2001]bombeo (plantas C[Author ID1: at Wed Sep 5 15:10:00 2001]4[Author ID1: at Wed Sep 5 15:10:00 2001], CAM y algas fotosintéticas)[Author ID1: at Wed Sep 5 15:10:00 2001].[Author ID0: at]

En estas la [Author ID1: at Wed Sep 5 15:11:00 2001]relación[Author ID1: at Wed Sep 5 15:26:00 2001] CO[Author ID1: at Wed Sep 5 15:11:00 2001]2[Author ID1: at Wed Sep 5 15:12:00 2001] / O[Author ID1: at Wed Sep 5 15:12:00 2001]2[Author ID1: at Wed Sep 5 15:12:00 2001] es muy grande, tienen [Author ID1: at Wed Sep 5 15:12:00 2001]mitocondrias[Author ID1: at Wed Sep 5 15:26:00 2001] y peroxisomas con los enzimas del proceso fotorrespiratorio.[Author ID0: at]

Si [Author ID1: at Wed Sep 5 15:12:00 2001]a las células de la vaina les añadimos CO[Author ID1: at Wed Sep 5 15:13:00 2001]2[Author ID1: at Wed Sep 5 15:13:00 2001] se da la [Author ID1: at Wed Sep 5 15:13:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:26:00 2001].[Author ID0: at]

Si le damos el CO[Author ID1: at Wed Sep 5 15:13:00 2001]2[Author ID1: at Wed Sep 5 15:13:00 2001] en forma de malato, los niveles de [Author ID1: at Wed Sep 5 15:13:00 2001]descarboxilación aumentan.[Author ID0: at]

En las células del mesófilo no hay RUBISCO.[Author ID0: at]

En las células de la vaina la entrada de O[Author ID1: at Wed Sep 5 15:14:00 2001]2[Author ID1: at Wed Sep 5 15:15:00 2001] es [Author ID1: at Wed Sep 5 15:15:00 2001]mínima[Author ID1: at Wed Sep 5 15:26:00 2001]. Si se diera [Author ID1: at Wed Sep 5 15:15:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:26:00 2001], el CO[Author ID1: at Wed Sep 5 15:15:00 2001]2[Author ID1: at Wed Sep 5 15:15:00 2001] [Author ID1: at Wed Sep 5 15:15:00 2001]tendría[Author ID1: at Wed Sep 5 15:26:00 2001] q salir al exterior, pero debido a las paredes gruesas este CO[Author ID1: at Wed Sep 5 15:15:00 2001]2[Author ID1: at Wed Sep 5 15:16:00 2001] se fija por la PEP carboxilasa.[Author ID0: at]

Las plantas CAM tienen los estomas [Author ID1: at Wed Sep 5 15:16:00 2001]cerrada[Author ID1: at Wed Sep 5 15:26:00 2001] cuando se libera el CO[Author ID1: at Wed Sep 5 15:16:00 2001]2[Author ID1: at Wed Sep 5 15:16:00 2001], por ello [Author ID1: at Wed Sep 5 15:16:00 2001]aunque[Author ID1: at Wed Sep 5 15:26:00 2001] se diera [Author ID1: at Wed Sep 5 15:16:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:26:00 2001] el CO[Author ID1: at Wed Sep 5 15:16:00 2001]2[Author ID1: at Wed Sep 5 15:17:00 2001] no puede salir porque cuando hay luz los estomas [Author ID1: at Wed Sep 5 15:17:00 2001]están[Author ID1: at Wed Sep 5 15:26:00 2001] [Author ID1: at Wed Sep 5 15:17:00 2001]cerrados[Author ID1: at Wed Sep 5 15:26:00 2001].[Author ID0: at]

El sistema de fijación de CO[Author ID1: at Wed Sep 5 15:17:00 2001]2[Author ID1: at Wed Sep 5 15:17:00 2001] implica malato en la vacuol[Author ID1: at Wed Sep 5 15:17:00 2001]a. Durante el [Author ID1: at Wed Sep 5 15:18:00 2001]día[Author ID1: at Wed Sep 5 15:26:00 2001] las descarboxilasas son muy eficientes, luego la [Author ID1: at Wed Sep 5 15:18:00 2001]función[Author ID1: at Wed Sep 5 15:26:00 2001] de la RUBISCO + O[Author ID1: at Wed Sep 5 15:19:00 2001]2[Author ID1: at Wed Sep 5 15:19:00 2001] no se da aparentemente.[Author ID0: at]

[Author ID1: at Wed Sep 5 15:19:00 2001]

Rutas [Author ID1: at Wed Sep 5 15:19:00 2001]colaterales[Author ID1: at Wed Sep 5 15:20:00 2001][Author ID1: at Wed Sep 5 15:19:00 2001]

El amonio liberado tiene doble posibilidad de ser asimilado:[Author ID0: at]

- **Combinación con el [Author ID1: at Wed Sep 5 15:20:00 2001] [Author ID1: at Wed Sep 5 15:21:00 2001]− [Author ID1: at Wed Sep 5 15:21:00 2001]cetoglutarato[Author ID1: at Wed Sep 5 15:22:00 2001] [Author ID1: at Wed Sep 5 15:21:00 2001]para dar glutamato en una [Author ID1: at Wed Sep 5 15:22:00 2001]reacción[Author ID1: at Wed Sep 5 15:25:00 2001] q requiere NADH, catalizada por la glutamato des[Author ID1: at Wed Sep 5 15:22:00 2001]H[Author ID1: at Wed Sep 5 15:23:00 2001]asa[Author ID1: at Wed Sep 5 15:23:00 2001].[Author ID1: at Wed Sep 5 15:23:00 2001]−−>[Author ID1: at Wed Sep 5 15:23:00 2001]**[Author ID1: at Wed Sep 5 15:20:00 2001]
- **Fijarse a [Author ID1: at Wed Sep 5 15:23:00 2001]través[Author ID1: at Wed Sep 5 15:25:00 2001] de la [Author ID1: at Wed Sep 5 15:23:00 2001]unión[Author ID1: at Wed Sep 5 15:25:00 2001] con glutamato en primer lugar para dar Gln con gasto de ATP por la Gln [Author ID1: at Wed Sep 5 15:23:00 2001]sintetasa[Author ID1: at Wed Sep 5 15:24:00 2001] [Author ID1: at Wed Sep 5 15:23:00 2001]q a su vez se combina con cetoglutarato [Author ID1: at Wed Sep 5 15:24:00 2001]para dar 2 glutamatos con gasto de Fd reducida en una [Author ID1: at Wed Sep 5 15:24:00 2001]reacción[Author ID1: at Wed Sep 5 15:26:00 2001] catalizada por GOGAT.[Author ID1: at Wed Sep 5 15:24:00 2001]−−>[Author ID1: at Wed Sep 5 15:24:00 2001]**[Author ID1: at Wed Sep 5 15:20:00 2001]

La glutamato deH[Author ID1: at Wed Sep 5 15:25:00 2001]asa[Author ID1: at Wed Sep 5 15:25:00 2001] es un enzima mitocondrial con baja afinidad por el sustrato por lo q necesita niveles altos para q se de la [Author ID1: at Wed Sep 5 15:27:00 2001]reacción[Author ID1: at Wed Sep 5 15:30:00 2001], niveles q son [Author ID1: at Wed Sep 5 15:27:00 2001]tóxicos[Author ID1: at Wed Sep 5 15:30:00 2001], por eso hay otra [Author ID1: at Wed Sep 5 15:27:00 2001]reacción[Author ID1: at Wed Sep 5 15:30:00 2001] q es la catalizada por la Gln [Author ID1: at Wed Sep 5 15:27:00 2001]sintetasa[Author ID1: at Wed Sep 5 15:28:00 2001] [Author ID1: at Wed Sep 5 15:27:00 2001]q tiene una Km [Author ID1: at Wed Sep 5 15:28:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] baja y por eso el sistema es altamente [Author ID1: at Wed Sep 5 15:28:00 2001]eficiente[Author ID1: at Wed Sep 5 15:30:00 2001] [Author ID1: at Wed Sep 5 15:28:00 2001]consumiendo enseguida todo el amonio q se produce.[Author ID0: at]

Existe una posibilidad de q se libere CO[Author ID1: at Wed Sep 5 15:29:00 2001]2[Author ID1: at Wed Sep 5 15:29:00 2001] por rutas diferentes a la del proceso [Author ID1: at Wed Sep 5 15:29:00 2001]fotorrespiratorio[Author ID1: at Wed Sep 5 15:30:00 2001].[Author ID1: at Wed Sep 5 15:29:00 2001][Author ID0: at]

El glioxalato en el peroxisoma normalmente se transamina con Glu para dar Gly.[Author ID0: at]

En ocasiones se puede combinar con H[Author ID1: at Wed Sep 5 15:32:00

2001]2[Author ID1: at Wed Sep 5 15:33:00 2001]O[Author ID1: at Wed Sep 5 15:33:00 2001]2[Author ID1: at Wed Sep 5 15:33:00 2001] y por una [Author ID1: at Wed Sep 5 15:33:00 2001]reacción[Author ID1: at Wed Sep 5 15:39:00 2001] no enzimática se libra CO[Author ID1: at Wed Sep 5 15:33:00 2001]2[Author ID1: at Wed Sep 5 15:33:00 2001], [Author ID1: at Wed Sep 5 15:33:00 2001]ácido[Author ID1: at Wed Sep 5 15:39:00 2001] formica y agua.[Author ID0: at]

Lo normal es q el H[Author ID1: at Wed Sep 5 15:33:00 2001]2[Author ID1: at Wed Sep 5 15:34:00 2001]O[Author ID1: at Wed Sep 5 15:34:00 2001]2[Author ID1: at Wed Sep 5 15:34:00 2001] se rompa por la catalasa ya q es toxico.[Author ID0: at]

Si aumenta la Tª, el Q[Author ID1: at Wed Sep 5 15:34:00 2001]10[Author ID1: at Wed Sep 5 15:34:00 2001] de la [Author ID1: at Wed Sep 5 15:34:00 2001]glicolato oxidasa es 1.73 y el de la catalasa 1.26.[Author ID0: at]

La tasa de [Author ID1: at Wed Sep 5 15:35:00 2001]producción[Author ID1: at Wed Sep 5 15:39:00 2001] es mayor q la tasa de [Author ID1: at Wed Sep 5 15:35:00 2001]degradación. En estas condiciones se puede dar esta [Author ID1: at Wed Sep 5 15:36:00 2001]reacción[Author ID1: at Wed Sep 5 15:39:00 2001]. La importancia de esto se desconoce. Como mucho es un 20% respecto a la [Author ID1: at Wed Sep 5 15:36:00 2001]liberación[Author ID1: at Wed Sep 5 15:37:00 2001] [Author ID1: at Wed Sep 5 15:36:00 2001]de CO[Author ID1: at Wed Sep 5 15:37:00 2001]2[Author ID1: at Wed Sep 5 15:37:00 2001] por la Gly descarboxilasa.[Author ID0: at]

También puede darse una [Author ID1: at Wed Sep 5 15:37:00 2001]reacción[Author ID1: at Wed Sep 5 15:39:00 2001] catalizada por la glicolato oxidasa[Author ID1: at Wed Sep 5 15:37:00 2001]:[Author ID0: at]

[Author ID1: at Wed Sep 5 15:38:00 2001]

Glioxalato + O[Author ID1: at Wed Sep 5 15:38:00 2001]2[Author ID1: at Wed Sep 5 15:38:00 2001] oxalato CO[Author ID1: at Wed Sep 5 15:38:00 2001]2[Author ID1: at Wed Sep 5 15:38:00 2001] + [Author ID1: at Wed Sep 5 15:38:00 2001]fórmico[Author ID1: at Wed Sep 5 15:39:00 2001]−−>[Author ID1: at Wed Sep 5 15:06:00 2001][Author ID1: at Wed Sep 5 15:38:00 2001]

Gli oxid. Oxal [Author ID1: at Wed Sep 5 15:40:00 2001]descar.[Author ID0: at]

[Author ID1: at Wed Sep 5 15:41:00 2001]

Fórmico[Author ID1: at Wed Sep 5 15:44:00 2001] + NAD CO[Author ID1: at Wed Sep 5 15:43:00 2001]2[Author ID1: at Wed Sep 5 15:44:00 2001] + NADH[Author ID0: at]

[Author ID0: at]

Otra consecuencia q deriva de la existencia de [Author ID1: at Wed Sep 5 15:44:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:47:00 2001] es la diferencia q existe en cuanto al punto de [Author ID1: at Wed Sep 5 15:44:00 2001]compensación[Author ID1: at Wed Sep 5 15:45:00 2001] [Author ID1: at Wed Sep 5 15:44:00 2001]de CO[Author ID1: at Wed Sep 5 15:45:00 2001]2[Author ID1: at Wed Sep 5 15:45:00 2001] entre las plantas C[Author ID1: at Wed Sep 5 15:45:00 2001]3[Author ID1: at Wed Sep 5 15:45:00 2001] y las [Author ID1: at Wed Sep 5 15:45:00 2001]demás[Author

ID1: at Wed Sep 5 15:47:00 2001].[Author ID0: at]

El [Author ID1: at Wed Sep 5 15:45:00 2001]−−>**pu[Author ID1: at Wed Sep 5 15:45:00 2001]**[Author ID1: at Wed Sep 5 15:47:00 2001]−−>**nto de compensación[Author ID1: at Wed Sep 5 15:46:00 2001]**[Author ID1: at Wed Sep 5 15:47:00 2001] **es cuando el balance de CO[Author ID1: at Wed Sep 5 15:46:00 2001]2[Author ID1: at Wed Sep 5 15:46:00 2001] desprendido por respiración y [Author ID1: at Wed Sep 5 15:46:00 2001]fotorrespiración[Author ID1: at Wed Sep 5 15:47:00 2001] es contrarrestado por el CO[Author ID1: at Wed Sep 5 15:46:00 2001]2[Author ID1: at Wed Sep 5 15:47:00 2001] fijado por la fotosíntesis.[Author ID1: at Wed Sep 5 15:47:00 2001]**

En plantas q no fotorrespiran el punto de compensación se alcanza a niveles [Author ID1: at Wed Sep 5 15:48:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] bajos q en el metabolismo C[Author ID1: at Wed Sep 5 15:48:00 2001]3[Author ID1: at Wed Sep 5 15:49:00 2001].[Author ID1: at Wed Sep 5 15:49:00 2001][Author ID0: at]

[Author ID1: at Wed Sep 5 15:50:00 2001]

Tema 12 respiración[Author ID1: at Wed Sep 5 15:50:00 2001][Author ID0: at]

[Author ID1: at Wed Sep 5 15:50:00 2001]

La [Author ID1: at Wed Sep 5 15:50:00 2001]energía[Author ID1: at Wed Sep 5 15:52:00 2001] almacenada en [Author ID1: at Wed Sep 5 15:50:00 2001]carbohidratos[Author ID1: at Wed Sep 5 15:51:00 2001] [Author ID1: at Wed Sep 5 15:50:00 2001]es liberada de modo controlado y utilizada en otros procesos [Author ID1: at Wed Sep 5 15:51:00 2001]metabólicos[Author ID1: at Wed Sep 5 15:52:00 2001] para la síntesis de estructuras vegetales.[Author ID1: at Wed Sep 5 15:51:00 2001][Author ID0: at]

[Author ID0: at]

La respiración permite la liberación de la [Author ID1: at Wed Sep 5 15:53:00 2001]energía[Author ID1: at Wed Sep 5 15:56:00 2001] almacenada de un modo controlado.[Author ID0: at]

Respiración y glucólisis van ligadas.[Author ID1: at Wed Sep 5 15:53:00 2001]

La respiración aerobia es [Author ID1: at Wed Sep 5 15:54:00 2001]común[Author ID1: at Wed Sep 5 15:56:00 2001] a [Author ID1: at Wed Sep 5 15:54:00 2001]eucariota[Author ID1: at Wed Sep 5 15:56:00 2001] y Procariotas aunque hay características especificas para [Author ID1: at Wed Sep 5 15:54:00 2001]plantas.[Author ID0: at]

Esta respiración es un proceso biológico por el cual los compuestos reducidos son movilizados y oxidados. Es un p[Author ID1: at Wed Sep 5 15:55:00 2001]roceso en el q se libera energía q se sintetiza como ATP en última instancia.[Author ID1: at Wed Sep 5 15:56:00 2001][Author ID1: at Wed Sep 5 16:03:00 2001]

(Hoja 74 [Author ID1: at Wed Sep 5 16:03:00 2001]Fig.[Author ID1: at Wed Sep 5 16:04:00 2001] 11.10)[Author ID1: at Wed Sep 5 16:03:00 2001] Es un proceso de [Author ID1: at Wed Sep 5 16:03:00 2001]oxidorreducción[Author ID1: at Wed Sep 5

16:04:00 2001] con gran liberación de [Author ID1: at Wed Sep 5 16:03:00 2001]energía[Author ID1: at Wed Sep 5 16:04:00 2001] por la hexosa oxidasa.[Author ID1: at Wed Sep 5 16:03:00 2001][Author ID0: at]

El O[Author ID1: at Wed Sep 5 16:05:00 2001]2[Author ID1: at Wed Sep 5 16:05:00 2001] se reduce a agua y los carbohidratos se oxidan a CO[Author ID1: at Wed Sep 5 16:05:00 2001]2[Author ID1: at Wed Sep 5 16:06:00 2001].[Author ID0: at]

La síntesis de ATP es el primer y principal paso del proceso respiratorio.[Author ID0: at]

[Author ID1: at Wed Sep 5 16:06:00 2001]

−−>**La [Author ID1: at Wed Sep 5 16:07:00 2001]**[Author ID1: at Wed Sep 5 16:08:00 2001]−−>**respiración[Author ID1: at Wed Sep 5 16:08:00 2001]**[Author ID1: at Wed Sep 5 16:08:00 2001]−−> **[Author ID1: at Wed Sep 5 16:07:00 2001]**[Author ID1: at Wed Sep 5 16:08:00 2001]−−>**se da en tres fases:[Author ID1: at Wed Sep 5 16:08:00 2001]**[Author ID1: at Wed Sep 5 16:08:00 2001]**[Author ID0: at]**

[Author ID1: at Wed Sep 5 16:08:00 2001]

Glucólisis:[Author ID1: at Wed Sep 5 16:08:00 2001]

Se produce a [Author ID1: at Wed Sep 5 16:08:00 2001]través[Author ID1: at Wed Sep 5 16:18:00 2001] del funcionamiento de e[Author ID1: at Wed Sep 5 16:08:00 2001]nzimas solubles en el citoplasma. Las hexosa son degradadas a pirúvico al mismo tiempo q se liber[Author ID1: at Wed Sep 5 16:09:00 2001]a una pequeña cantidad de ATP y una pequeña cantidad de poder reductor en forma de NADH.[Author ID1: at Wed Sep 5 16:10:00 2001][Author ID1: at Wed Sep 5 16:11:00 2001]

[Author ID1: at Tue Sep 11 12:23:00 2001]

[Author ID1: at Wed Sep 5 16:11:00 2001]

−−>**CAT:[Author ID1: at Wed Sep 5 16:11:00 2001]**[Author ID1: at Wed Sep 5 16:11:00 2001]**[Author ID1: at Wed Sep 5 16:11:00 2001]**

−−>**Se localiza en la[Author ID1: at Wed Sep 5 16:11:00 2001]**[Author ID1: at Wed Sep 5 16:11:00 2001] **matriz de la[Author ID1: at Wed Sep 5 16:13:00 2001]**−−> **mitocondria. Produce la [Author ID1: at Wed Sep 5 16:11:00 2001]**[Author ID1: at Wed Sep 5 16:11:00 2001]**oxidación [Author ID1: at Wed Sep 5 16:11:00 2001]completa de pirúvico a CO[Author ID1: at Wed Sep 5 16:12:00 2001]2[Author ID1: at Wed Sep 5 16:12:00 2001] y se genera gran cantidad de poder reductor en forma de NADH, FADH[Author ID1: at Wed Sep 5 16:12:00 2001]2[Author ID1: at Wed Sep 5 16:13:00 2001] y una pequeña cantidad de ATP.[Author ID1: at Wed Sep 5 16:13:00 2001][Author ID0: at]**

[Author ID1: at Wed Sep 5 16:33:00 2001]

CTE mitocondrial:[Author ID1: at Wed Sep 5 16:34:00 2001]

Se da en la mitocondria. El poder reductor en forma de NADH, FA[Author ID1: at Wed Sep 5 16:34:00 2001]DH[Author ID1: at Wed Sep 5 16:35:00 2001]2[Author ID1: at

Wed Sep 5 16:35:00 2001] y Fd[Author ID1: at Wed Sep 5 16:35:00 2001]red[Author ID1: at Wed Sep 5 16:35:00 2001] son oxidados a [Author ID1: at Wed Sep 5 16:35:00 2001]través[Author ID1: at Wed Sep 5 16:37:00 2001] de la [Author ID1: at Wed Sep 5 16:35:00 2001]transferencia[Author ID1: at Wed Sep 5 16:37:00 2001] de e[Author ID1: at Wed Sep 5 16:35:00 2001]−[Author ID1: at Wed Sep 5 16:36:00 2001] mediante [Author ID1: at Wed Sep 5 16:36:00 2001]proteínas[Author ID1: at Wed Sep 5 16:37:00 2001] al O[Author ID1: at Wed Sep 5 16:36:00 2001]2[Author ID1: at Wed Sep 5 16:36:00 2001] q se oxida a agua. A la vez se da un gradiente electroquímico de protones entre la matriz y el citoplasma[Author ID1: at Wed Sep 5 16:36:00 2001] [Author ID1: at Wed Sep 5 16:37:00 2001]utilizado por la ATP[Author ID1: at Wed Sep 5 16:36:00 2001]asa[Author ID1: at Wed Sep 5 16:37:00 2001] para generar ATP.[Author ID1: at Wed Sep 5 16:37:00 2001][Author ID0: at]

[Author ID0: at]

Muchos de los intermediarios q se originan son el punto de partida en la [Author ID1: at Wed Sep 5 16:38:00 2001]síntesis[Author ID1: at Wed Sep 5 16:39:00 2001] [Author ID1: at Wed Sep 5 16:38:00 2001]de otros compuestos.[Author ID0: at]

Los [Author ID1: at Wed Sep 5 16:39:00 2001]órganos[Author ID1: at Wed Sep 5 16:41:00 2001] verdes a la luz también respiran no para obtener [Author ID1: at Wed Sep 5 16:39:00 2001]energía[Author ID1: at Wed Sep 5 16:43:00 2001] sino para [Author ID1: at Wed Sep 5 16:39:00 2001]obtener[Author ID1: at Wed Sep 5 16:41:00 2001] [Author ID1: at Wed Sep 5 16:39:00 2001]intermediarios[Author ID1: at Wed Sep 5 16:41:00 2001] como punto de inicio para la [Author ID1: at Wed Sep 5 16:39:00 2001]síntesis[Author ID1: at Wed Sep 5 16:40:00 2001] [Author ID1: at Wed Sep 5 16:39:00 2001]de otros compuestos.[Author ID0: at]

[Author ID1: at Wed Sep 5 16:40:00 2001]

G[Author ID1: at Wed Sep 5 16:41:00 2001]−−>lucólisis[Author ID1: at Wed Sep 5 16:41:00 2001][Author ID1: at Wed Sep 5 16:41:00 2001]**[Author ID1: at Wed Sep 5 16:41:00 2001]**

Se [Author ID1: at Wed Sep 5 16:41:00 2001]da en todos los organismos vivos.[Author ID1: at Wed Sep 5 16:42:00 2001] (Hoja 75)[Author ID1: at Wed Sep 5 16:44:00 2001]−−>[Author ID1: at Wed Sep 5 16:42:00 2001][Author ID1: at Wed Sep 5 16:44:00 2001]

Es el primer estadio q compone el proceso respiratorio. No requiere O[Author ID1: at Wed Sep 5 16:42:00 2001]2[Author ID1: at Wed Sep 5 16:42:00 2001], constituye el primer modo de [Author ID1: at Wed Sep 5 16:42:00 2001]producción[Author ID1: at Wed Sep 5 16:43:00 2001] [Author ID1: at Wed Sep 5 16:42:00 2001]de energía en los tejidos vegetales cuando los niveles de O[Author ID1: at Wed Sep 5 16:43:00 2001]2[Author ID1: at Wed Sep 5 16:43:00 2001] son bajos.[Author ID0: at]

Implica reacciones [Author ID1: at Wed Sep 5 16:43:00 2001]enzimáticas q se dan en el citoplasma por lo q son solubles. En animales se ha visto q esta[Author ID1: at Wed Sep 5 16:44:00 2001]s[Author ID1: at Wed Sep 5 17:32:00 2001] [Author ID1: at Wed Sep 5 16:44:00 2001]enzimas[Author ID1: at Wed Sep 5 16:45:00 2001] se agregan formando complejos [Author ID1: at Wed Sep 5 16:44:00 2001]enzimáticos[Author ID1: at Wed Sep 5 16:45:00 2001] q se une[Author ID1: at Wed Sep 5 16:44:00 2001]n[Author ID1:

at Wed Sep 5 17:32:00 2001] a la membrana.[Author ID1: at Wed Sep 5 16:44:00 2001][Author ID1: at Wed Sep 5 16:45:00 2001]

[Author ID0: at]

En condiciones de hipoxia o anoxia las plantas pueden llevar a cabo procesos de fermentación. Con ello lo q consiguen es reoxidar el NADH porque si no [Author ID1: at Wed Sep 5 16:47:00 2001]esta reoxidado el ciclo no puede continuar.[Author ID0: at]

Dos tipos de fermentación:[Author ID1: at Wed Sep 5 16:48:00 2001]

- −−>**Láctica:[Author ID1: at Wed Sep 5 16:49:00 2001]**[Author ID1: at Wed Sep 5 16:50:00 2001] **el pirúvico es reducido a lactato con NADH como donador de poder reductor.[Author ID1: at Wed Sep 5 16:49:00 2001]**−−>**[Author ID1: at Wed Sep 5 16:49:00 2001]**[Author ID1: at Wed Sep 5 16:43:00 2001]
- −−>**Alcohólica[Author ID1: at Wed Sep 5 16:50:00 2001]**[Author ID1: at Wed Sep 5 16:50:00 2001]−−>**:[Author ID1: at Wed Sep 5 16:49:00 2001]**[Author ID1: at Wed Sep 5 16:50:00 2001] **se da en levaduras en las q el pirúvico es convertido en [Author ID1: at Wed Sep 5 16:50:00 2001]acetaldehído[Author ID1: at Wed Sep 5 16:51:00 2001] y este es convertido en etanol obteniendo poder[Author ID1: at Wed Sep 5 16:50:00 2001] reductor oxidado para siga funcionando la glucólisis. [Author ID1: at Wed Sep 5 16:51:00 2001]**−−>**[Author ID1: at Wed Sep 5 16:52:00 2001]**[Author ID1: at Wed Sep 5 16:52:00 2001]

[Author ID1: at Wed Sep 5 16:52:00 2001]

−−>**La [Author ID1: at Wed Sep 5 16:52:00 2001]**[Author ID1: at Wed Sep 5 16:52:00 2001]−−>**gluconeogénesis[Author ID1: at Wed Sep 5 16:52:00 2001]**[Author ID1: at Wed Sep 5 16:52:00 2001] **es la glucólisis en senito inverso. Ocurre en[Author ID1: at Wed Sep 5 16:52:00 2001] plantas q acumulan lípidos en la semilla q los transforman en sacarosa poniéndola a disposición de los tejidos vegetales para su crecimiento.[Author ID1: at Wed Sep 5 16:53:00 2001][Author ID1: at Wed Sep 5 16:54:00 2001]**

Los triglicéridos son hidrolizados por las lipasas hasta Ac CoA q por la [Author ID1: at Wed Sep 5 16:58:00 2001] [Author ID1: at Wed Sep 5 16:58:00 2001]−[Author ID1: at Wed Sep 5 16:59:00 2001]oxidación[Author ID1: at Wed Sep 5 17:08:00 2001] se unen a OA o glioxalato uniéndose al CAT hasta dar malato q sale de la mitocondria oxidándose a OA y por la PEP [Author ID1: at Wed Sep 5 16:59:00 2001]carboxilasa[Author ID1: at Wed Sep 5 17:00:00 2001] [Author ID1: at Wed Sep 5 16:59:00 2001]da PEP. A partir de aquí se usan las enzimas reversibles y en las irreversibles se sustituyen por fosfofructokinas dep[Author ID1: at Wed Sep 5 17:00:00 2001]endiente de pirofosfato y[Author ID1: at Wed Sep 5 17:00:00 2001] la [Author ID1: at Wed Sep 5 17:01:00 2001]fructosa[Author ID1: at Wed Sep 5 17:08:00 2001] 1,6−BP fosfatasa.[Author ID1: at Wed Sep 5 17:01:00 2001][Author ID0: at]

[Author ID0: at]

Cuando la planta esta en condiciones aeróbicas, se pueden dar las siguientes etapas como son el CAT y la CTE [Author ID1: at Wed Sep 5 17:02:00 2001]mitocondrial[Author ID1: at Wed Sep 5 17:03:00 2001].[Author ID1: at Wed Sep 5 17:02:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Wed Sep 5 17:03:00 2001]

−−>**La mitocondria[Author ID1: at Wed Sep 5 17:03:00 2001]**[Author ID1: at Wed Sep 5 17:03:00 2001]**:[Author ID1: at Wed Sep 5 17:03:00 2001] consta de una [Author ID1: at Wed Sep 5 17:03:00 2001]doble[Author ID1: at Wed Sep 5 17:07:00 2001] membrana, una externa lisa q rodea a una interna altamente invaginada (crestas). [Author ID1: at Wed Sep 5 17:03:00 2001]El contenido de la mitocondria constituye la matriz. El[Author ID1: at Wed Sep 5 17:04:00 2001] espacio [Author ID1: at Wed Sep 5 17:05:00 2001]i[Author ID1: at Wed Sep 5 17:07:00 2001]ntermembranal es el espacio q hay entre las dos membranas. La [Author ID1: at Wed Sep 5 17:05:00 2001]externa[Author ID1: at Wed Sep 5 17:07:00 2001] es permeable y la interna es selectiva.[Author ID0: at]**

Las mem[Author ID1: at Wed Sep 5 17:05:00 2001]branas [Author ID1: at Wed Sep 5 17:06:00 2001]están[Author ID1: at Wed Sep 5 17:07:00 2001] formadas por lípidos de los cuales el 80% son fosfatidiletanolamina y fosfatidilcolina.[Author ID0: at]

Tienen cie[Author ID1: at Wed Sep 5 17:06:00 2001]rta anatomía genética.[Author ID1: at Wed Sep 5 17:07:00 2001][Author ID0: at]

[Author ID1: at Wed Sep 5 17:08:00 2001]

[Author ID1: at Wed Sep 5 17:09:00 2001]

−−>**[Author ID1: at Wed Sep 5 15:50:00 2001]**[Author ID1: at Wed Sep 5 17:03:00 2001]

CAT[Author ID1: at Wed Sep 5 17:09:00 2001] o [Author ID1: at Wed Sep 5 17:10:00 2001]−−>**Ciclo de Krebs[Author ID1: at Wed Sep 5 17:10:00 2001]**[Author ID1: at Wed Sep 5 17:10:00 2001]**[Author ID1: at Wed Sep 5 17:09:00 2001]**

−−>**(Hoja 77)[Author ID1: at Wed Sep 5 17:09:00 2001]**[Author ID1: at Wed Sep 5 17:10:00 2001] **[Author ID1: at Wed Sep 5 17:09:00 2001]Tiene lugar en la matriz mitocondrial. Se necesita q el pirúvico formado entre en la matriz, debido a la barrera q supone la membrana interna[Author ID1: at Wed Sep 5 17:11:00 2001],[Author ID1: at Wed Sep 5 17:12:00 2001] para poder pasarla se tiene q intercambiar con hidroxilos.[Author ID1: at Wed Sep 5 17:11:00 2001][Author ID0: at]**

Una vez dentro el primer paso es la oxidación a Ac CoA. Son tres paso: descarboxilación, oxidación y [Author ID1: at Wed Sep 5 17:13:00 2001]unión[Author ID1: at Wed Sep 5 17:14:00 2001] del grupo CoA. [Author ID1: at Wed Sep 5 17:13:00 2001]Esta catalizado por la piruvato desH[Author ID1: at Wed Sep 5 17:14:00 2001]asa[Author ID1: at Wed Sep 5 17:14:00 2001] regulada por un proceso de [Author ID1: at Wed Sep 5 17:14:00 2001]fosforilación − desfosforilación a través de una proteinkinasa.[Author ID0: at]

[Author ID1: at Wed Sep 5 17:15:00 2001]

−−>**(Hoja 78 [Author ID1: at Wed Sep 5 17:15:00 2001]**[Author ID1: at Wed Sep 5 17:20:00 2001]−−>**Fig.[Author ID1: at Wed Sep 5 17:20:00 2001]**[Author ID1: at Wed Sep 5 17:20:00 2001]−−> **11[Author ID1: at Wed Sep 5 17:15:00 2001]**[Author ID1: at Wed

Sep 5 17:20:00 2001]−−>.**4)[Author ID1: at Wed Sep 5 17:16:00 2001]**[Author ID1: at Wed Sep 5 17:20:00 2001] **Las mitocondrias de plantas tienen un enzima NAD−EM q [Author ID1: at Wed Sep 5 17:16:00 2001]cataliza la descarboxilación de malato a pirúvico. Esto es debido a q la piruvato kinasa se inhibe [Author ID1: at Wed Sep 5 17:17:00 2001]según[Author ID1: at Wed Sep 5 17:18:00 2001] [Author ID1: at Wed Sep 5 17:17:00 2001]la cantidad de pirúvico q haya. Si los niveles de producción de pirúvico son mayores q los niveles de consumo, esto se para y la glucólisis [Author ID1: at Wed Sep 5 17:18:00 2001]no puede seguir funcionando. Las plantas tienen rutas anapler[Author ID1: at Wed Sep 5 17:19:00 2001]ó[Author ID1: at Wed Sep 5 17:21:00 2001]ticas para superar el puente de la pi[Author ID1: at Wed Sep 5 17:19:00 2001]r[Author ID1: at Wed Sep 5 17:21:00 2001]uvato kinasa , es la PEP carboxilasa. P[Author ID1: at Wed Sep 5 17:19:00 2001]or esta vía [Author ID1: at Wed Sep 5 17:20:00 2001]obtenemos[Author ID1: at Wed Sep 5 17:21:00 2001] malato q mediante un transportador entra y sale P[Author ID1: at Wed Sep 5 17:20:00 2001]i[Author ID1: at Wed Sep 5 17:20:00 2001].[Author ID1: at Wed Sep 5 17:20:00 2001] [Author ID1: at Wed Sep 5 17:14:00 2001][Author ID0: at]**

El malato puede ser oxidado por la enzima [Author ID1: at Wed Sep 5 17:22:00 2001]málica[Author ID1: at Wed Sep 5 17:26:00 2001] (EM) se transforma en pirúvico q se transforma en Ac CoA y sigue el ciclo.[Author ID1: at Wed Sep 5 17:22:00 2001]

[Author ID0: at]

[Author ID1: at Wed Sep 5 17:23:00 2001]

CTE mitocondrial[Author ID1: at Wed Sep 5 17:23:00 2001]

El poder reductor puede transformarse en ATP.[Author ID0: at]

En la transferencia de e[Author ID1: at Wed Sep 5 17:23:00 2001]−[Author ID1: at Wed Sep 5 17:24:00 2001] se da salida de H[Author ID1: at Wed Sep 5 17:24:00 2001]+[Author ID1: at Wed Sep 5 17:24:00 2001] al espacio mitocondrial debido a un gradiente electromotriz q [Author ID1: at Wed Sep 5 17:24:00 2001]será[Author ID1: at Wed Sep 5 17:26:00 2001] utilizado por la ATP[Author ID1: at Wed Sep 5 17:24:00 2001]asa[Author ID1: at Wed Sep 5 17:24:00 2001] para forma[Author ID1: at Wed Sep 5 17:24:00 2001]r ATP.[Author ID1: at Wed Sep 5 17:25:00 2001][Author ID0: at]

Tanto en la glucólisis como en el CAT, [Author ID1: at Wed Sep 5 17:26:00 2001]además[Author ID1: at Wed Sep 5 17:30:00 2001] de producirse ATP por [Author ID1: at Wed Sep 5 17:26:00 2001]fosforilación[Author ID1: at Wed Sep 5 17:30:00 2001] a nivel de sustrato se produce poder reductor (en la [Author ID1: at Wed Sep 5 17:26:00 2001]glucólisis[Author ID1: at Wed Sep 5 17:27:00 2001] [Author ID1: at Wed Sep 5 17:26:00 2001]dos por hexosa y en el CAT 8 por [Author ID1: at Wed Sep 5 17:27:00 2001]hexosa[Author ID1: at Wed Sep 5 17:28:00 2001] [Author ID1: at Wed Sep 5 17:27:00 2001]y en forma de FADH[Author ID1: at Wed Sep 5 17:28:00 2001]2[Author ID1: at Wed Sep 5 17:28:00 2001]). [Author ID1: at Wed Sep 5 17:28:00 2001]El NADH se combina con O[Author ID1: at Wed Sep 5 17:29:00 2001]2[Author ID1: at Wed Sep 5 17:29:00 2001] [Author ID1: at Wed Sep 5 17:29:00 2001]oxidándose[Author ID1: at Wed Sep 5 21:27:00 2001] [Author ID1: at Wed Sep 5 17:29:00 2001]para dar NAD[Author ID1: at Wed Sep 5 17:30:00 2001]+[Author ID1: at Wed Sep 5 17:30:00 2001] + H[Author ID1: at Wed Sep 5 17:30:00 2001]2[Author ID1: at Wed Sep 5 17:30:00 2001]O[Author ID1: at Wed Sep 5 17:30:00 2001][Author ID0: at]

[Author ID0: at]

Hay 4 complejos multiproteicos q conducen los e[Author ID1: at Wed Sep 5 21:28:00 2001]− [Author ID1: at Wed Sep 5 21:28:00 2001]al O[Author ID1: at Wed Sep 5 21:28:00 2001]2[Author ID1: at Wed Sep 5 21:28:00 2001] para dar H[Author ID1: at Wed Sep 5 21:28:00 2001]2[Author ID1: at Wed Sep 5 21:29:00 2001]O:[Author ID1: at Wed Sep 5 21:29:00 2001]

- −−>**NADH desH[Author ID1: at Wed Sep 5 21:29:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**asa[Author ID1: at Wed Sep 5 21:29:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**:[Author ID1: at Wed Sep 5 21:29:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001] **oxida el NADH en el interior de la mitocondria. Los e[Author ID1: at Wed Sep 5 21:29:00 2001]−[Author ID1: at Wed Sep 5 21:29:00 2001] son cedidos a la [Author ID1: at Wed Sep 5 21:30:00 2001]ubiquinona[Author ID1: at Wed Sep 5 21:32:00 2001].[Author ID1: at Wed Sep 5 21:30:00 2001] Este paso de e[Author ID1: at Wed Sep 5 21:32:00 2001]−[Author ID1: at Wed Sep 5 21:32:00 2001] puede estar interrumpido por varias sustancias como la p[Author ID1: at Wed Sep 5 21:32:00 2001]iericidina o la rotenona.[Author ID1: at Wed Sep 5 21:33:00 2001]−−>[Author ID1: at Wed Sep 5 21:33:00 2001]**[Author ID1: at Wed Sep 5 21:29:00 2001]
- −−>**Succina[Author ID1: at Wed Sep 5 21:33:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**t[Author ID1: at Wed Sep 5 21:36:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**o desH[Author ID1: at Wed Sep 5 21:33:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**asa[Author ID1: at Wed Sep 5 21:33:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001]−−>**:[Author ID1: at Wed Sep 5 21:34:00 2001]**[Author ID1: at Wed Sep 5 21:42:00 2001] **constituido por el FADH producido por la succinato desH[Author ID1: at Wed Sep 5 21:34:00 2001]asa[Author ID1: at Wed Sep 5 21:34:00 2001] y 3 complejos sulfof[Author ID1: at Wed Sep 5 21:34:00 2001]errosos. Los e[Author ID1: at Wed Sep 5 21:35:00 2001]−[Author ID1: at Wed Sep 5 21:35:00 2001] también son cedidos a la [Author ID1: at Wed Sep 5 21:35:00 2001]ubiquinona (UQ)[Author ID1: at Wed Sep 5 21:41:00 2001]. El paso de succinato a FADH puede bloquearse por el malonato. [Author ID1: at Wed Sep 5 21:35:00 2001]Los e[Author ID1: at Wed Sep 5 21:36:00 2001]−[Author ID1: at Wed Sep 5 21:36:00 2001] del complejo II son cedidos al complejo III[Author ID1: at Wed Sep 5 21:36:00 2001]−−>[Author ID1: at Wed Sep 5 21:36:00 2001]**[Author ID1: at Wed Sep 5 21:29:00 2001]
- −−>**Ubiquinona citocromo c oxidasa:[Author ID1: at Wed Sep 5 21:42:00 2001]**[Author ID1: at Wed Sep 5 21:43:00 2001] **los e[Author ID1: at Wed Sep 5 21:42:00 2001]−[Author ID1: at Wed Sep 5 21:42:00 2001] cedidos por el complejo II son cedidos al citocromo c. Tiene dos cit b, un cit c y un complejo sulfoferroso. La transferencia de e[Author ID1: at Wed Sep 5 21:42:00 2001]−[Author ID1: at Wed Sep 5 21:42:00 2001] de la UQ al complejo III se bloquea por la antimicina.[Author ID0: at]**

El cit c es el único móvil, y esta localizado hacia la cara citoplasmática de la membrana interna.[Author ID1: at Wed Sep 5 21:42:00 2001]

- −−>**Cit c oxidasa terminal:[Author ID1: at Wed Sep 5 21:42:00**

2001][Author ID1: at Wed Sep 5 21:43:00 2001] **a [Author ID1: at Wed Sep 5 21:43:00 2001]través[Author ID1: at Wed Sep 5 21:44:00 2001] de 2 cit a y 2 [Author ID1: at Wed Sep 5 21:43:00 2001]átomos[Author ID1: at Wed Sep 5 21:44:00 2001] de cobre[Author ID1: at Wed Sep 5 21:43:00 2001] ceden los e[Author ID1: at Wed Sep 5 21:44:00 2001]−[Author ID1: at Wed Sep 5 22:05:00 2001] al O[Author ID1: at Wed Sep 5 22:05:00 2001]2[Author ID1: at Wed Sep 5 22:05:00 2001] (4e[Author ID1: at Wed Sep 5 22:05:00 2001]−[Author ID1: at Wed Sep 5 22:05:00 2001]) para dar dos moléculas de agua. Esta [Author ID1: at Wed Sep 5 22:06:00 2001]proteína[Author ID1: at Wed Sep 5 22:07:00 2001] es sensible a la azida, cianuro y monóxido de carbono.[Author ID1: at Wed Sep 5 22:06:00 2001]−−>[Author ID1: at Wed Sep 5 22:07:00 2001]**[Author ID1: at Wed Sep 5 22:07:00 2001]

[Author ID1: at Wed Sep 5 22:07:00 2001]

(Fig. 11.6)[Author ID1: at Wed Sep 5 22:07:00 2001] la ubicación y organización dentro de la membrana interna hace q en el paso de e[Author ID1: at Wed Sep 5 22:08:00 2001]−[Author ID1: at Wed Sep 5 22:09:00 2001] haya direccionalidad y haya[Author ID1: at Wed Sep 5 22:08:00 2001] salida de e[Author ID1: at Wed Sep 5 22:09:00 2001]−[Author ID1: at Wed Sep 5 22:09:00 2001] hacia el espacio intermembranal.[Author ID0: at]

La NADH desH[Author ID1: at Wed Sep 5 22:09:00 2001]asa[Author ID1: at Wed Sep 5 22:09:00 2001], succinato de[Author ID1: at Wed Sep 5 22:09:00 2001]s[Author ID1: at Wed Sep 5 22:10:00 2001]H[Author ID1: at Wed Sep 5 22:09:00 2001]asa[Author ID1: at Wed Sep 5 22:10:00 2001] y la reducción del O2 de llevan a cabo en el lado matricial de la membrana interna.[Author ID0: at]

En citocromo se localiza en la cara intermembranal, lo mismo q los complejos sulfoferrosos y el [Author ID1: at Wed Sep 5 22:10:00 2001]citocromo[Author ID1: at Wed Sep 5 22:11:00 2001] [Author ID1: at Wed Sep 5 22:10:00 2001]c del complejo III.[Author ID0: at]

Los citocromos [Author ID1: at Wed Sep 5 22:11:00 2001]b del complejo III y los citocromo a del complejo IV se[Author ID1: at Wed Sep 5 22:12:00 2001] [Author ID1: at Wed Sep 5 22:15:00 2001]encuentran distribuidos hacia la cara opuesta.[Author ID1: at Wed Sep 5 22:12:00 2001]

[Author ID0: at]

La [Author ID1: at Wed Sep 5 22:13:00 2001]respiración [Author ID1: at Wed Sep 5 22:14:00 2001]vegetal[Author ID1: at Wed Sep 5 22:15:00 2001] tiene características especificas:[Author ID0: at]

Tran[Author ID1: at Wed Sep 5 22:14:00 2001]sportadores específicos. Las mitocondrias vegetales tienen una NADH desH[Author ID1: at Wed Sep 5 22:15:00 2001]asa [Author ID1: at Wed Sep 5 22:15:00 2001] [Author ID1: at Wed Sep 5 22:15:00 2001]localizada cerca de la cara intermembranal q se encarga de oxidar al NADH [Author ID1: at Wed Sep 5 22:16:00 2001]citoplasmático.[Author ID1: at Wed Sep 5 22:17:00 2001][Author ID0: at]

Tiene una segunda NADH desH[Author ID1: at Wed Sep 5 22:18:00 2001]asa[Author

ID1: at Wed Sep 5 22:18:00 2001] localizada en la cara matricial capaz de oxidar el NADH del ciclo de Krebs [Author ID1: at Wed Sep 5 22:18:00 2001]insensible[Author ID1: at Wed Sep 5 22:19:00 2001] a la rotenona.[Author ID1: at Wed Sep 5 22:18:00 2001][Author ID0: at]

La mayor parte de las mitocondrias poseen la capacidad de reducir el O[Author ID1: at Wed Sep 5 22:29:00 2001]2[Author ID1: at Wed Sep 5 22:30:00 2001] por otra ruta q es insensible al cianuro.[Author ID0: at]

Paralelamente al transporte de e[Author ID1: at Wed Sep 5 22:30:00 2001]−[Author ID1: at Wed Sep 5 22:31:00 2001] se da la salida de H[Author ID1: at Wed Sep 5 22:30:00 2001]+ [Author ID1: at Wed Sep 5 22:31:00 2001]creándose[Author ID1: at Wed Sep 5 22:34:00 2001] un gradiente electroquímico con componente [Author ID1: at Wed Sep 5 22:31:00 2001]eléctrico[Author ID1: at Wed Sep 5 22:34:00 2001] y un gradiente de pH porque el espacio intermembranal se esta acidificando.[Author ID1: at Wed Sep 5 22:32:00 2001]

(Hoja 80 fig11.7) este gradiente se [Author ID1: at Wed Sep 5 22:33:00 2001]puede[Author ID1: at Wed Sep 5 22:34:00 2001] utilizar para la síntesis de ATP por el 5º complejo, q es el de la ATP[Author ID1: at Wed Sep 5 22:33:00 2001]asa.[Author ID1: at Wed Sep 5 22:33:00 2001][Author ID0: at]

La salida del ATP formado por la ATP[Author ID1: at Wed Sep 5 22:43:00 2001]asa[Author ID1: at Wed Sep 5 22:43:00 2001] es la q [Author ID1: at Wed Sep 5 22:43:00 2001]controla[Author ID1: at Wed Sep 5 22:50:00 2001] toda la respiración.[Author ID0: at]

[Author ID1: at Wed Sep 5 22:43:00 2001]

Ruta in[Author ID1: at Wed Sep 5 22:43:00 2001]sensible al cianuro[Author ID1: at Wed Sep 5 22:44:00 2001]

En los [Author ID1: at Wed Sep 5 22:44:00 2001]tejidos[Author ID1: at Wed Sep 5 22:50:00 2001] animales activos, la aplicación de una concentración de cianuro de 1 mM provoca un descenso de la [Author ID1: at Wed Sep 5 22:44:00 2001]respiración de 1%.[Author ID0: at]

En los tejidos vegetales [Author ID1: at Wed Sep 5 22:45:00 2001]presentan[Author ID1: at Wed Sep 5 22:50:00 2001] una [Author ID1: at Wed Sep 5 22:45:00 2001]respiración[Author ID1: at Wed Sep 5 22:46:00 2001] [Author ID1: at Wed Sep 5 22:45:00 2001]insensible y tienen niveles de respiración de un 20−25% pero en ocasiones puede alcanzar un 100%.[Author ID0: at]

El enzim[Author ID1: at Wed Sep 5 22:46:00 2001]a encargado es una oxidasa especial. Los e[Author ID1: at Wed Sep 5 22:47:00 2001]−[Author ID1: at Wed Sep 5 22:47:00 2001] q llegan al O[Author ID1: at Wed Sep 5 22:47:00 2001]2[Author ID1: at Wed Sep 5 22:47:00 2001] a [Author ID1: at Wed Sep 5 22:47:00 2001]través[Author ID1: at Wed Sep 5 22:50:00 2001] de ella se [Author ID1: at Wed Sep 5 22:47:00 2001]desvían[Author ID1: at Wed Sep 5 22:50:00 2001] de la UQ. Este enzima es sensible al [Author ID1: at Wed Sep 5 22:47:00 2001]ácido[Author ID1: at Wed Sep 5 22:50:00 2001] [Author ID1: at Wed Sep 5 22:47:00 2001]s[Author ID1: at Wed Sep 5 22:48:00 2001]a[Author ID1: at Wed Sep 5 22:50:00 2001]licilhidroxamico y al

hidroxipropilgalato.[Author ID0: at]

El hecho de q los e[Author ID1: at Wed Sep 5 22:48:00 2001]−[Author ID1: at Wed Sep 5 22:48:00 2001] no pasen por los complejos III y IV implica q haya dos puntos de [Author ID1: at Wed Sep 5 22:48:00 2001]acumulación de H[Author ID1: at Wed Sep 5 22:49:00 2001]+[Author ID1: at Wed Sep 5 22:49:00 2001] q no atraviesan.[Author ID0: at]

Esta ruta [Author ID1: at Wed Sep 5 22:49:00 2001]alternativa[Author ID1: at Wed Sep 5 22:50:00 2001] produce poco ATP. La [Author ID1: at Wed Sep 5 22:49:00 2001]energía[Author ID1: at Wed Sep 5 22:50:00 2001] se[Author ID1: at Wed Sep 5 22:49:00 2001] [Author ID1: at Wed Sep 5 22:51:00 2001]libera por calor[Author ID1: at Wed Sep 5 22:49:00 2001]. Es una ruta termog[Author ID1: at Wed Sep 5 22:51:00 2001]é[Author ID1: at Wed Sep 5 22:58:00 2001]nica.[Author ID1: at Wed Sep 5 22:51:00 2001]

Mas q un proceso termog[Author ID1: at Wed Sep 5 22:52:00 2001]é[Author ID1: at Wed Sep 5 22:58:00 2001]nico (paralelamente a esto se da una [Author ID1: at Wed Sep 5 22:52:00 2001]acumulación[Author ID1: at Wed Sep 5 22:53:00 2001] [Author ID1: at Wed Sep 5 22:52:00 2001]de [Author ID1: at Wed Sep 5 22:53:00 2001]ácido[Author ID1: at Wed Sep 5 22:57:00 2001] [Author ID1: at Wed Sep 5 22:53:00 2001]salicílico[Author ID1: at Wed Sep 5 22:58:00 2001] induciendo un aumento de Tª) es un papel de rebosadero del exceso de NADH por encima de su uso para formar ATP.[Author ID1: at Wed Sep 5 22:53:00 2001]

La respiración se requiere también para la síntesis de intermediarios, [Author ID1: at Wed Sep 5 22:54:00 2001]además[Author ID1: at Wed Sep 5 22:57:00 2001] de sintetizar ATP formándose poder reductor para la [Author ID1: at Wed Sep 5 22:54:00 2001]energía[Author ID1: at Wed Sep 5 22:58:00 2001] por CTE, pero si el consumo de ATP no es paralelo a su [Author ID1: at Wed Sep 5 22:54:00 2001]síntesis[Author ID1: at Wed Sep 5 22:58:00 2001] , el exceso de [Author ID1: at Wed Sep 5 22:54:00 2001]ATP puede inhibir la CTE y acumular NADH reducido e inhibirse tanto la [Author ID1: at Wed Sep 5 22:55:00 2001]glucólisis[Author ID1: at Wed Sep 5 22:56:00 2001] [Author ID1: at Wed Sep 5 22:55:00 2001]como el ciclo de Krebs, no dándose los intermediarios.[Author ID1: at Wed Sep 5 22:56:00 2001]

Para evitar esto el NADH y FAD son oxidados para no generar energía por la ruta alternativa insensible al cianuro.[Author ID1: at Wed Sep 5 22:57:00 2001][Author ID0: at]

[Author ID1: at Wed Sep 5 22:58:00 2001]

Regulación del metabolismo respiratorio del carbono[Author ID1: at Wed Sep 5 22:58:00 2001]

Las tasas de producción del metabolito ADP en el citoplasma van a ser las q regulan toda la respiración.[Author ID0: at]

La glucólisis tiene dos puntos de [Author ID1: at Wed Sep 5 22:59:00 2001]regulación[Author ID1: at Wed Sep 5 23:00:00 2001]:[Author ID1: at Wed Sep 5 22:59:00 2001] la fosfofructokinasa y la piruvatokinasa.[Author ID0: at]

Cuando la tasa de producción del ATP es mayor q el consumo, el exceso inhibe la piruvatokinasa. [Author ID1: at Wed Sep 5 23:00:00 2001]También esta inhibida alost[Author ID1: at Wed Sep 5 23:01:00 2001]é[Author ID1: at Wed Sep 5 23:03:00 2001]ricamente por malato y [Author ID1: at Wed Sep 5 23:01:00 2001] − cetoglutarato.[Author ID0: at]

La inhibición del enzima [Author ID1: at Wed Sep 5 23:01:00 2001]provoca un aumento de PEP y este inhibe la fosfofructokinasa reduciendo las tasas de reducción de [Author ID1: at Wed Sep 5 23:02:00 2001]azúcar[Author ID1: at Wed Sep 5 23:03:00 2001] por [Author ID1: at Wed Sep 5 23:02:00 2001]glucólisis[Author ID1: at Wed Sep 5 23:03:00 2001].[Author ID1: at Wed Sep 5 23:02:00 2001][Author ID0: at]

Existe la posibilidad de usar una ruta anapler[Author ID1: at Thu Sep 6 18:53:00 2001]ó[Author ID1: at Thu Sep 6 19:25:00 2001]tica para saltarnos el paso de la piruvatoki[Author ID1: at Thu Sep 6 18:53:00 2001]nasa q funcionar[Author ID1: at Thu Sep 6 18:53:00 2001]á porque los intermediarios del ciclo de Krebs se requieren para otras rutas.[Author ID0: at]

Las plantas [Author ID1: at Thu Sep 6 18:54:00 2001]además[Author ID1: at Thu Sep 6 19:24:00 2001] de producir Fructosa 1,6−BP por la fructokinasa tienen una [Author ID1: at Thu Sep 6 18:54:00 2001]fosfofructokinasa dependiente de PP[Author ID1: at Thu Sep 6 18:55:00 2001]i[Author ID1: at Thu Sep 6 18:56:00 2001] q esta regulada por los niveles de fructosa 2,6−BP.[Author ID1: at Thu Sep 6 18:56:00 2001]

[Author ID1: at Thu Sep 6 18:57:00 2001]

Cuando los niveles de ADP citoplasmáticos son altos se da una mayor eficiencia en la CTE.[Author ID1: at Thu Sep 6 19:00:00 2001]

En el momento en q el ADP se agota las tasas de CTE disminuyen y si se vuelve a añadir aumenta.[Author ID1: at Thu Sep 6 19:01:00 2001]

Cuando el cociente ATP / ADP en la mitoc[Author ID1: at Thu Sep 6 19:06:00 2001]o[Author ID1: at Thu Sep 6 19:07:00 2001]ndria es alto[Author ID1: at Thu Sep 6 19:06:00 2001], disminuyen las tasas de la CTE.[Author ID0: at]

Al ATP acumulado tiene un efecto alost[Author ID1: at Thu Sep 6 19:10:00 2001]é[Author ID1: at Thu Sep 6 19:24:00 2001]rico sobre la piruvato desH[Author ID1: at Thu Sep 6 19:10:00 2001]asa[Author ID1: at Thu Sep 6 19:11:00 2001] y la citrato sintasa.[Author ID0: at]

Todo esto puede ser puenteado si se consigue poner en funcionamiento la ruta alternati[Author ID1: at Thu Sep 6 19:11:00 2001]va insensible al cianuro.[Author ID0: at]

Las plantas [Author ID1: at Thu Sep 6 19:12:00 2001]además[Author ID1: at Thu Sep 6 19:24:00 2001] de oxidar azucares por glucólisis también la llevan a cabo a [Author ID1: at Thu Sep 6 19:12:00 2001]través[Author ID1: at Thu Sep 6 19:24:00 2001] de l[Author ID1: at Thu Sep 6 19:12:00 2001]a ruta oxidativa de las pentosas P. Se da in zonas meristam[Author ID1: at Thu Sep 6 19:13:00 2001]á[Author ID1: at Thu Sep 6 19:24:00 2001]ticas en procesos de diferenciación.[Author ID0: at]

[Author ID1: at Thu Sep 6 19:13:00 2001]

[Author ID1: at Thu Sep 6 19:14:00 2001]

Ruta de las pentosas fosfato[Author ID0: at]

[Author ID1: at Thu Sep 6 19:14:00 2001]

(Hoja 83 [Author ID1: at Thu Sep 6 19:14:00 2001]Fig.[Author ID1: at Thu Sep 6 19:24:00 2001] 11.9)[Author ID1: at Thu Sep 6 19:14:00 2001] [Author ID1: at Thu Sep 6 19:15:00 2001]De todo el proceso solo las dos primeras etapas son oxidaciones. Se [Author ID1: at Thu Sep 6 19:15:00 2001]obtiene[Author ID1: at Thu Sep 6 19:24:00 2001] un NADPH en la primera [Author ID1: at Thu Sep 6 19:15:00 2001]reacción[Author ID1: at Thu Sep 6 19:24:00 2001] y otro en la segunda [Author ID1: at Thu Sep 6 19:15:00 2001]reacción[Author ID1: at Thu Sep 6 19:24:00 2001].[Author ID1: at Thu Sep 6 19:15:00 2001] [Author ID1: at Thu Sep 6 19:23:00 2001]El resto de etapas [Author ID1: at Thu Sep 6 19:15:00 2001]están[Author ID1: at Thu Sep 6 19:23:00 2001] para transformar la [Author ID1: at Thu Sep 6 19:15:00 2001]Ribulosa[Author ID1: at Thu Sep 6 19:16:00 2001] [Author ID1: at Thu Sep 6 19:15:00 2001]5P en intermediarios.[Author ID1: at Thu Sep 6 19:16:00 2001][Author ID0: at]

Cuando se oxida el NADPH se obtiene [Author ID1: at Thu Sep 6 19:17:00 2001]energía[Author ID1: at Thu Sep 6 19:23:00 2001] por la CTE.[Author ID0: at]

La regulación esta en las dos primeras enzimas y esta controlado por e[Author ID1: at Thu Sep 6 19:17:00 2001]l cociente NADPH / NADP.[Author ID0: at]

En los cloroplastos este cociente va a ser alto. A la luz no funciona la ruta [Author ID1: at Thu Sep 6 19:18:00 2001]oxidativa[Author ID1: at Thu Sep 6 19:23:00 2001] de pentosas P porque [Author ID1: at Thu Sep 6 19:19:00 2001]están[Author ID1: at Thu Sep 6 19:23:00 2001] inhibidas los dos primeros enzimas.[Author ID0: at]

[Author ID1: at Thu Sep 6 19:19:00 2001]

Proceso respiratorio en la planta entera[Author ID0: at]

[Author ID1: at Thu Sep 6 19:20:00 2001]

Los factores q afectan a la respiración son variados: condiciones [Author ID1: at Thu Sep 6 19:20:00 2001]internas[Author ID1: at Thu Sep 6 19:22:00 2001], com[Author ID1: at Thu Sep 6 19:20:00 2001]o la edad de la planta, habito de [Author ID1: at Thu Sep 6 19:21:00 2001]crecimiento[Author ID1: at Thu Sep 6 19:23:00 2001], tipo de [Author ID1: at Thu Sep 6 19:21:00 2001]orgánulo[Author ID1: at Thu Sep 6 19:23:00 2001] o condiciones externas como O[Author ID1: at Thu Sep 6 19:22:00 2001]2[Author ID1: at Thu Sep 6 19:22:00 2001], Tª y el estado hídrico.[Author ID1: at Thu Sep 6 19:22:00 2001][Author ID0: at]

Por análisis se ha podido determinar q se pierde un 30% del C po[Author ID1: at Thu Sep 6 19:47:00 2001]r respiración.[Author ID0: at]

En las plantas tropicales este porcentaje puede llegar a un pérdida de hasta el 80% por

la noche.[Author ID1: at Thu Sep 6 19:48:00 2001] Asimismo, las yemas en desarrollo tienen tasas superiores de respiración q las zonas [Author ID1: at Thu Sep 6 19:49:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] viejas.[Author ID1: at Thu Sep 6 19:49:00 2001][Author ID0: at]

[Author ID0: at]

Algunas plantas son climatéricas, esto es, q durante el inicio de la maduración de frutos au[Author ID1: at Thu Sep 6 19:50:00 2001]menta la tasa de respiración. A partir de la senescencia también se da un aumento de las tasas de respiración.[Author ID1: at Thu Sep 6 19:51:00 2001] [Author ID1: at Thu Sep 6 20:16:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Thu Sep 6 20:18:00 2001]

Tema 13 [Author ID1: at Thu Sep 6 20:18:00 2001]asimilación[Author ID1: at Thu Sep 6 20:19:00 2001] de nutrientes minerales[Author ID1: at Thu Sep 6 20:18:00 2001][Author ID0: at]

[Author ID1: at Thu Sep 6 20:19:00 2001]

Asimilación de aniones y de cationes.[Author ID0: at]

Las plantas superiores son [Author ID1: at Thu Sep 6 20:19:00 2001]autótrofas[Author ID1: at Thu Sep 6 20:21:00 2001], q sintetizan los com[Author ID1: at Thu Sep 6 20:19:00 2001]puestos [Author ID1: at Thu Sep 6 20:20:00 2001]celulares[Author ID1: at Thu Sep 6 20:21:00 2001] a partir de sustancias inorgánicas del lugar donde se desarrollan. Se tienen q tomar por las [Author ID1: at Thu Sep 6 20:20:00 2001]raíces[Author ID1: at Thu Sep 6 20:22:00 2001] y luego incorporarlos a esqueletos carbonados.[Author ID1: at Thu Sep 6 20:20:00 2001][Author ID0: at]

Los aniones han de reducirse primero antes de asimilarlos. Posteriormente se incorporan a compuestos [Author ID1: at Thu Sep 6 20:22:00 2001]intermediarios[Author ID1: at Thu Sep 6 20:30:00 2001] y luego[Author ID1: at Thu Sep 6 20:22:00 2001] forman [Author ID1: at Thu Sep 6 20:23:00 2001]macromoléculas[Author ID1: at Thu Sep 6 20:30:00 2001].[Author ID0: at]

Los ca[Author ID1: at Thu Sep 6 20:23:00 2001]t[Author ID1: at Thu Sep 6 20:30:00 2001]iones se incluyen formando enlaces de coordinación.[Author ID1: at Thu Sep 6 20:23:00 2001]

[Author ID0: at]

[Author ID0: at]

[Author ID1: at Tue Sep 11 12:23:00 2001]

[Author ID1: at Thu Sep 6 20:23:00 2001]

Asimilación del [Author ID1: at Thu Sep 6 20:23:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:30:00 2001][Author ID1: at Thu Sep 6 20:23:00 2001]

El [Author ID1: at Thu Sep 6 20:24:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:30:00 2001] está presente [Author ID1: at Thu Sep 6 20:24:00 2001] en los aa de las [Author ID1: at Thu Sep 6 20:25:00 2001]proteínas[Author ID1: at Thu Sep 6 20:31:00 2001] y los [Author ID1: at Thu Sep 6 20:25:00 2001]ácidos[Author ID1: at Thu Sep 6 20:31:00 2001] nucleicos. La disponibilidad es un factor limitante para su crecimiento, y la producción agrícola depende de la capacidad de captarlo por la planta.[Author ID1: at Thu Sep 6 20:25:00 2001]

Solo el C, H y O[Author ID1: at Thu Sep 6 20:26:00 2001]2[Author ID1: at Thu Sep 6 20:26:00 2001] son elementos [Author ID1: at Thu Sep 6 20:26:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] abundantes en[Author ID1: at Thu Sep 6 20:26:00 2001]tre los constituyentes celulares.[Author ID0: at]

La cantidad de N es entre [Author ID1: at Thu Sep 6 20:31:00 2001]0.5−5% del peso seco del vegetal. El [Author ID1: at Thu Sep 6 20:32:00 2001]nitrógeno[Author ID1: at Sat Sep 8 19:14:00 2001] de la litosfera es muy poco disponible. El 0.03% es transformado y puesto a disposición de la planta.[Author ID0: at]

El [Author ID1: at Thu Sep 6 20:33:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:37:00 2001] de la [Author ID1: at Thu Sep 6 20:33:00 2001]atmósfera[Author ID1: at Thu Sep 6 20:37:00 2001] es la mayor fuente de [Author ID1: at Thu Sep 6 20:33:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:36:00 2001] para la planta. [Author ID1: at Thu Sep 6 20:33:00 2001]Aunque es muy abundante no es [Author ID1: at Thu Sep 6 20:34:00 2001]asimilable[Author ID1: at Thu Sep 6 20:36:00 2001] por la planta porque no son [Author ID1: at Thu Sep 6 20:34:00 2001]capaces[Author ID1: at Thu Sep 6 20:37:00 2001] de romper el triple enlace del [Author ID1: at Thu Sep 6 20:34:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:36:00 2001] N[Author ID1: at Thu Sep 6 20:34:00 2001]2[Author ID1: at Thu Sep 6 20:35:00 2001].[Author ID0: at]

El [Author ID1: at Thu Sep 6 20:35:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:37:00 2001] presente en el suelo es [Author ID1: at Thu Sep 6 20:35:00 2001]rápidamente[Author ID1: at Thu Sep 6 20:36:00 2001] tomado por l[Author ID1: at Thu Sep 6 20:35:00 2001]a raíz e incorporado a los constituyentes celulares, incorporándose al ciclo trófico.[Author ID1: at Thu Sep 6 20:36:00 2001][Author ID0: at]

Los detritos revierten el [Author ID1: at Thu Sep 6 20:37:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:44:00 2001] al suelo.[Author ID1: at Thu Sep 6 20:37:00 2001]

La fijación de [Author ID1: at Thu Sep 6 20:38:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:44:00 2001] biológicamente se da por bacterias libres o mediante simbiosis.[Author ID0: at]

Estos microorganismos realizan la fijación [Author ID1: at Thu Sep 6 20:39:00 2001]porque[Author ID1: at Thu Sep 6 20:44:00 2001] tienen el enzima q origina la rotura del triple enlace , esta es la nitrogenasa.[Author ID0: at]

Una vez incorporado el [Author ID1: at Thu Sep 6 20:40:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:44:00 2001] en el suelo en forma de nitrato, puede ser tomado por las [Author ID1: at Thu Sep 6 20:40:00 2001]raíces[Author ID1: at Thu Sep 6 20:44:00 2001].[Author ID1: at Thu Sep 6 20:40:00 2001]

El [Author ID1: at Thu Sep 6 20:41:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:44:00 2001] de los [Author ID1: at Thu Sep 6 20:41:00 2001]compuestos[Author ID1: at Thu Sep 6 20:44:00 2001] [Author ID1: at Thu Sep 6 20:41:00 2001]celulares[Author ID1: at Thu Sep 6 20:44:00 2001] cuando mueren va a ser [Author ID1: at Thu Sep 6 20:41:00 2001]preoxidado[Author ID1: at Thu Sep 6 20:44:00 2001] a NO[Author ID1: at Thu Sep 6 20:41:00 2001]3[Author ID1: at Thu Sep 6 20:42:00 2001], se da la amonificación formando [Author ID1: at Thu Sep 6 20:42:00 2001]sales[Author ID1: at Thu Sep 6 20:44:00 2001] de amonio q se pueden quedar en el suelo para ser tomadas por la planta o planta o pueden ser reducidas por [Author ID1: at Thu Sep 6 20:42:00 2001]desnitrificación[Author ID1: at Thu Sep 6 20:44:00 2001].[Author ID1: at Thu Sep 6 20:42:00 2001]

[Author ID1: at Thu Sep 6 20:43:00 2001]

Fijación biológica del [Author ID1: at Thu Sep 6 20:43:00 2001]nitrógeno[Author ID1: at Thu Sep 6 20:44:00 2001] (Hoja 85 Tabla 12.1)[Author ID1: at Thu Sep 6 20:43:00 2001][Author ID1: at Thu Sep 6 20:44:00 2001]

La fijación biológica de N se da tanto en la vida libre como cuando se realiza simbiosis. En esta [Author ID1: at Thu Sep 6 20:45:00 2001]relación[Author ID1: at Thu Sep 6 21:21:00 2001] [Author ID1: at Thu Sep 6 20:45:00 2001]simbiótica[Author ID1: at Thu Sep 6 21:21:00 2001] se produce un [Author ID1: at Thu Sep 6 20:45:00 2001]trasvase[Author ID1: at Thu Sep 6 21:21:00 2001] de compuestos en un u otra [Author ID1: at Thu Sep 6 20:45:00 2001]dirección.[Author ID0: at]

Existe un gran numero de microorganismos capaces de llevar a cabo la fijación sobre [Author ID1: at Thu Sep 6 20:46:00 2001]todo[Author ID1: at Thu Sep 6 21:21:00 2001] las leguminosas q forman [Author ID1: at Thu Sep 6 20:46:00 2001]simbiosis[Author ID1: at Thu Sep 6 20:47:00 2001] [Author ID1: at Thu Sep 6 20:46:00 2001]con bacterias del genero Rhizobium, Bradyrizobium...[Author ID1: at Thu Sep 6 20:47:00 2001]

Hay [Author ID1: at Thu Sep 6 20:48:00 2001]árboles[Author ID1: at Thu Sep 6 21:21:00 2001] y arbustos q realizan simbiosis con actinomicetes del genero Frankia.[Author ID1: at Thu Sep 6 20:48:00 2001][Author ID0: at]

[Author ID0: at]

Todos estos organismos q llevan a cabo la fijación biológica de N se caracterizan por tener la nitrogenasa q es altamente sensible al [Author ID1: at Thu Sep 6 20:49:00 2001]O[Author ID1: at Thu Sep 6 20:50:00 2001]2[Author ID1: at Thu Sep 6 20:50:00 2001], es decir q se debe procurar q los niveles de [Author ID1: at Thu Sep 6 20:50:00 2001]O[Author ID1: at Thu Sep 6 20:51:00 2001]2[Author ID1: at Thu Sep 6 20:51:00 2001] cerca de la nitro[Author ID1: at Thu Sep 6 20:51:00 2001]g[Author ID1: at Thu Sep 6 21:21:00 2001]enasa sean [Author ID1: at Thu Sep 6 20:51:00 2001]mínimos[Author ID1: at Thu Sep 6 21:21:00 2001].[Author ID0: at]

En cianobacterias filamentosa tienen los heteroc[Author ID1: at Thu Sep 6 20:51:00 2001]i[Author ID1: at Thu Sep 6 21:21:00 2001]st[Author ID1: at Thu Sep 6 20:51:00 2001]e[Author ID1: at Thu Sep 6 21:21:00 2001]s, q se desarrollan cuando el alga se encuentra en un medio c[Author ID1: at Thu Sep 6 20:51:00 2001]on [Author ID1: at Thu Sep 6 20:52:00 2001]poco[Author ID1: at Thu Sep 6 21:22:00 2001] N. Estas células

no [Author ID1: at Thu Sep 6 20:52:00 2001]tienen[Author ID1: at Thu Sep 6 21:22:00 2001] PS II (RUBISCO).[Author ID0: at]

No se da la fotolisis del agua y no se[Author ID1: at Thu Sep 6 20:52:00 2001] producen niveles de O[Author ID1: at Thu Sep 6 20:53:00 2001]2[Author ID1: at Thu Sep 6 20:53:00 2001] intracelulares. Son [Author ID1: at Thu Sep 6 20:53:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] impermeables a la [Author ID1: at Thu Sep 6 20:53:00 2001]entrada[Author ID1: at Thu Sep 6 21:22:00 2001] de O[Author ID1: at Thu Sep 6 20:53:00 2001]2[Author ID1: at Thu Sep 6 20:53:00 2001] dado sus gruesas paredes.[Author ID1: at Thu Sep 6 20:53:00 2001]

Las cianobacterias no filamentosas y las bacterias tienen altas tasas respiratorias de modo q el O[Author ID1: at Thu Sep 6 20:54:00 2001]2[Author ID1: at Thu Sep 6 20:54:00 2001] q llega es reducido.[Author ID0: at]

Otras fijan el N solamente de noche..[Author ID1: at Thu Sep 6 20:55:00 2001]

O[Author ID1: at Thu Sep 6 21:20:00 2001]scillatoria forma agrupaciones densas de cianobacterias se modo q las q fijan son las q [Author ID1: at Thu Sep 6 20:55:00 2001]están[Author ID1: at Thu Sep 6 21:21:00 2001] [Author ID1: at Thu Sep 6 20:55:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] hacia el interior[Author ID1: at Thu Sep 6 20:55:00 2001]. [Author ID0: at]

En las facultativas solo llevan a cabo la fijación cuando [Author ID1: at Thu Sep 6 20:56:00 2001]están[Author ID1: at Thu Sep 6 21:20:00 2001] en anaerobiosis.[Author ID1: at Thu Sep 6 20:56:00 2001] [Author ID0: at]

Cuando [Author ID1: at Thu Sep 6 21:22:00 2001]están[Author ID1: at Thu Sep 6 21:24:00 2001] u[Author ID1: at Thu Sep 6 21:22:00 2001]nidas a [Author ID1: at Thu Sep 6 21:23:00 2001]leguminosas[Author ID1: at Thu Sep 6 21:24:00 2001] controlan el aporte de O[Author ID1: at Thu Sep 6 21:23:00 2001]2[Author ID1: at Thu Sep 6 21:23:00 2001] mediante una [Author ID1: at Thu Sep 6 21:23:00 2001]proteína[Author ID1: at Thu Sep 6 21:27:00 2001] transportadora de O[Author ID1: at Thu Sep 6 21:23:00 2001]2[Author ID1: at Thu Sep 6 21:23:00 2001], la leghemoglobina[Author ID1: at Thu Sep 6 21:23:00 2001], q transporta cantidades muy precisas de O[Author ID1: at Thu Sep 6 21:27:00 2001]2[Author ID1: at Thu Sep 6 21:28:00 2001] para no inhibir la nitrogenasa..[Author ID0: at]

La leghemoglobina tiene dos partes. [Author ID1: at Thu Sep 6 21:28:00 2001]Un grupo hemo sintetizado por la bacteria y una [Author ID1: at Thu Sep 6 21:29:00 2001]proteína[Author ID1: at Thu Sep 6 21:30:00 2001] globular sintetizada por la [Author ID1: at Thu Sep 6 21:29:00 2001]célula[Author ID1: at Thu Sep 6 21:31:00 2001] vegetal.[Author ID0: at]

Esta [Author ID1: at Thu Sep 6 21:29:00 2001]proteína[Author ID1: at Thu Sep 6 21:31:00 2001] se encuentra en el citoplasma de la [Author ID1: at Thu Sep 6 21:29:00 2001]célula[Author ID1: at Thu Sep 6 21:31:00 2001] infectada[Author ID1: at Thu Sep 6 21:29:00 2001] en una concentración muy elevada q hace q la [Author ID1: at Thu Sep 6 21:30:00 2001]estructura[Author ID1: at Thu Sep 6 21:31:00 2001] del modulo tenga un coloración [Author ID1: at Thu Sep 6 21:30:00 2001]rosácea[Author ID1: at Thu Sep 6 21:31:00 2001].[Author ID1: at Thu Sep 6 21:30:00 2001][Author ID0: at]

Los niveles de O[Author ID1: at Thu Sep 6 21:38:00 2001]2[Author ID1: at Thu Sep 6 21:38:00 2001] vienen regulados por la capacidad de la leghemoglobina para unirse al O[Author ID1: at Thu Sep 6 21:38:00 2001]2[Author ID1: at Thu Sep 6 21:38:00 2001]. [Author ID1: at Thu Sep 6 21:38:00 2001]lo suelta según el bacteroide lo necesite para respirar.[Author ID0: at]

Los nódulos son estructuras donde se produce la fijación. La simbiosis [Author ID1: at Thu Sep 6 21:39:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] conocida es la q se da entre Rhizobium u la [Author ID1: at Thu Sep 6 21:40:00 2001]raíz[Author ID1: at Thu Sep 6 22:04:00 2001] de las leguminosas. Se dan en la [Author ID1: at Thu Sep 6 21:40:00 2001]raíz[Author ID1: at Thu Sep 6 22:04:00 2001] de la planta después de la infección.[Author ID0: at]

Tiene un origen de parasitismo y luego se transforma en una [Author ID1: at Thu Sep 6 21:40:00 2001]relación[Author ID1: at Thu Sep 6 21:45:00 2001] de mutualismo.[Author ID1: at Thu Sep 6 21:40:00 2001]

Los Rhizobium infectivos reconocen específicamente las especies de leguminosas.[Author ID0: at]

[Author ID1: at Thu Sep 6 21:41:00 2001]

Interacción[Author ID1: at Thu Sep 6 21:44:00 2001] [Author ID1: at Thu Sep 6 21:41:00 2001]entre la bacteria u la leguminosa[Author ID1: at Thu Sep 6 21:42:00 2001]

Los Rhizobium son G[Author ID1: at Thu Sep 6 21:42:00 2001]−[Author ID1: at Thu Sep 6 21:42:00 2001],[Author ID1: at Thu Sep 6 21:45:00 2001] [Author ID1: at Thu Sep 6 21:42:00 2001]−−>bacilares, flagelados, [Author ID1: at Thu Sep 6 21:42:00 2001][Author ID1: at Thu Sep 6 21:44:00 2001]−−>**no esporulados y [Author ID1: at Thu Sep 6 21:43:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]−−>**móviles[Author ID1: at Thu Sep 6 21:44:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]−−> **con un diámetro de 1 nm.[Author ID0: at]**[Author ID0: at]

−−>**normalmente la bacteria de da por procesos quimiol[Author ID1: at Thu Sep 6 21:43:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]**á[Author ID1: at Thu Sep 6 21:44:00 2001]**−−>**cticos por la [Author ID1: at Thu Sep 6 21:43:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]−−>**excreción[Author ID1: at Thu Sep 6 21:44:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]−−> **de flavonoides y betainas por parte de [Author ID1: at Thu Sep 6 21:43:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001]−−>**la planta.[Author ID1: at Thu Sep 6 21:44:00 2001]**[Author ID1: at Thu Sep 6 21:44:00 2001] **[Author ID1: at Thu Sep 6 21:44:00 2001][Author ID0: at]**

El Rhizobium es [Author ID1: at Thu Sep 6 22:05:00 2001]atraído[Author ID1: at Fri Sep 7 01:06:00 2001] desplazándose hasta llegar a la [Author ID1: at Thu Sep 6 22:05:00 2001]raíz[Author ID1: at Fri Sep 7 01:06:00 2001].[Author ID1: at Thu Sep 6 22:05:00 2001]

Se activan genes NOR y el contacto de la bacteria con la [Author ID1: at Thu Sep 6 22:06:00 2001]raíz[Author ID1: at Fri Sep 7 01:06:00 2001] induce la proliferación de células del cortex de la [Author ID1: at Thu Sep 6 22:06:00 2001]raíz[Author ID1: at Fri Sep 7 01:06:00 2001] dando el meristemo nodular 1º.[Author ID1: at Thu Sep 6 22:06:00

2001]

El reconocimiento se da por la [Author ID1: at Thu Sep 6 22:07:00 2001]unión[Author ID1: at Fri Sep 7 01:06:00 2001] de [Author ID1: at Thu Sep 6 22:07:00 2001]polisacáridos[Author ID1: at Fri Sep 7 01:06:00 2001] de la bacteria con glicoproteinas de la [Author ID1: at Thu Sep 6 22:07:00 2001]raíz[Author ID1: at Fri Sep 7 01:06:00 2001] q son lecitinas.[Author ID1: at Thu Sep 6 22:07:00 2001]

Una vez dado el reconocimiento se dividen las células del periciclo formándose el canal de infección o de penetración de las bacterias por los pelos radicales de las plantas.[Author ID1: at Thu Sep 6 22:08:00 2001][Author ID0: at]

Posteriormente se desarrollan los tejidos conductores q comunican los nódulos con los tejidos conductores de la [Author ID1: at Fri Sep 7 01:07:00 2001]raíz[Author ID1: at Fri Sep 7 01:09:00 2001].[Author ID1: at Fri Sep 7 01:07:00 2001]

(Hoja 87 [Author ID1: at Fri Sep 7 01:08:00 2001]Fig.[Author ID1: at Fri Sep 7 01:22:00 2001] 12.5) Cómo se da la infección[Author ID1: at Fri Sep 7 01:08:00 2001] [Author ID1: at Fri Sep 7 01:09:00 2001]

posiblemente las bacterias excretan sustancias q degradan la pared del [Author ID1: at Fri Sep 7 01:09:00 2001]vegetal[Author ID1: at Fri Sep 7 01:22:00 2001] permitiendo la entrada de las bacterias al pelo radical.[Author ID1: at Fri Sep 7 01:09:00 2001]

El hilo de infección se va[Author ID1: at Fri Sep 7 01:10:00 2001] [Author ID1: at Fri Sep 7 01:22:00 2001]torciendo y crece por [Author ID1: at Fri Sep 7 01:10:00 2001]aposición[Author ID1: at Fri Sep 7 01:22:00 2001] de vesículas de Golgi.[Author ID1: at Fri Sep 7 01:10:00 2001]

Penetra hasta la base del pelo radical y se rompe el hilo penetrando en las células de la [Author ID1: at Fri Sep 7 01:11:00 2001]raíz[Author ID1: at Fri Sep 7 01:22:00 2001].[Author ID0: at]

Las bacterias se incorporan en el ci[Author ID1: at Fri Sep 7 01:11:00 2001]toplasma en las células diana donde por endocitosis entran en el citoplasma. La [Author ID1: at Fri Sep 7 01:12:00 2001]célula[Author ID1: at Fri Sep 7 01:22:00 2001] de la [Author ID1: at Fri Sep 7 01:12:00 2001]raíz[Author ID1: at Fri Sep 7 01:22:00 2001] forma una membrana q rodea las bacterias (membrana peribacteroidal).[Author ID1: at Fri Sep 7 01:12:00 2001]

Las bacterias siguen creciendo de un modo limitado y se transforman en bacteroides.[Author ID1: at Fri Sep 7 01:13:00 2001]

Paralelamente se da la formación de la leghemoglobina y del sistema vascular q une al [Author ID1: at Fri Sep 7 01:14:00 2001]nódulo[Author ID1: at Fri Sep 7 01:22:00 2001] con es resto de la [Author ID1: at Fri Sep 7 01:14:00 2001]raíz[Author ID1: at Fri Sep 7 01:22:00 2001]. A traes del xilema se transporta el amonio formado y [Author ID1: at Fri Sep 7 01:14:00 2001]por el floema se suministran los carbohidratos para la respiración de la bacteria obteniendo ATP y el NAD[Author ID1: at Fri Sep 7 01:15:00 2001] [Author ID1: at Fri Sep 7 01:22:00 2001]q se usara para la [Author ID1: at Fri Sep 7 01:15:00 2001]fijación[Author ID1: at Fri Sep 7 01:16:00 2001] [Author ID1: at Fri Sep 7 01:15:00 2001]de [Author ID1: at Fri Sep 7 01:16:00 2001]nitrógeno[Author

ID1: at Fri Sep 7 01:21:00 2001].[Author ID0: at]

En las leguminosas el [Author ID1: at Fri Sep 7 01:16:00 2001]nódulo[Author ID1: at Fri Sep 7 01:21:00 2001] tiene un crecimiento indeterminado[Author ID1: at Fri Sep 7 01:16:00 2001] con forma cilíndrica, q[Author ID1: at Fri Sep 7 01:17:00 2001] corresp[Author ID1: at Fri Sep 7 01:16:00 2001]onde a las leguminosas de clima templado[Author ID1: at Fri Sep 7 01:17:00 2001]. La soja tiene un [Author ID1: at Fri Sep 7 01:18:00 2001]nódulo[Author ID1: at Fri Sep 7 01:21:00 2001] de crecimiento determinado con forma [Author ID1: at Fri Sep 7 01:18:00 2001]esférica[Author ID1: at Fri Sep 7 01:21:00 2001].[Author ID0: at]

Hay otras q forman una [Author ID1: at Fri Sep 7 01:18:00 2001]relación[Author ID1: at Fri Sep 7 01:21:00 2001] no [Author ID1: at Fri Sep 7 01:18:00 2001]simbiótica[Author ID1: at Fri Sep 7 01:21:00 2001] porque no hay [Author ID1: at Fri Sep 7 01:18:00 2001]penetración[Author ID1: at Fri Sep 7 01:19:00 2001] [Author ID1: at Fri Sep 7 01:18:00 2001]de las bacterias, se anchan en la [Author ID1: at Fri Sep 7 01:19:00 2001]raíz[Author ID1: at Fri Sep 7 01:22:00 2001]. En este caso la planta excreta azucares q son recogidos por los actinomicetes y estos cuando mueren son los q liberan el [Author ID1: at Fri Sep 7 01:19:00 2001]nitrógeno[Author ID1: at Fri Sep 7 01:21:00 2001] q toma la planta.[Author ID1: at Fri Sep 7 01:19:00 2001]

−−>(Hoja 88 Fig. 12.6) Cómo se da la penetración en el canal de [Author ID1: at Fri Sep 7 01:21:00 2001][Author ID1: at Fri Sep 7 01:21:00 2001]**−−>infección[Author ID1: at Fri Sep 7 01:22:00 2001]**[Author ID1: at Fri Sep 7 01:21:00 2001]**[Author ID1: at Fri Sep 7 01:22:00 2001]**

−−>b[Author ID1: at Fri Sep 7 01:24:00 2001][Author ID1: at Fri Sep 7 01:24:00 2001] **[Author ID1: at Fri Sep 7 01:24:00 2001]−−>punto de ramificación[Author ID1: at Fri Sep 7 01:24:00 2001]**[Author ID1: at Fri Sep 7 01:24:00 2001]

c [Author ID1: at Fri Sep 7 01:24:00 2001]se ve la penetración. Las bacterias quedan rodeadas por una membrana.[Author ID0: at]

Una vez q se da la simbiosis lo[Author ID1: at Fri Sep 7 01:25:00 2001]s bacteroides son capaces de reducir el [Author ID1: at Fri Sep 7 01:26:00 2001]nitrógeno[Author ID1: at Fri Sep 7 01:40:00 2001] atmosférico a amonio[Author ID1: at Fri Sep 7 01:26:00 2001] mediante la nitrogenasa.[Author ID1: at Fri Sep 7 21:09:00 2001].[Author ID0: at]

Se requieren 6 e[Author ID1: at Fri Sep 7 01:26:00 2001]−[Author ID1: at Fri Sep 7 01:27:00 2001],[Author ID1: at Fri Sep 7 21:09:00 2001] pero la nitrogenasa funciona con 8 e[Author ID1: at Fri Sep 7 01:27:00 2001] −[Author ID1: at Fri Sep 7 01:27:00 2001] y 8 H[Author ID1: at Fri Sep 7 01:27:00 2001]+[Author ID1: at Fri Sep 7 01:27:00 2001] porque llevan aparejada la reducción de 2 H[Author ID1: at Fri Sep 7 01:28:00 2001]+[Author ID1: at Fri Sep 7 01:28:00 2001] a H[Author ID1: at Fri Sep 7 01:28:00 2001]2[Author ID1: at Fri Sep 7 01:28:00 2001].[Author ID0: at]

El sistema q lleva a cabo la [Author ID1: at Fri Sep 7 01:28:00 2001]reacción[Author ID1: at Fri Sep 7 01:40:00 2001] [Author ID1: at Fri Sep 7 01:28:00 2001]es la nitrogenasa q tiene dos componentes; molibdoferroprote[Author ID1: at Fri Sep 7 01:29:00 2001]í[Author ID1: at Fri Sep 7 01:40:00 2001]na y ferroprote[Author ID1: at Fri Sep 7 01:29:00 2001]í[Author ID1: at Fri Sep 7 01:40:00 2001]na.[Author ID1: at Fri Sep 7 01:29:00 2001]

−−>**(Fig. 12.7)[Author ID1: at Fri Sep 7 01:29:00 2001]**[Author ID1: at Fri Sep 7 01:29:00 2001] **L[Author ID1: at Fri Sep 7 01:29:00 2001]a[Author ID1: at Fri Sep 7 01:40:00 2001] ferropr[Author ID1: at Fri Sep 7 01:29:00 2001]o[Author ID1: at Fri Sep 7 01:40:00 2001]te[Author ID1: at Fri Sep 7 01:29:00 2001]í[Author ID1: at Fri Sep 7 01:40:00 2001]na es el componente menor; co[Author ID1: at Fri Sep 7 01:29:00 2001]nsta de 2 subunidade[Author ID1: at Fri Sep 7 01:30:00 2001]s[Author ID1: at Fri Sep 7 01:40:00 2001] con 30−70 Kda. Tiene por lo menos un agrupamiento[Author ID1: at Fri Sep 7 01:30:00 2001] sulfoferro[Author ID1: at Fri Sep 7 01:31:00 2001]s[Author ID1: at Fri Sep 7 01:39:00 2001]o con 4 Fe y 4 S. Es muy sensible frente al O[Author ID1: at Fri Sep 7 01:31:00 2001]2[Author ID1: at Fri Sep 7 01:31:00 2001] (con 45 segundos de exposición [Author ID1: at Fri Sep 7 01:31:00 2001]al O[Author ID1: at Fri Sep 7 01:32:00 2001]2[Author ID1: at Fri Sep 7 01:32:00 2001] se inactiva)[Author ID1: at Fri Sep 7 01:32:00 2001]**

L[Author ID1: at Fri Sep 7 21:06:00 2001]a molibdoprote[Author ID1: at Fri Sep 7 01:32:00 2001]í[Author ID1: at Fri Sep 7 01:39:00 2001]na tiene 4 subunidades con Pm 180−235 Kda, con dos agrupaciones Mo Fe S y varios complejos sulfof[Author ID1: at Fri Sep 7 01:32:00 2001]errosos[Author ID1: at Fri Sep 7 01:39:00 2001], sensibles al O[Author ID1: at Fri Sep 7 01:32:00 2001]2[Author ID1: at Fri Sep 7 01:33:00 2001].[Author ID0: at]

La vida media es de 10 minutos en presencia de O[Author ID1: at Fri Sep 7 01:33:00 2001]2[Author ID1: at Fri Sep 7 01:33:00 2001].[Author ID0: at]

El donador de e[Author ID1: at Fri Sep 7 01:34:00 2001]−[Author ID1: at Fri Sep 7 01:34:00 2001]es la Fd red q cede los e[Author ID1: at Fri Sep 7 01:34:00 2001]−[Author ID1: at Fri Sep 7 01:34:00 2001] al complejo sulfoferroso [Author ID1: at Fri Sep 7 01:34:00 2001]reduciéndolo[Author ID1: at Fri Sep 7 01:39:00 2001].[Author ID0: at]

La transferencia de e[Author ID1: at Fri Sep 7 01:34:00 2001]−[Author ID1: at Fri Sep 7 01:34:00 2001] de la ferroprote[Author ID1: at Fri Sep 7 01:35:00 2001]í[Author ID1: at Fri Sep 7 01:38:00 2001]na a la molibdoferroprote[Author ID1: at Fri Sep 7 01:35:00 2001]í[Author ID1: at Fri Sep 7 01:39:00 2001]na [Author ID1: at Fri Sep 7 01:35:00 2001]requiere[Author ID1: at Fri Sep 7 01:39:00 2001] la hidrólisis de 2 ATP / e[Author ID1: at Fri Sep 7 01:35:00 2001]−[Author ID1: at Fri Sep 7 01:35:00 2001]. A su vez los 8 e[Author ID1: at Fri Sep 7 01:35:00 2001]−[Author ID1: at Fri Sep 7 01:35:00 2001] se ceden al N[Author ID1: at Fri Sep 7 01:35:00 2001]2 [Author ID1: at Fri Sep 7 01:36:00 2001]−−>**y[Author ID1: at Fri Sep 7 01:36:00 2001]**[Author ID1: at Fri Sep 7 21:07:00 2001] **H[Author ID1: at Fri Sep 7 21:07:00 2001]+[Author ID1: at Fri Sep 7 01:36:00 2001] para [Author ID1: at Fri Sep 7 01:36:00 2001]reducirlos[Author ID1: at Fri Sep 7 01:38:00 2001] [Author ID1: at Fri Sep 7 01:36:00 2001]obteniendo[Author ID1: at Fri Sep 7 01:38:00 2001] NH[Author ID1: at Fri Sep 7 01:36:00 2001]3[Author ID1: at Fri Sep 7 01:36:00 2001] y H[Author ID1: at Fri Sep 7 01:36:00 2001]2[Author ID1: at Fri Sep 7 01:36:00 2001]. [Author ID0: at]**

Esto energéticamente resulta muy caro.[Author ID1: at Fri Sep 7 01:36:00 2001]

Las leguminosas si [Author ID1: at Fri Sep 7 01:37:00 2001]están[Author ID1: at Fri Sep 7 01:38:00 2001] en un medio con nitrato no [Author ID1: at Fri Sep 7 01:37:00 2001]dan simbiosis [Author ID1: at Fri Sep 7 01:38:00 2001]porque es [Author ID1: at Fri Sep 7 01:37:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] caro reducir N atmosférico con la ayuda de las[Author ID1: at Fri Sep 7 01:37:00 2001] bacterias q

asimilar el NO[Author ID1: at Fri Sep 7 01:41:00 2001]3[Author ID1: at Fri Sep 7 01:41:00 2001].[Author ID1: at Fri Sep 7 01:41:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Fri Sep 7 01:42:00 2001]

Tema 14 [Author ID1: at Fri Sep 7 01:42:00 2001]asimilación[Author ID1: at Fri Sep 7 01:43:00 2001] de nitrato[Author ID0: at]

[Author ID1: at Fri Sep 7 01:42:00 2001]

La fuente fundamental de N en [Author ID1: at Fri Sep 7 01:42:00 2001]plantas no leguminosas es el nitrato del suelo.[Author ID0: at]

El amonio de los detritus se oxida hasta el nitrato por la [Author ID1: at Fri Sep 7 01:43:00 2001]nitrificación[Author ID1: at Fri Sep 7 01:47:00 2001].[Author ID0: at]

En suelos encharcados, con pH[Author ID1: at Fri Sep 7 01:43:00 2001] [Author ID1: at Fri Sep 7 01:44:00 2001]ácido[Author ID1: at Fri Sep 7 01:47:00 2001] la [Author ID1: at Fri Sep 7 01:44:00 2001]mayor[Author ID1: at Fri Sep 7 01:47:00 2001] parte del N esta en forma de nitrato por lo q la [Author ID1: at Fri Sep 7 01:44:00 2001]raíz[Author ID1: at Fri Sep 7 01:47:00 2001] en el suelo [Author ID1: at Fri Sep 7 01:44:00 2001]encuentra[Author ID1: at Fri Sep 7 01:47:00 2001] nitrato. Para ser asimilado la [Author ID1: at Fri Sep 7 01:44:00 2001]célula[Author ID1: at Fri Sep 7 01:47:00 2001] lo tiene q tomar. Se requieren [Author ID1: at Fri Sep 7 01:45:00 2001]transportadores[Author ID1: at Fri Sep 7 01:47:00 2001] de[Author ID1: at Fri Sep 7 01:45:00 2001] [Author ID1: at Fri Sep 7 01:47:00 2001]membrana. Estos transportadores de membrana pueden ser:[Author ID0: at]

- **Constitutivo [Author ID1: at Fri Sep 7 01:45:00 2001]preexistentes[Author ID1: at Fri Sep 7 01:46:00 2001]−−>[Author ID1: at Fri Sep 7 01:46:00 2001]**[Author ID1: at Fri Sep 7 01:42:00 2001]
- **Inducidos[Author ID1: at Fri Sep 7 01:46:00 2001]−−>[Author ID1: at Fri Sep 7 01:46:00 2001]**[Author ID1: at Fri Sep 7 01:42:00 2001]

[Author ID0: at]

La toma de nitrato es por simporte con H[Author ID1: at Fri Sep 7 01:46:00 2001]+[Author ID1: at Fri Sep 7 01:46:00 2001] ó antiporte con[Author ID1: at Fri Sep 7 01:46:00 2001] [Author ID1: at Fri Sep 7 01:47:00 2001]OH.[Author ID0: at]

Es un transporte activo porque [Author ID1: at Fri Sep 7 01:46:00 2001]necesita[Author ID1: at Fri Sep 7 01:47:00 2001] el [Author ID1: at Fri Sep 7 01:46:00 2001]funcionamiento[Author ID1: at Fri Sep 7 01:47:00 2001] [Author ID1: at Fri Sep 7 01:46:00 2001]de una ATPasa[Author ID1: at Fri Sep 7 01:47:00 2001].[Author ID0: at]

Podemos hablar de tres tipos de sistemas transportadores:[Author ID0: at]

- **Constitutivo[Author ID1: at Fri Sep 7 01:48:00 2001]s de alta afinidad.[Author ID1: at Fri Sep 7 01:49:00 2001]−−>[Author ID1: at Fri Sep 7 01:49:00 2001]**[Author ID1: at Fri Sep 7 01:46:00 2001]
- **Inductivo de alta afinidad [Author ID1: at Fri Sep 7 01:49:00 2001]−−>[Author**

ID1: at Fri Sep 7 01:49:00 2001][Author ID1: at Fri Sep 7 01:46:00 2001]

- ◊ **Transportador de baja afinidad.[Author ID1: at Fri Sep 7 01:49:00 2001]**−−>**[Author ID1: at Fri Sep 7 01:49:00 2001]**[Author ID1: at Fri Sep 7 01:46:00 2001]

[Author ID0: at]

Se [Author ID1: at Fri Sep 7 01:49:00 2001]sabe q es activo porque cuando se añade un inhibidor (cianuro) no se da la toma de nitrato.[Author ID0: at]

Una vez dentro de la [Author ID1: at Fri Sep 7 01:50:00 2001]raíz[Author ID1: at Fri Sep 7 01:55:00 2001] el NO[Author ID1: at Fri Sep 7 01:50:00 2001]3[Author ID1: at Fri Sep 7 01:50:00 2001] o se almacena en la vacuola, después se transfiere al xilema y es conducido a las hojas donde es asimilado, [Author ID1: at Fri Sep 7 01:51:00 2001]ó es asimilado en la propia [Author ID1: at Fri Sep 7 01:52:00 2001]raíz[Author ID1: at Fri Sep 7 01:55:00 2001].[Author ID0: at]

Entra un NO[Author ID1: at Fri Sep 7 01:52:00 2001]3[Author ID1: at Fri Sep 7 01:52:00 2001] en simporte con 2H[Author ID1: at Fri Sep 7 01:52:00 2001]+[Author ID1: at Fri Sep 7 01:52:00 2001].[Author ID0: at]

Las plantas tienen capacidad de almacenar gran cantidad[Author ID1: at Fri Sep 7 01:52:00 2001] de NO[Author ID1: at Fri Sep 7 01:53:00 2001]3[Author ID1: at Fri Sep 7 01:53:00 2001]−[Author ID1: at Fri Sep 7 01:53:00 2001] en la vacuola, por esto puede ser perjudicial para los consumidores[Author ID1: at Fri Sep 7 01:53:00 2001], pudiendo producir efectos [Author ID1: at Fri Sep 7 01:54:00 2001]mutagénicos[Author ID1: at Fri Sep 7 01:55:00 2001].[Author ID0: at]

En NO[Author ID1: at Fri Sep 7 01:54:00 2001]3[Author ID1: at Fri Sep 7 01:54:00 2001] antes de asimilarse en los esqueletos carbonados tiene q reducirse primero a NO[Author ID1: at Fri Sep 7 01:54:00 2001]2[Author ID1: at Fri Sep 7 01:55:00 2001] y después a amonio (NH[Author ID1: at Fri Sep 7 01:55:00 2001]4[Author ID1: at Fri Sep 7 01:55:00 2001]+[Author ID1: at Fri Sep 7 01:55:00 2001]).[Author ID1: at Fri Sep 7 01:55:00 2001][Author ID1: at Fri Sep 7 21:05:00 2001]

[Author ID0: at]

NO[Author ID1: at Fri Sep 7 01:55:00 2001]3[Author ID1: at Fri Sep 7 01:56:00 2001]−[Author ID1: at Fri Sep 7 01:56:00 2001]>>>[Author ID1: at Fri Sep 7 01:56:00 2001] [Author ID1: at Fri Sep 7 01:57:00 2001]nitrato [Author ID1: at Fri Sep 7 01:56:00 2001]reductasa [Author ID1: at Fri Sep 7 01:57:00 2001]>>>[Author ID1: at Fri Sep 7 01:56:00 2001] [Author ID1: at Fri Sep 7 01:57:00 2001]NO[Author ID1: at Fri Sep 7 01:56:00 2001]2[Author ID1: at Fri Sep 7 01:56:00 2001]−[Author ID1: at Fri Sep 7 01:56:00 2001] [Author ID1: at Fri Sep 7 01:57:00 2001]>>> nitrito reductasa >>>[Author ID1: at Fri Sep 7 01:56:00 2001] NH[Author ID1: at Fri Sep 7 01:57:00 2001]4[Author ID1: at Fri Sep 7 01:57:00 2001]+[Author ID1: at Fri Sep 7 01:57:00 2001][Author ID0: at]

[Author ID1: at Fri Sep 7 01:57:00 2001]

Nitrato reductasa (Hoja 89 [Author ID1: at Fri Sep 7 01:57:00 2001]Fig.[Author ID1: at Fri Sep 7 01:58:00 2001] 12.8)[Author ID1: at Fri Sep 7 01:57:00 2001]

Cataliza la reducción del nitrato a ni[Author ID1: at Fri Sep 7 01:58:00 2001]t[Author ID1: at Fri Sep 7 01:59:00 2001]rito. Se requieren 2 e[Author ID1: at Fri Sep 7 01:58:00 2001]−[Author ID1: at Fri Sep 7 01:58:00 2001].[Author ID1: at Fri Sep 7 01:58:00 2001][Author ID0: at]

Es un enzima citosólico q funciona a con el NADH como fuente de poder reductor aunque puede funcionar con el NADH proveniente de la ruta oxidativa de pentosas fosfato.[Author ID1: at Fri Sep 7 01:59:00 2001]

Es un [Author ID1: at Fri Sep 7 02:00:00 2001]homodímero[Author ID1: at Fri Sep 7 02:01:00 2001] con una masa total de 200[Author ID1: at Fri Sep 7 02:00:00 2001]−[Author ID1: at Sun Sep 9 19:44:00 2001]270 Kda y cada componente de 100[Author ID1: at Fri Sep 7 02:01:00 2001]−[Author ID1: at Sun Sep 9 19:44:00 2001]200 Kda.[Author ID0: at]

En la transferencia de [Author ID1: at Fri Sep 7 02:01:00 2001]e[Author ID1: at Fri Sep 7 13:14:00 2001]−[Author ID1: at Fri Sep 7 13:14:00 2001] intervienen 3 grupos [Author ID1: at Fri Sep 7 13:14:00 2001]prostéticos[Author ID1: at Fri Sep 7 13:20:00 2001] : FAD, grupo hemo tipo[Author ID1: at Fri Sep 7 13:14:00 2001] cit b y un complejo con molib[Author ID1: at Fri Sep 7 13:16:00 2001]deno unido al enzima a [Author ID1: at Fri Sep 7 13:17:00 2001]través[Author ID1: at Fri Sep 7 13:20:00 2001] de un estructura q es una molibdopterina unida con S.[Author ID1: at Fri Sep 7 13:17:00 2001]

Se [Author ID1: at Fri Sep 7 13:19:00 2001]puede analizar la[Author ID1: at Fri Sep 7 13:17:00 2001] actividad [Author ID1: at Fri Sep 7 13:18:00 2001]de cada componente [Author ID1: at Fri Sep 7 13:19:00 2001]mediante donadores y aceptores artificiales.[Author ID1: at Fri Sep 7 13:18:00 2001][Author ID0: at]

La nitrato reductasa de la [Author ID1: at Fri Sep 7 13:20:00 2001]raíz[Author ID1: at Fri Sep 7 13:26:00 2001] esta en el citoplasma de la [Author ID1: at Fri Sep 7 13:20:00 2001]célula[Author ID1: at Fri Sep 7 13:26:00 2001] radical. [Author ID1: at Fri Sep 7 13:20:00 2001]Este enzima es [Author ID1: at Fri Sep 7 13:21:00 2001]inducible[Author ID1: at Fri Sep 7 13:27:00 2001] por el sustrato q tiene una vida media corta y tiene un renovación alta.[Author ID1: at Fri Sep 7 13:21:00 2001]

−−>**([Author ID1: at Fri Sep 7 13:21:00 2001]**[Author ID1: at Fri Sep 7 13:27:00 2001]−−>**Fig.[Author ID1: at Fri Sep 7 13:27:00 2001]**[Author ID1: at Fri Sep 7 13:27:00 2001]−−> **12.9)[Author ID1: at Fri Sep 7 13:21:00 2001]**[Author ID1: at Fri Sep 7 13:27:00 2001] **Esto significa q se requiere sustrato[Author ID1: at Fri Sep 7 13:21:00 2001] para q los genes de la nitrato reductasa transcriban. [Author ID0: at]**

Primero se da la síntesis de RNAm de la nitrato [Author ID1: at Fri Sep 7 13:22:00 2001]reductasa[Author ID1: at Fri Sep 7 13:23:00 2001] [Author ID1: at Fri Sep 7 13:22:00 2001]concreta y con [Author ID1: at Fri Sep 7 13:23:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] calma se aprecia la actividad. La actividad de la nitrato reductasa tanto en la [Author ID1: at Fri Sep 7 13:23:00 2001]raíz[Author ID1: at Fri Sep 7 13:27:00 2001] como en el tallo es [Author ID1: at Fri Sep 7 13:23:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] pausada q la síntesis d[Author ID1: at Fri Sep 7 13:23:00 2001]e RNA nada [Author ID1: at Fri Sep 7 13:24:00 2001]más[Author ID1: at Fri Sep 7 21:18:00 2001] transferido al medio con nitrato.[Author ID0: at]

También se ve afectada por la luz y carbohidratos.[Author ID0: at]

Puede ser [Author ID1: at Fri Sep 7 13:24:00 2001]retroinhi[Author ID1: at Fri Sep 7 13:25:00 2001]b[Author ID1: at Fri Sep 7 13:27:00 2001]ida por sus productos. Si no hay carbohidratos para incorporar el amonio se inhibe todo el proceso.[Author ID1: at Fri Sep 7 13:25:00 2001][Author ID0: at]

También se puede dar la [Author ID1: at Fri Sep 7 13:26:00 2001]activación[Author ID1: at Fri Sep 7 13:27:00 2001] − inhibición por procesos de [Author ID1: at Fri Sep 7 13:26:00 2001]fosforilación[Author ID1: at Fri Sep 7 13:27:00 2001] − desfosforilación.[Author ID1: at Fri Sep 7 13:26:00 2001][Author ID0: at]

En oscuridad el enzima se fosforila [Author ID1: at Fri Sep 7 18:47:00 2001]inactivándose[Author ID1: at Fri Sep 7 18:48:00 2001].[Author ID1: at Fri Sep 7 18:47:00 2001] Con la luz mediante una fosfatasa el enzima se activa.[Author ID0: at]

Nada m[Author ID1: at Fri Sep 7 18:48:00 2001]ás[Author ID1: at Fri Sep 7 18:53:00 2001] formado el nitrito se incorpora al cloroplasto o al protoplasto [Author ID1: at Fri Sep 7 18:48:00 2001]dándose[Author ID1: at Fri Sep 7 18:49:00 2001] [Author ID1: at Fri Sep 7 18:48:00 2001]la reducción por la nitrito reductasa.[Author ID0: at]

[Author ID1: at Fri Sep 7 18:49:00 2001]

Nitr[Author ID1: at Fri Sep 7 18:49:00 2001]i[Author ID1: at Fri Sep 7 18:50:00 2001]to [Author ID1: at Fri Sep 7 18:49:00 2001]reductasa ([Author ID1: at Fri Sep 7 18:50:00 2001]Fig.[Author ID1: at Fri Sep 7 18:53:00 2001] 12.10)[Author ID1: at Fri Sep 7 18:50:00 2001]

Implica[Author ID1: at Fri Sep 7 18:53:00 2001] la transferencia de 6 e[Author ID1: at Fri Sep 7 18:50:00 2001]−[Author ID1: at Fri Sep 7 18:50:00 2001]. La fuente de poder reductor el la Fd reducida o e[Author ID1: at Fri Sep 7 18:50:00 2001]−[Author ID1: at Fri Sep 7 18:51:00 2001] derivados de NADH.[Author ID0: at]

Posee dos grupos [Author ID1: at Fri Sep 7 18:51:00 2001]prostéticos[Author ID1: at Fri Sep 7 18:53:00 2001]: el sulfoferroso y el grupo hemo q conserva los re[Author ID1: at Fri Sep 7 18:51:00 2001]siduos propi[Author ID1: at Fri Sep 7 18:52:00 2001]ó[Author ID1: at Fri Sep 7 18:53:00 2001]nicos y [Author ID1: at Fri Sep 7 18:52:00 2001]acéticos[Author ID1: at Fri Sep 7 18:53:00 2001].[Author ID0: at]

No esta codificada por el genoma del cloroplasto, sino por el nuclear, se sintetiza en el citoplasma y luego se [Author ID1: at Fri Sep 7 18:52:00 2001]incorpora[Author ID1: at Fri Sep 7 18:53:00 2001] al cloroplasto[Author ID1: at Sat Sep 8 00:44:00 2001].[Author ID1: at Fri Sep 7 18:53:00 2001][Author ID1: at Fri Sep 7 18:54:00 2001]

[Author ID1: at Fri Sep 7 18:58:00 2001]

Factores q afectan al metabolismo del nitrato[Author ID1: at Fri Sep 7 18:58:00 2001]

Tanto las [Author ID1: at Fri Sep 7 18:59:00 2001]raíces[Author ID1: at Fri Sep 7 19:09:00 2001] como la parte [Author ID1: at Fri Sep 7 18:59:00 2001]aérea[Author ID1: at Fri Sep 7 19:09:00 2001] pueden participar el la reducción.[Author ID0: at]

La cantidad de reducción depende de la[Author ID1: at Fri Sep 7 18:59:00 2001] edad de la planta ,disponibilidad del NO[Author ID1: at Fri Sep 7 19:01:00 2001]3[Author ID1: at Fri Sep 7 19:02:00 2001], tipo de especie.[Author ID0: at]

Cuando la [NO[Author ID1: at Fri Sep 7 19:02:00 2001]3[Author ID1: at Fri Sep 7 19:02:00 2001]] es baja, la [Author ID1: at Fri Sep 7 19:02:00 2001]asimilación[Author ID1: at Fri Sep 7 19:09:00 2001] se da e[Author ID1: at Fri Sep 7 19:02:00 2001]n la [Author ID1: at Fri Sep 7 19:03:00 2001]raíz[Author ID1: at Fri Sep 7 19:09:00 2001].[Author ID0: at]

Cuando la [NO[Author ID1: at Fri Sep 7 19:03:00 2001]3[Author ID1: at Fri Sep 7 19:03:00 2001]] es alta la asimilación se da en las hojas,[Author ID1: at Fri Sep 7 19:03:00 2001]

En los [Author ID1: at Fri Sep 7 19:04:00 2001]árboles[Author ID1: at Fri Sep 7 19:09:00 2001] normalmente se da en la [Author ID1: at Fri Sep 7 19:04:00 2001]raíz[Author ID1: at Fri Sep 7 19:09:00 2001], en las herbáceas normalmente se da en las hojas.[Author ID0: at]

[Author ID0: at]

Siempre q el NO[Author ID1: at Fri Sep 7 19:04:00 2001]3[Author ID1: at Fri Sep 7 19:04:00 2001] es asimilado en las [Author ID1: at Fri Sep 7 19:04:00 2001]raíces[Author ID1: at Fri Sep 7 19:09:00 2001] no se transporta amonio ya q es t[Author ID1: at Fri Sep 7 19:04:00 2001]ó[Author ID1: at Sun Sep 9 18:21:00 2001]xico[Author ID1: at Fri Sep 7 19:04:00 2001]. Normalmente se trasloca en forma de aa fundamentalmente amidas o en forma de ureidos.[Author ID1: at Fri Sep 7 19:05:00 2001]

[Author ID0: at]

Una vez llegado al amonio hay q asimilar este [Author ID1: at Fri Sep 7 19:06:00 2001]amonio[Author ID1: at Fri Sep 7 19:09:00 2001] q deriva de procesos [Author ID1: at Fri Sep 7 19:06:00 2001]metabólicos[Author ID1: at Fri Sep 7 19:09:00 2001], fijación de [Author ID1: at Fri Sep 7 19:06:00 2001]N atmosférico y reducción de NO[Author ID1: at Fri Sep 7 19:07:00 2001]3[Author ID1: at Fri Sep 7 19:07:00 2001]−[Author ID1: at Fri Sep 7 19:07:00 2001].[Author ID0: at]

La mayor parte del amonio q se encuentra en el citoplasma deriva de la [Author ID1: at Fri Sep 7 19:07:00 2001]fotorrespiración[Author ID1: at Fri Sep 7 19:09:00 2001] q puede ser de 10−20 veces mayor q la cantidad de NH[Author ID1: at Fri Sep 7 19:07:00 2001]3[Author ID1: at Fri Sep 7 19:08:00 2001] [Author ID1: at Fri Sep 7 19:08:00 2001]proveniente[Author ID1: at Fri Sep 7 19:09:00 2001] de la reducción de nitrato.[Author ID1: at Fri Sep 7 19:08:00 2001][Author ID0: at]

[Author ID1: at Fri Sep 7 19:09:00 2001]

Asimilación de amonio NH[Author ID1: at Fri Sep 7 19:09:00 2001]4[Author ID1: at Fri Sep 7 19:09:00 2001] (Hoja 90 [Author ID1: at Fri Sep 7 19:09:00 2001]Fig.[Author ID1: at Fri Sep 7 19:10:00 2001] 12.12)[Author ID1: at Fri Sep 7 19:09:00 2001][Author ID0: at]

Consiste en fijarlo sobre [Author ID1: at Fri Sep 7 19:10:00 2001]esqueletos carbonados para[Author ID1: at Fri Sep 7 19:11:00 2001] dar aa.[Author ID0: at]

El primer paso puede darse a [Author ID1: at Fri Sep 7 19:11:00 2001]través[Author ID1: at Fri Sep 7 19:14:00 2001] de dos [Author ID1: at Fri Sep 7 19:11:00 2001]vías[Author ID1: at Fri Sep 7 19:14:00 2001]:[Author ID1: at Fri Sep 7 19:11:00 2001]

- **Incorporación de amonio sobre −cetoglutarato catalizado por la [Author ID1: at Fri Sep 7 19:16:00 2001]−−>glutamato desH[Author ID1: at Fri Sep 7 19:16:00 2001]**[Author ID1: at Fri Sep 7 19:18:00 2001]−−>**asa[Author ID1: at Fri Sep 7 19:16:00 2001]**[Author ID1: at Fri Sep 7 19:18:00 2001] **para dar glutamato. Es una aminación reductiva.[Author ID0: at]**

La glutamato desH[Author ID1: at Fri Sep 7 19:16:00 2001]asa[Author ID1: at Fri Sep 7 19:16:00 2001] se localiza tanto en el cloroplasto como en mit[Author ID1: at Fri Sep 7 19:16:00 2001]ocondrias.[Author ID1: at Fri Sep 7 19:16:00 2001]−−>[Author ID1: at Fri Sep 7 19:16:00 2001][Author ID1: at Fri Sep 7 19:10:00 2001]

- **Incorporación sobre el glutamato para dar Gl[Author ID1: at Fri Sep 7 19:17:00 2001]utamina[Author ID1: at Fri Sep 7 19:19:00 2001] catalizado por la [Author ID1: at Fri Sep 7 19:17:00 2001]−−>glutamina sintetasa[Author ID1: at Fri Sep 7 19:17:00 2001]**[Author ID1: at Fri Sep 7 19:18:00 2001] **con gasto de ATP.[Author ID1: at Fri Sep 7 19:17:00 2001]−−>[Author ID1: at Fri Sep 7 19:20:00 2001]**[Author ID1: at Fri Sep 7 19:15:00 2001]

Se encuentra en los cloroplastos y plastidios.[Author ID0: at]

Esta [Author ID1: at Fri Sep 7 19:20:00 2001]reacción[Author ID1: at Fri Sep 7 19:35:00 2001] va acompañada de otra donde se incorpora[Author ID1: at Fri Sep 7 19:20:00 2001] un NH[Author ID1: at Fri Sep 7 19:21:00 2001]4[Author ID1: at Fri Sep 7 19:21:00 2001] sobre el glutamato catalizada por la GOGAT[Author ID1: at Fri Sep 7 19:21:00 2001] ([Author ID1: at Sat Sep 8 01:15:00 2001]−−>glutamato sintetasa[Author ID1: at Sat Sep 8 01:15:00 2001][Author ID1: at Sat Sep 8 01:15:00 2001])**[Author ID1: at Sat Sep 8 01:15:00 2001] (localizada en el cloroplasto y plastidios) q requiere poder reductor en forma de Fd reducido o NADH[Author ID1: at Fri Sep 7 19:36:00 2001] red para dar dos glutamatos.[Author ID1: at Fri Sep 7 19:37:00 2001][Author ID1: at Fri Sep 7 19:39:00 2001]**

[Author ID0: at]

El resultado de las dos reacciones es q el NH[Author ID1: at Fri Sep 7 19:37:00 2001]4[Author ID1: at Fri Sep 7 19:37:00 2001] es incorporado a la molécula de glutamato.[Author ID0: at]

La e[Author ID1: at Fri Sep 7 19:37:00 2001]xistencia de una u otra depende de la afinidad.[Author ID0: at]

La glutamato desH[Author ID1: at Fri Sep 7 19:38:00 2001]asa[Author ID1: at Fri Sep 7 19:38:00 2001] tiene una Km muy alta, la de la glutamina [Author ID1: at Fri Sep 7 19:38:00 2001]sintetasa[Author ID1: at Fri Sep 7 19:39:00 2001] [Author ID1: at Fri Sep 7 19:38:00 2001]es [Author ID1: at Fri Sep 7 19:39:00 2001]más[Author ID1: at Fri Sep

7 21:18:00 2001] baja[Author ID1: at Fri Sep 7 19:39:00 2001] (mayor afinidad)[Author ID1: at Fri Sep 7 19:40:00 2001].[Author ID0: at]

En algunos casos se ve q [Author ID1: at Fri Sep 7 19:41:00 2001]si[Author ID1: at Fri Sep 7 19:46:00 2001] esta inhibida la glutamina sintetasa se activa la glutamato desH[Author ID1: at Fri Sep 7 19:41:00 2001]asa[Author ID1: at Fri Sep 7 19:41:00 2001] como un detoxificante q [Author ID1: at Fri Sep 7 19:41:00 2001]intentaría[Author ID1: at Fri Sep 7 19:46:00 2001] paliar el efecto toxico del amonio, pero la planta acaba muriendo pues no se palia del todo.[Author ID1: at Fri Sep 7 19:41:00 2001]

Una vez incorporado el amonio, [Author ID1: at Fri Sep 7 19:42:00 2001]el resto de los aa se sintetizan por procesos de transaminación.[Author ID0: at]

El glutamato [Author ID1: at Fri Sep 7 19:43:00 2001]será[Author ID1: at Fri Sep 7 19:46:00 2001] el donador de los grupos amino q por transaminaciones [Author ID1: at Fri Sep 7 19:43:00 2001]darán[Author ID1: at Fri Sep 7 19:46:00 2001] los aa[Author ID1: at Fri Sep 7 19:43:00 2001]

Las transaminasas [Author ID1: at Fri Sep 7 19:44:00 2001]están[Author ID1: at Fri Sep 7 19:46:00 2001] en todos los compartimentos celulares.[Author ID0: at]

El [Author ID1: at Fri Sep 7 19:44:00 2001]nitrógeno[Author ID1: at Fri Sep 7 19:46:00 2001] q se transfiere del [Author ID1: at Fri Sep 7 19:44:00 2001]nódulo[Author ID1: at Fri Sep 7 19:46:00 2001] a las hojas es en forma de amidas en[Author ID1: at Fri Sep 7 19:44:00 2001] plantas leguminosas de climas templados.[Author ID0: at]

Las [Author ID1: at Fri Sep 7 19:45:00 2001]plantas[Author ID1: at Fri Sep 7 19:46:00 2001] leguminosas tropicales lo transfieren en forma de ureidos, q son menos solubles en agua por lo q necesitan vivir en [Author ID1: at Fri Sep 7 19:45:00 2001]medios[Author ID1: at Fri Sep 7 19:47:00 2001] con mayor cantidad de agua.[Author ID1: at Fri Sep 7 19:45:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID0: at]

[Author ID1: at Fri Sep 7 19:47:00 2001]

Tema 15 asimilación del azufre[Author ID0: at]

[Author ID1: at Fri Sep 7 19:47:00 2001]

El [Author ID1: at Fri Sep 7 19:47:00 2001]S presente en los sustituyentes celulares proviene del [Author ID1: at Fri Sep 7 19:48:00 2001]sulfato[Author ID1: at Fri Sep 7 20:01:00 2001] tomado por las [Author ID1: at Fri Sep 7 19:48:00 2001]raíces[Author ID1: at Fri Sep 7 20:01:00 2001] q deriva de la descomposición de la roca madre y [Author ID1: at Fri Sep 7 19:48:00 2001]también[Author ID1: at Fri Sep 7 19:49:00 2001] [Author ID1: at Fri Sep 7 19:48:00 2001]por la [Author ID1: at Fri Sep 7 19:49:00 2001]quema de combustibles [Author ID1: at Mon Sep 10 19:46:00 2001]fósiles[Author ID1: at Fri Sep 7 20:01:00 2001].[Author ID1: at Fri Sep 7 19:49:00 2001]

Además[Author ID1: at Fri Sep 7 20:02:00 2001] de S pueden asimilar S en forma de SO[Author ID1: at Fri Sep 7 19:49:00 2001]2[Author ID1: at Fri Sep 7 19:49:00 2001] por [Author ID1: at Fri Sep 7 19:49:00 2001]los[Author ID1: at Fri Sep 7 20:02:00 2001] estomas siempre q el tiempo de exposición y [Author ID1: at Fri Sep 7 19:49:00 2001]concentración sea bajo.[Author ID0: at]

La toma de SO[Author ID1: at Fri Sep 7 19:50:00 2001]4[Author ID1: at Fri Sep 7 19:50:00 2001] es activa en simporte, con 8 H[Author ID1: at Fri Sep 7 19:50:00 2001]+[Author ID1: at Fri Sep 7 19:50:00 2001] y 8 e[Author ID1: at Sat Sep 8 01:44:00 2001]−[Author ID1: at Sat Sep 8 01:44:00 2001] por cada SO[Author ID1: at Fri Sep 7 19:50:00 2001]4[Author ID1: at Fri Sep 7 19:50:00 2001] tomado por los transportadores de membrana.[Author ID1: at Fri Sep 7 19:50:00 2001][Author ID1: at Sat Sep 8 01:47:00 2001]

[Author ID1: at Sat Sep 8 01:44:00 2001]

SO[Author ID1: at Sat Sep 8 01:44:00 2001]4[Author ID1: at Sat Sep 8 01:44:00 2001]2−[Author ID1: at Sat Sep 8 01:45:00 2001] + ATP + 8 e[Author ID1: at Sat Sep 8 01:45:00 2001]−[Author ID1: at Sat Sep 8 01:45:00 2001] + 8 H[Author ID1: at Sat Sep 8 01:45:00 2001]+[Author ID1: at Sat Sep 8 01:45:00 2001] [Author ID1: at Sat Sep 8 01:45:00 2001] S[Author ID1: at Sat Sep 8 01:46:00 2001]2−[Author ID1: at Sat Sep 8 01:46:00 2001] + 4H[Author ID1: at Sat Sep 8 01:46:00 2001]2[Author ID1: at Sat Sep 8 01:46:00 2001]O + AMP + PP[Author ID1: at Sat Sep 8 01:46:00 2001]i[Author ID1: at Sat Sep 8 01:46:00 2001]−−>[Author ID1: at Fri Sep 7 19:51:00 2001][Author ID1: at Sat Sep 8 01:46:00 2001]

Una vez dentro se puede acumular en la vacuola o ser reducido a sulfuro, modo en q se incorpora.[Author ID0: at]

El SO[Author ID1: at Fri Sep 7 19:51:00 2001]4[Author ID1: at Fri Sep 7 19:51:00 2001] antes de ser asimilado hay q reducirlo, pero primero hay q activarlo por [Author ID1: at Fri Sep 7 19:52:00 2001]fosforilación[Author ID1: at Fri Sep 7 20:02:00 2001].[Author ID1: at Fri Sep 7 19:52:00 2001]

−−>**(Hoja 91 [Author ID1: at Fri Sep 7 19:52:00 2001]**[Author ID1: at Fri Sep 7 20:02:00 2001]−−>**Fig.[Author ID1: at Fri Sep 7 20:02:00 2001]**[Author ID1: at Fri Sep 7 20:02:00 2001]−−> **12.3)[Author ID1: at Fri Sep 7 19:52:00 2001]**[Author ID1: at Fri Sep 7 20:02:00 2001] **El sulfato por la ATP sulfurilasa con gasto de ATP se transforma en APS. [Author ID1: at Fri Sep 7 19:52:00 2001]Es una [Author ID1: at Fri Sep 7 19:53:00 2001]reacción[Author ID1: at Fri Sep 7 20:02:00 2001] muy [Author ID1: at Fri Sep 7 19:53:00 2001]desfavorable[Author ID1: at Fri Sep 7 20:02:00 2001] energéticamente. Este APS enseguida se fosforila gastando otro ATP dando PAPS por la APS[Author ID1: at Fri Sep 7 19:53:00 2001] kinasa. Esta [Author ID1: at Fri Sep 7 19:54:00 2001]reacción[Author ID1: at Fri Sep 7 20:02:00 2001] es favorable a la vez q el [Author ID1: at Fri Sep 7 19:54:00 2001]fósforo[Author ID1: at Fri Sep 7 20:02:00 2001] es hidrolizado por la pirofosfori[Author ID1: at Fri Sep 7 19:54:00 2001]lasa.[Author ID0: at]**

A partir de q el compuesto esta activado (PAPS) se puede dar la transferencia del SO[Author ID1: at Fri Sep 7 19:55:00 2001]4[Author ID1: at Fri Sep 7 19:55:00 2001] a lípidos originando los [Author ID1: at Fri Sep 7 19:55:00 2001]sulfolípidos [Author ID1: at Fri Sep 7 20:03:00 2001]por un enlace sulfoester. Lo normal es reducirlo hasta

sulfuro.[Author ID0: at]

[Author ID0: at]

Hay dos [Author ID1: at Fri Sep 7 19:56:00 2001]vías[Author ID1: at Fri Sep 7 20:03:00 2001] de reducción hasta sulfito.[Author ID1: at Fri Sep 7 19:56:00 2001]

- **El APS[Author ID1: at Fri Sep 7 19:57:00 2001] (adenosin fosfosulfato)[Author ID1: at Sat Sep 8 01:57:00 2001] es reducido por una reductasa para dar sulfito [Author ID1: at Fri Sep 7 19:57:00 2001]ligado[Author ID1: at Fri Sep 7 20:03:00 2001] al enzima.[Author ID1: at Fri Sep 7 19:57:00 2001]−−>[Author ID1: at Fri Sep 7 19:57:00 2001]**[Author ID1: at Fri Sep 7 19:55:00 2001]
- **El PAPS[Author ID1: at Fri Sep 7 19:57:00 2001] (fosfoadenosin fosfosulfato)[Author ID1: at Sat Sep 8 01:58:00 2001] es [Author ID1: at Fri Sep 7 19:57:00 2001]reducido[Author ID1: at Fri Sep 7 20:03:00 2001] mediante una reductasa para dar sulfito ligado a[Author ID1: at Fri Sep 7 19:57:00 2001]l enzima.[Author ID1: at Fri Sep 7 19:58:00 2001]−−>[Author ID1: at Fri Sep 7 19:58:00 2001]**[Author ID1: at Fri Sep 7 19:55:00 2001]

[Author ID0: at]

La reducción en los dos casos es la misma solo q se parte de compuestos diferentes. Se da tanto en el cloroplasto[Author ID1: at Fri Sep 7 19:58:00 2001] (tejidos verdes)[Author ID1: at Sat Sep 8 01:55:00 2001] como en los [Author ID1: at Fri Sep 7 19:58:00 2001]plastidios (tejidos no verdes)[Author ID1: at Sat Sep 8 01:55:00 2001].[Author ID1: at Fri Sep 7 19:58:00 2001][Author ID0: at]

En los [Author ID1: at Fri Sep 7 19:59:00 2001]cloro[Author ID1: at Sat Sep 8 01:50:00 2001]pl[Author ID1: at Fri Sep 7 19:59:00 2001]a[Author ID1: at Fri Sep 7 20:03:00 2001]st[Author ID1: at Fri Sep 7 19:59:00 2001]os[Author ID1: at Sat Sep 8 01:50:00 2001] el donador es la [Author ID1: at Fri Sep 7 19:59:00 2001]ferredoxina[Author ID1: at Sat Sep 8 01:52:00 2001] [Author ID1: at Fri Sep 7 19:59:00 2001]reducida (Fd[Author ID1: at Sat Sep 8 01:52:00 2001]red[Author ID1: at Sat Sep 8 01:52:00 2001]), e[Author ID1: at Sat Sep 8 01:52:00 2001]n[Author ID1: at Sat Sep 8 01:56:00 2001] los plastidios [Author ID1: at Sat Sep 8 01:52:00 2001]el donador de e[Author ID1: at Sat Sep 8 01:53:00 2001]−[Author ID1: at Sat Sep 8 01:53:00 2001] [Author ID1: at Sat Sep 8 01:53:00 2001]es [Author ID1: at Sat Sep 8 01:52:00 2001]el NADPH.[Author ID1: at Sat Sep 8 01:53:00 2001][Author ID0: at]

El S [Author ID1: at Fri Sep 7 20:05:00 2001]s[Author ID1: at Sat Sep 8 01:56:00 2001]e incorpora en los esqueletos carbonados para dar lo[Author ID1: at Fri Sep 7 20:05:00 2001]s[Author ID1: at Sat Sep 8 01:56:00 2001] aa sulfurilados Cys y Met.[Author ID1: at Fri Sep 7 20:05:00 2001][Author ID1: at Fri Sep 7 20:06:00 2001]

(Hoja 92 [Author ID1: at Fri Sep 7 20:06:00 2001]Fig.[Author ID1: at Fri Sep 7 20:17:00 2001] 12.14)[Author ID1: at Fri Sep 7 20:06:00 2001] La incorporación de S se da sobre la Ser[Author ID1: at Fri Sep 7 20:06:00 2001],[Author ID1: at Fri Sep 7 20:07:00 2001] q po[Author ID1: at Fri Sep 7 20:06:00 2001]r la serina transacetilasa da acetilserina, q mediante la acetilserina sulfhidratasa de Cys.[Author ID1: at Fri Sep 7 20:07:00 2001]

La producción de metionina puede darse por una trans sulfurilaci[Author ID1: at Fri

Sep 7 20:08:00 2001]ó[Author ID1: at Fri Sep 7 20:18:00 2001]n o por una sulfurilaci[Author ID1: at Fri Sep 7 20:08:00 2001]ó[Author ID1: at Fri Sep 7 20:18:00 2001]n directa.[Author ID0: at]

Parece q la [Author ID1: at Fri Sep 7 20:08:00 2001]principal[Author ID1: at Fri Sep 7 20:09:00 2001] [Author ID1: at Fri Sep 7 20:08:00 2001]vía[Author ID1: at Fri Sep 7 20:18:00 2001] de producción de Met es la trans sulfurilaci[Author ID1: at Fri Sep 7 20:09:00 2001]ó[Author ID1: at Fri Sep 7 20:18:00 2001]n.[Author ID0: at]

El S [Author ID1: at Fri Sep 7 20:09:00 2001]también puede ser transportado en forma de glutatión constituido por [Author ID1: at Fri Sep 7 20:27:00 2001]glutamato,[Author ID1: at Fri Sep 7 20:28:00 2001] [Author ID1: at Fri Sep 7 20:27:00 2001]Cys, Gly. Este participa en procesos de [Author ID1: at Fri Sep 7 20:28:00 2001]oxidorreducción[Author ID1: at Fri Sep 7 20:34:00 2001].[Author ID1: at Fri Sep 7 20:28:00 2001]

[Author ID0: at]

[Author ID1: at Tue Sep 11 12:24:00 2001]

[Author ID1: at Fri Sep 7 20:28:00 2001]

Asimilación de fosfato (Hoja 93 [Author ID1: at Fri Sep 7 20:29:00 2001]Fig.[Author ID1: at Fri Sep 7 20:34:00 2001] 12.15)[Author ID1: at Fri Sep 7 20:29:00 2001]

No se reduce antes de su incorporación en los compuestos [Author ID1: at Fri Sep 7 20:29:00 2001]orgánicos[Author ID1: at Fri Sep 7 20:34:00 2001].[Author ID0: at]

La [Author ID1: at Fri Sep 7 20:29:00 2001]principal[Author ID1: at Fri Sep 7 20:30:00 2001] [Author ID1: at Fri Sep 7 20:29:00 2001]vía[Author ID1: at Fri Sep 7 20:34:00 2001] de incorporación es un la formación de ATP por la [Author ID1: at Fri Sep 7 20:30:00 2001]fotofosforilación[Author ID1: at Fri Sep 7 20:34:00 2001], [Author ID1: at Fri Sep 7 20:30:00 2001]fosforilación[Author ID1: at Fri Sep 7 20:34:00 2001] oxidativa o FNS.[Author ID0: at]

[Author ID1: at Fri Sep 7 20:30:00 2001]

−−>**Asimilación de cationes[Author ID1: at Fri Sep 7 20:30:00 2001]**[Author ID1: at Fri Sep 7 20:37:00 2001]

Es a [Author ID1: at Fri Sep 7 20:30:00 2001]través[Author ID1: at Fri Sep 7 20:34:00 2001] de la [Author ID1: at Fri Sep 7 20:30:00 2001]formación[Author ID1: at Fri Sep 7 20:31:00 2001] [Author ID1: at Fri Sep 7 20:30:00 2001]de complejos con moléculas [Author ID1: at Fri Sep 7 20:31:00 2001]orgánicas[Author ID1: at Fri Sep 7 20:34:00 2001].[Author ID0: at]

- **Formación de enlaces de coordinación: se establecen entre Los e[Author ID1: at Fri Sep 7 20:31:00 2001]−[Author ID1: at Fri Sep 7 20:31:00 2001] no [Author ID1: at Fri Sep 7 20:31:00 2001]compartidos de O y N de moléculas [Author ID1: at Fri Sep 7 20:32:00 2001]orgánicas[Author ID1: at Fri Sep 7 20:34:00 2001] q contrarrestan las cargas positivas de los cationes.[Author ID1: at Fri Sep 7 20:32:00 2001] [Author ID1: at Fri**

Sep 7 20:33:00 2001]Los cationes divalentes forman este tipo de enlace.[Author ID1: at Fri Sep 7 20:32:00 2001]−−>**[Author ID1: at Fri Sep 7 20:32:00 2001]**[Author ID1: at Fri Sep 7 20:29:00 2001]

- **Formación de enlaces tipo [Author ID1: at Fri Sep 7 20:33:00 2001]electroestáticos[Author ID1: at Fri Sep 7 20:34:00 2001]: este tipo de enlaces los forman los c[Author ID1: at Fri Sep 7 20:33:00 2001]a[Author ID1: at Fri Sep 7 20:34:00 2001]tiones monovalentes.[Author ID1: at Fri Sep 7 20:33:00 2001] Se dan enlaces entre los cationes y [Author ID1: at Fri Sep 7 20:35:00 2001]ácidos[Author ID1: at Fri Sep 7 20:37:00 2001] [Author ID1: at Fri Sep 7 20:35:00 2001]orgánicos[Author ID1: at Fri Sep 7 20:37:00 2001] ionizados.[Author ID1: at Fri Sep 7 20:35:00 2001]**−−>**[Author ID1: at Fri Sep 7 20:35:00 2001]**[Author ID1: at Fri Sep 7 20:29:00 2001]

[Author ID0: at]

El Ca[Author ID1: at Fri Sep 7 20:35:00 2001]2+[Author ID1: at Fri Sep 7 20:35:00 2001] puede formar este tipo de enlace con los hidroxilos del poligalactur[Author ID1: at Fri Sep 7 20:35:00 2001]ó[Author ID1: at Fri Sep 7 20:37:00 2001]nico.[Author ID1: at Fri Sep 7 20:35:00 2001]

El K[Author ID1: at Fri Sep 7 20:36:00 2001]+[Author ID1: at Fri Sep 7 20:36:00 2001] [Author ID1: at Fri Sep 7 20:36:00 2001]además[Author ID1: at Fri Sep 7 20:38:00 2001] de formar este tipo de enlace puede estar li[Author ID1: at Fri Sep 7 20:36:00 2001]bre actuando como catalizador de reacciones enzimáticas.[Author ID0: at]

[Author ID1: at Fri Sep 7 20:37:00 2001]

−−>**Asimilación de Fe[Author ID1: at Fri Sep 7 20:37:00 2001]**[Author ID1: at Fri Sep 7 20:37:00 2001]

Normalmente [Author ID1: at Fri Sep 7 20:37:00 2001]se encuentra en el suelo en forma f[Author ID1: at Fri Sep 7 20:38:00 2001]é[Author ID1: at Fri Sep 7 20:40:00 2001]rrrica insoluble de difícil toma por la [Author ID1: at Fri Sep 7 20:38:00 2001]raíz[Author ID1: at Fri Sep 7 20:40:00 2001].[Author ID0: at]

Antes de entrar es reducido[Author ID1: at Fri Sep 7 20:38:00 2001] de Fe[Author ID1: at Sat Sep 8 02:01:00 2001]3+[Author ID1: at Sat Sep 8 02:01:00 2001] a Fe[Author ID1: at Sat Sep 8 02:01:00 2001]2+[Author ID1: at Sat Sep 8 02:01:00 2001],[Author ID1: at Sat Sep 8 02:01:00 2001] y este Fe[Author ID1: at Fri Sep 7 20:38:00 2001]2+[Author ID1: at Fri Sep 7 20:39:00 2001] es tomado e incorporado formando complejos [Author ID1: at Fri Sep 7 20:39:00 2001]electrostáticos[Author ID1: at Fri Sep 7 20:40:00 2001] con los [Author ID1: at Fri Sep 7 20:39:00 2001]ácidos[Author ID1: at Fri Sep 7 20:40:00 2001] [Author ID1: at Fri Sep 7 20:39:00 2001]orgánicos[Author ID1: at Fri Sep 7 20:40:00 2001] como el citrato.[Author ID1: at Fri Sep 7 20:39:00 2001][Author ID0: at]

Consta de 4 etapas:[Author ID0: at]

- **acidificación del suelo[Author ID1: at Sat Sep 8 02:04:00 2001]**−−>**[Author ID1: at Sat Sep 8 02:04:00 2001]**[Author ID1: at Fri Sep 7 20:39:00 2001]
- **reducción del Fe[Author ID1: at Sat Sep 8 02:04:00 2001]3+[Author ID1: at Sat Sep 8 02:04:00 2001] [Author ID1: at Sat Sep 8 02:04:00 2001] Fe[Author ID1: at Sat Sep 8**

02:05:00 2001]2+[Author ID1: at Sat Sep 8 02:05:00 2001]−−>[Author ID1: at Sat Sep 8 02:05:00 2001][Author ID1: at Fri Sep 7 20:39:00 2001]

- **toma de Fe[Author ID1: at Sat Sep 8 02:05:00 2001]2+[Author ID1: at Sat Sep 8 02:05:00 2001]−−>[Author ID1: at Sat Sep 8 02:05:00 2001]**[Author ID1: at Fri Sep 7 20:39:00 2001]
- **formación de complejos con [Author ID1: at Sat Sep 8 02:05:00 2001]ácidos[Author ID1: at Sat Sep 8 02:06:00 2001] [Author ID1: at Sat Sep 8 02:05:00 2001]orgánicos[Author ID1: at Sat Sep 8 02:06:00 2001] (citrato para el transporte por el xilema)[Author ID1: at Sat Sep 8 02:05:00 2001]−−>[Author ID1: at Sat Sep 8 14:47:00 2001]**[Author ID1: at Fri Sep 7 20:39:00 2001]

[Author ID0: at]

en un medio deficiente den Fe, si la planta de pasa a un medio con Fe[Author ID1: at Sat Sep 8 14:47:00 2001], se produce la toma masiva, perjudicial porque el Fe[Author ID1: at Sat Sep 8 14:48:00 2001]2+[Author ID1: at Sat Sep 8 14:48:00 2001] puede unirse al O[Author ID1: at Sat Sep 8 14:48:00 2001]2[Author ID1: at Sat Sep 8 14:49:00 2001] formando O[Author ID1: at Sat Sep 8 14:49:00 2001]2[Author ID1: at Sat Sep 8 14:49:00 2001]−[Author ID1: at Sat Sep 8 14:49:00 2001], q resulta toxico. [Author ID1: at Sat Sep 8 14:49:00 2001]Así[Author ID1: at Sat Sep 8 14:53:00 2001], las plantas [Author ID1: at Sat Sep 8 14:49:00 2001]secuestran[Author ID1: at Sat Sep 8 14:53:00 2001] el Fe[Author ID1: at Sat Sep 8 14:49:00 2001]2+[Author ID1: at Sat Sep 8 14:50:00 2001] y lo unen al complejo proteico fitoferritina, [Author ID1: at Sat Sep 8 14:50:00 2001]proteína[Author ID1: at Sat Sep 8 14:53:00 2001] [Author ID1: at Sat Sep 8 14:50:00 2001]esférica[Author ID1: at Sat Sep 8 14:53:00 2001] con 24 subunidades proteicas de 480 Kda de peso toral. En [Author ID1: at Sat Sep 8 14:50:00 2001]su [Author ID1: at Sat Sep 8 14:51:00 2001]nitrógeno[Author ID1: at Sat Sep 8 14:53:00 2001] secuestra el Fe[Author ID1: at Sat Sep 8 14:51:00 2001]3+[Author ID1: at Sat Sep 8 14:52:00 2001] (5400−6200 [Author ID1: at Sat Sep 8 14:52:00 2001]átomos[Author ID1: at Sat Sep 8 14:53:00 2001] de[Author ID1: at Sat Sep 8 14:52:00 2001] [Author ID1: at Sat Sep 8 14:53:00 2001]Fe unidos al fosfato)[Author ID1: at Sat Sep 8 14:52:00 2001].[Author ID1: at Sat Sep 8 14:53:00 2001]

[Author ID1: at Sat Sep 8 14:54:00 2001]

Asimilación de O[Author ID1: at Sat Sep 8 14:54:00 2001]2[Author ID1: at Sat Sep 8 14:54:00 2001][Author ID1: at Sat Sep 8 14:54:00 2001]

−−>**El O[Author ID1: at Sat Sep 8 14:54:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]−−>**2[Author ID1: at Sat Sep 8 14:54:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]−−> **en procesos fisiológicos interviene in el proceso respiratorio de mitocondrias y en reacciones[Author ID1: at Sat Sep 8 14:54:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]−−> **de oxigenación donde el O[Author ID1: at Sat Sep 8 14:55:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]−−>**2[Author ID1: at Sat Sep 8 14:55:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]−−> **se[Author ID1: at Sat Sep 8 14:55:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001] **incorpora a compuestos [Author ID1: at Sat Sep 8 14:55:00 2001]orgánicos[Author ID1: at Sat Sep 8 14:58:00 2001] para transformarlos con las oxigenasa[Author ID1: at Sat Sep 8 14:55:00 2001]s. Estas oxigenasas son de dos tipos:[Author ID1: at Sat Sep 8 14:56:00 2001]**

  - −−>**M[Author ID1: at Sat Sep 8 14:57:00 2001]**[Author ID1: at Sat Sep 8 15:00:00 2001]−−>**onooxigenasas:[Author ID1: at Sat Sep 8 14:56:00**

2001][Author ID1: at Sat Sep 8 15:00:00 2001] **[Author ID1: at Sat Sep 8 14:56:00 2001]reacción[Author ID1: at Sat Sep 8 14:58:00 2001] donde se incorpora [Author ID1: at Sat Sep 8 14:56:00 2001]1 [Author ID1: at Sat Sep 8 14:57:00 2001]átomo[Author ID1: at Sat Sep 8 14:58:00 2001] de O[Author ID1: at Sat Sep 8 14:57:00 2001]2[Author ID1: at Sat Sep 8 14:57:00 2001].[Author ID1: at Sat Sep 8 14:57:00 2001] Un [Author ID1: at Sat Sep 8 14:59:00 2001]átomo[Author ID1: at Sat Sep 8 15:00:00 2001] de O se incorpora a la molécula transformada y el 2º [Author ID1: at Sat Sep 8 14:59:00 2001]átomo[Author ID1: at Sat Sep 8 15:00:00 2001] de oxigeno es reducido a H[Author ID1: at Sat Sep 8 14:59:00 2001]2[Author ID1: at Sat Sep 8 15:00:00 2001]O, a esto se denomina oxidasa de función mixta.[Author ID1: at Sat Sep 8 15:00:00 2001]**−−>**[Author ID1: at Sat Sep 8 14:57:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]

- −−>**Dioxigenasas:[Author ID1: at Sat Sep 8 14:57:00 2001]**[Author ID1: at Sat Sep 8 15:00:00 2001] **[Author ID1: at Sat Sep 8 14:57:00 2001]reacción[Author ID1: at Sat Sep 8 14:58:00 2001] donde se incorporan 2 [Author ID1: at Sat Sep 8 14:57:00 2001]átomos[Author ID1: at Sat Sep 8 14:58:00 2001] de O[Author ID1: at Sat Sep 8 14:57:00 2001]2[Author ID1: at Sat Sep 8 14:57:00 2001].[Author ID1: at Sat Sep 8 14:57:00 2001]**−−>**[Author ID1: at Sat Sep 8 15:01:00 2001]**[Author ID1: at Sat Sep 8 14:55:00 2001]

[Author ID0: at]

Una oxigenasa importante es la RUBISCO, q incorpora el O[Author ID1: at Sat Sep 8 15:01:00 2001]2[Author ID1: at Sat Sep 8 15:01:00 2001] en la Ribulosa 1,5−bifosfato para dar lugar a una molécula de · PGA y una molécula de 2 fosfoglicolato en vez de dos [Author ID1: at Sat Sep 8 15:02:00 2001]moléculas[Author ID1: at Sat Sep 8 15:03:00 2001] [Author ID1: at Sat Sep 8 15:02:00 2001]de 3 PGA.[Author ID1: at Sat Sep 8 15:03:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Sat Sep 8 15:18:00 2001]

Tema 16 crecimiento y su regulación[Author ID0: at]

[Author ID0: at]

[Author ID1: at Sat Sep 8 15:18:00 2001]

Durante la ontogenia de las plantas (zi[Author ID1: at Sat Sep 8 15:18:00 2001]goto planta adulta), estas sufren [Author ID1: at Sat Sep 8 15:19:00 2001]transformaciones[Author ID1: at Sat Sep 8 15:21:00 2001] q se ven en [Author ID1: at Sat Sep 8 15:19:00 2001]variaciones[Author ID1: at Sat Sep 8 15:20:00 2001] [Author ID1: at Sat Sep 8 15:19:00 2001]en el crecimiento (adaptativas) y en la diferenciación y especialización (cualitativas). El conjunto se denomina desarrollo vegetal.[Author ID1: at Sat Sep 8 15:20:00 2001][Author ID0: at]

Estos procesos [Author ID1: at Sat Sep 8 15:22:00 2001]están[Author ID1: at Sat Sep 8 15:23:00 2001] influenciados por dos tipos de factores:[Author ID1: at Sat Sep 8 15:22:00 2001][Author ID1: at Sat Sep 8 15:23:00 2001]

- −−>**Factores internos:[Author ID1: at Sat Sep 8 15:23:00 2001]**[Author ID1: at Sat Sep 8 15:29:00 2001] **intracelulares ([Author ID1: at Sat Sep 8 15:23:00 2001]genéticos[Author ID1: at Sat Sep 8 15:26:00 2001]), o intercelulares (fitohormonas).[Author ID1: at Sat Sep 8 15:23:00 2001][Author ID1: at Sat Sep 8 15:24:00 2001]**
- −−>**F[Author ID1: at Sat Sep 8 15:29:00 2001]**[Author ID1: at Sat Sep 8 15:29:00 2001]−−>**actores extrínsecos o ambientales:[Author ID1: at Sat Sep 8 15:24:00 2001]**[Author ID1: at Sat Sep 8 15:29:00 2001] **O[Author ID1: at Sat Sep 8 15:26:00 2001]2[Author ID1: at Sat Sep 8 15:26:00 2001] (papel en respiración. Por debajo del 5% se detienen los procesos [Author ID1: at Sat Sep 8 15:26:00 2001]metabólicos[Author ID1: at Sat Sep 8 15:29:00 2001] y [Author ID1: at Sat Sep 8 15:26:00 2001]obtención[Author ID1: at Sat Sep 8 15:27:00 2001] [Author ID1: at Sat Sep 8 15:26:00 2001]de [Author ID1: at Sat Sep 8 15:27:00 2001]energía[Author ID1: at Sat Sep 8 15:29:00 2001]), Tª (papel en [Author ID1: at Sat Sep 8 15:27:00 2001]márgenes[Author ID1: at Sat Sep 8 15:29:00 2001] fisiológicos, aumento de Tª da aumento de los procesos [Author ID1: at Sat Sep 8 15:27:00 2001]enzimáticos[Author ID1: at Sat Sep 8 15:30:00 2001]), Nutrientes (disponibilidad de O[Author ID1: at Sat Sep 8 15:28:00 2001]2[Author ID1: at Sat Sep 8 15:28:00 2001], S[Author ID1: at Sat Sep 8 15:28:00 2001] [Author ID1: at Sat Sep 8 15:28:00 2001]...), Agua (desarrollo de plantas condicionado por el agua[Author ID1: at Sat Sep 8 15:28:00 2001]).[Author ID1: at Sat Sep 8 15:29:00 2001][Author ID0: at]**

[Author ID0: at]

Las fitohormonas coordinan el [Author ID1: at Sat Sep 8 15:30:00 2001]desarrollo[Author ID1: at Sat Sep 8 15:32:00 2001] de los [Author ID1: at Sat Sep 8 15:30:00 2001]distintos[Author ID1: at Sat Sep 8 15:32:00 2001] tejidos y [Author ID1: at Sat Sep 8 15:30:00 2001]órganos[Author ID1: at Sat Sep 8 15:32:00 2001] para permitir el crecimiento coordinado de los mismos. [Author ID1: at Sat Sep 8 15:30:00 2001]Estas fitohormonas son básicamente 5 grupos: Auxinas, Giberelinas, Fitoquininas, [Author ID1: at Sat Sep 8 15:31:00 2001]Ácido[Author ID1: at Sat Sep 8 15:32:00 2001] abscísico[Author ID1: at Sat Sep 8 15:31:00 2001] (ABA) y Etileno.[Author ID1: at Sat Sep 8 15:32:00 2001][Author ID0: at]

Una hormona es una molécula cuyo modo de [Author ID1: at Sat Sep 8 17:42:00 2001]acción[Author ID1: at Sat Sep 8 17:43:00 2001] seria la regulación de las reacciones metabólicas claras[Author ID1: at Sat Sep 8 17:42:00 2001],[Author ID1: at Sat Sep 8 17:43:00 2001] originada en el propio organismo por procesos [Author ID1: at Sat Sep 8 17:42:00 2001]metabólicos[Author ID1: at Sat Sep 8 17:43:00 2001] q no tienen valor nu[Author ID1: at Sat Sep 8 17:42:00 2001]t[Author ID1: at Sat Sep 8 17:43:00 2001]ritivo.[Author ID1: at Sat Sep 8 17:42:00 2001][Author ID1: at Sat Sep 8 17:44:00 2001]

Auxinas[Author ID1: at Sat Sep 8 17:44:00 2001][Author ID1: at Sat Sep 8 18:37:00 2001]

−−>**El AIA deriva del Triptófano por la ruta del [Author ID1: at Sat Sep 8 18:37:00 2001]**[Author ID1: at Sat Sep 8 18:37:00 2001]−−>**ácido[Author ID1: at Sat Sep 8 18:38:00 2001]**[Author ID1: at Sat Sep 8 18:37:00 2001]−−> **Shikimico.[Author ID1: at Sat Sep 8 18:37:00 2001]**[Author ID1: at Sat Sep 8 18:37:00 2001]−−>**[Author ID1: at Sat Sep 8 17:44:00 2001]**[Author ID1: at Sat Sep 8 18:37:00 2001]

El AIA no suele translocarse a [Author ID1: at Sat Sep 8 18:22:00 2001]través[Author

ID1: at Sat Sep 8 18:24:00 2001] de los tubos cribosos del floema o por el xilema, si[Author ID1: at Sat Sep 8 18:22:00 2001]no q se transloca a [Author ID1: at Sat Sep 8 18:23:00 2001]través[Author ID1: at Sat Sep 8 18:24:00 2001] de las células parenquimatosas q se encuentran en contacto con haces vasculares.[Author ID1: at Sat Sep 8 18:23:00 2001][Author ID1: at Sat Sep 8 18:24:00 2001]

El transporte de la auxina es polar. En tallos siempre se presenta de manera preferencial en sentido vasipetalo[Author ID1: at Sat Sep 8 18:25:00 2001],[Author ID1: at Sat Sep 8 18:27:00 2001] [Author ID1: at Sat Sep 8 18:25:00 2001]h[Author ID1: at Sat Sep 8 18:27:00 2001]acia[Author ID1: at Sat Sep 8 18:25:00 2001] la base,[Author ID1: at Sat Sep 8 18:26:00 2001] [Author ID1: at Sun Sep 9 17:21:00 2001]sin importar si la base esta abajo como es normal o se le da la vuelta a la planta. [Author ID1: at Sun Sep 9 17:22:00 2001]En cambio en las [Author ID1: at Sun Sep 9 17:21:00 2001]raíces[Author ID1: at Sun Sep 9 17:22:00 2001] también es polar pero en sentido acrop[Author ID1: at Sun Sep 9 17:21:00 2001]é[Author ID1: at Sun Sep 9 17:22:00 2001]talo, es decir hacia los [Author ID1: at Sun Sep 9 17:21:00 2001]ápices[Author ID1: at Sun Sep 9 17:22:00 2001].[Author ID0: at]

El movimiento de la auxina requiere [Author ID1: at Sat Sep 8 18:27:00 2001]energía[Author ID1: at Sat Sep 8 18:29:00 2001] [Author ID1: at Sat Sep 8 18:27:00 2001]metabólica[Author ID1: at Sat Sep 8 18:29:00 2001] (los inhibidores de la [Author ID1: at Sat Sep 8 18:27:00 2001]síntesis[Author ID1: at Sat Sep 8 18:28:00 2001] [Author ID1: at Sat Sep 8 18:27:00 2001]de ATP interfieren en su transporte)[Author ID1: at Sat Sep 8 18:28:00 2001].[Author ID1: at Sat Sep 8 18:29:00 2001]−−>**[Author ID1: at Sat Sep 8 17:52:00 2001]**[Author ID1: at Sat Sep 8 18:22:00 2001]

Efectos fisiológicos de las auxinas[Author ID1: at Sat Sep 8 17:52:00 2001]

−−>**Elongación[Author ID1: at Sat Sep 8 18:00:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001]−−> **celular:[Author ID1: at Sat Sep 8 17:52:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001] **promueve el alargamiento celular. [Author ID1: at Sat Sep 8 17:52:00 2001]Distribución[Author ID1: at Sat Sep 8 17:53:00 2001] [Author ID1: at Sat Sep 8 17:52:00 2001]asimétrica AIA produce alargamiento desigual lo q se traducen una curvatura del [Author ID1: at Sat Sep 8 17:53:00 2001]órgano[Author ID1: at Sat Sep 8 18:00:00 2001] (geotropismo[Author ID1: at Sat Sep 8 17:53:00 2001], es inhibidor del geotr[Author ID1: at Sun Sep 9 16:20:00 2001]o[Author ID1: at Sun Sep 9 16:21:00 2001]pismo[Author ID1: at Sun Sep 9 16:20:00 2001], fototropismo).[Author ID1: at Sat Sep 8 17:53:00 2001]**

−−>**Inhibición de [Author ID1: at Sat Sep 8 17:54:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001]−−>**yemas[Author ID1: at Sat Sep 8 18:00:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001]−−> **laterales (dominancia apical):[Author ID1: at Sat Sep 8 17:54:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001] **el desarrollo de yemas laterales es inhibido por el AIA producido en la yema apical[Author ID1: at Sat Sep 8 17:54:00 2001] (transporte basipetalo por el tallo, es decir de arriba [Author ID1: at Sat Sep 8 17:55:00 2001]abajo[Author ID1: at Sat Sep 8 17:56:00 2001])[Author ID1: at Sat Sep 8 17:55:00 2001]. Si se da la supresión de la yema apical se da una ruptura de la dominancia apical y un desarrollo de las laterales[Author ID1: at Sat Sep 8 17:56:00 2001].[Author ID1: at Sat Sep 8 17:57:00 2001]**

−−>**Actividad cambial:[Author ID1: at Sat Sep 8 17:57:00 2001]**[Author ID1: at Sat Sep 8

18:00:00 2001] **crecimiento secundario en grosor. División de la células del cambium y formación del xilema y floema.[Author ID1: at Sat Sep 8 17:57:00 2001]**

−−>**Crecimiento radicular:[Author ID1: at Sat Sep 8 17:58:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001] **el AIA inhibe el crecimiento de las [Author ID1: at Sat Sep 8 17:58:00 2001]raíces[Author ID1: at Sat Sep 8 22:47:00 2001]. A [Author ID1: at Sat Sep 8 17:58:00 2001] [Author ID1: at Wed Sep 12 01:09:00 2001]concentraciones muy bajas en cambio,[Author ID1: at Sat Sep 8 17:58:00 2001] promueve el alargamiento de la [Author ID1: at Sat Sep 8 17:59:00 2001]raíz[Author ID1: at Sat Sep 8 22:47:00 2001].[Author ID1: at Sat Sep 8 17:59:00 2001][Author ID1: at Wed Sep 12 01:09:00 2001]**

En cambio promueve el crecimiento de [Author ID1: at Mon Sep 10 14:08:00 2001]raíces[Author ID1: at Mon Sep 10 14:09:00 2001] adventicias[Author ID1: at Mon Sep 10 14:08:00 2001] en el tallo[Author ID1: at Mon Sep 10 14:10:00 2001].[Author ID1: at Mon Sep 10 14:08:00 2001][Author ID1: at Sat Sep 8 17:59:00 2001]

−−>**Abscisión foliar:[Author ID1: at Sat Sep 8 17:59:00 2001]**[Author ID1: at Sat Sep 8 18:00:00 2001] **disminuye el aporte de auxina en zonas de abscisión lo q da la [Author ID1: at Sat Sep 8 17:59:00 2001]caída[Author ID1: at Sat Sep 8 18:00:00 2001] de la hoja.[Author ID1: at Sat Sep 8 17:59:00 2001][Author ID1: at Sat Sep 8 18:01:00 2001]**

−−>**Promueven la síntesis de etileno[Author ID1: at Mon Sep 10 19:16:00 2001]**[Author ID1: at Mon Sep 10 19:17:00 2001]−−>**[Author ID1: at Sat Sep 8 18:01:00 2001]**[Author ID1: at Mon Sep 10 19:17:00 2001]

Mecanismos de [Author ID1: at Sat Sep 8 18:01:00 2001]elongación[Author ID1: at Sat Sep 8 18:04:00 2001] celular[Author ID1: at Sat Sep 8 18:01:00 2001]

El AIA interviene en el crecimiento [Author ID1: at Sat Sep 8 18:01:00 2001]ácido[Author ID1: at Sat Sep 8 18:04:00 2001], [Author ID1: at Sat Sep 8 18:01:00 2001]promueve[Author ID1: at Sat Sep 8 18:04:00 2001] ATPasa de membrana para sacar H[Author ID1: at Sat Sep 8 18:01:00 2001]+[Author ID1: at Sat Sep 8 18:02:00 2001] al apoplasto, activando hidrolasas q degradan la rigidez de la pared (respuesta inicial de crecimiento)[Author ID1: at Sat Sep 8 18:02:00 2001]

La síntesis de compuestos de la pared[Author ID1: at Sat Sep 8 18:02:00 2001] (respuesta a [Author ID1: at Sat Sep 8 18:03:00 2001]más[Author ID1: at Sat Sep 8 22:04:00 2001] largo plazo) se requiere para mantener la pared, controlado en primer termino por el AIA ([Author ID1: at Sat Sep 8 18:03:00 2001]activación[Author ID1: at Sat Sep 8 18:04:00 2001] de genes del [Author ID1: at Sat Sep 8 18:03:00 2001]núcleo síntesis de RNA[Author ID1: at Sat Sep 8 18:04:00 2001] síntesis de proteínas crecimiento celular).[Author ID1: at Sat Sep 8 18:05:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Sat Sep 8 18:29:00 2001]

Tema 17 giberelinas[Author ID0: at]

[Author ID1: at Sat Sep 8 18:06:00 2001]

Eran sustan[Author ID1: at Sat Sep 8 18:06:00 2001]cias originarias de infecciones [Author ID1: at Sat Sep 8 18:07:00 2001]fúngicas[Author ID1: at Sat Sep 8 18:08:00 2001]. [Author ID1: at Sat Sep 8 18:07:00 2001]Están[Author ID1: at Sat Sep 8 18:08:00 2001] implicadas en: mover reservas de sustancias almacenadas en semillas de [Author ID1: at Sat Sep 8 18:07:00 2001]gramíneas[Author ID1: at Sat Sep 8 18:08:00 2001] [Author ID1: at Sat Sep 8 18:07:00 2001]y también sobre el desarrollo de la flor y fruto.[Author ID1: at Sat Sep 8 18:08:00 2001]

Aparecen en semillas, frutos en [Author ID1: at Sat Sep 8 19:52:00 2001]desarrollo[Author ID1: at Sat Sep 8 19:57:00 2001], tallos en [Author ID1: at Sat Sep 8 19:52:00 2001]elongación[Author ID1: at Sat Sep 8 19:57:00 2001], parte apical de las [Author ID1: at Sat Sep 8 19:53:00 2001]raíces[Author ID1: at Sat Sep 8 19:57:00 2001].[Author ID1: at Sat Sep 8 19:53:00 2001]

Efectos de las gibereli[Author ID1: at Sat Sep 8 19:53:00 2001]n[Author ID1: at Sat Sep 8 19:57:00 2001]as[Author ID1: at Sat Sep 8 19:53:00 2001]

Produce [Author ID1: at Sat Sep 8 19:53:00 2001]elongación[Author ID1: at Sat Sep 8 19:57:00 2001] en internudos en plantas q tienen alguna mutación en [Author ID1: at Sat Sep 8 19:54:00 2001]algún[Author ID1: at Sat Sep 8 19:57:00 2001] alelo.[Author ID1: at Sat Sep 8 19:54:00 2001][Author ID0: at]

Inhiben la formación de raíces adventicias[Author ID1: at Mon Sep 10 14:13:00 2001] (contrario de auxinas)[Author ID1: at Mon Sep 10 14:15:00 2001].[Author ID1: at Mon Sep 10 14:13:00 2001][Author ID0: at]

Efecto sobre plantas con crecimiento en roseta. Necesitan pasar por un periodo de tiempo [Author ID1: at Sat Sep 8 19:54:00 2001]frío[Author ID1: at Sat Sep 8 19:57:00 2001] o aumentar el fotoperiodo para florecer.[Author ID0: at]

Tiene q ver con la movilización de los carbohidratos de reserva en la semilla.[Author ID1: at Sat Sep 8 19:55:00 2001] (estimulan la gluconeogénesis).[Author ID1: at Sat Sep 8 20:25:00 2001][Author ID1: at Sat Sep 8 19:55:00 2001]

Aumenta los niveles de RNAm.[Author ID0: at]

Tiene efecto en la [Author ID1: at Sat Sep 8 19:56:00 2001]floración[Author ID1: at Sat Sep 8 19:58:00 2001] de plantas [Author ID1: at Sat Sep 8 19:56:00 2001]bianuales[Author ID0: at]

Estado de juvenilidad de la planta[Author ID1: at Sat Sep 8 19:57:00 2001] (detienen la senescencia de la hoja)[Author ID1: at Mon Sep 10 14:17:00 2001].[Author ID1: at Sat Sep 8 19:57:00 2001][Author ID0: at]

Pr[Author ID1: at Mon Sep 10 14:17:00 2001]ovocan el desarrollo de frutos partenocárpicos (sin semilla).[Author ID1: at Mon Sep 10 14:18:00 2001][Author ID1: at Sat Sep 8 19:58:00 2001]

−−>**Síntesis [Author ID1: at Sat Sep 8 19:58:00 2001]**[Author ID1: at Sat Sep 8 19:58:00 2001][**Author ID1: at Sat Sep 8 19:58:00 2001]**

−−>**Son[Author ID1: at Sat Sep 8 19:58:00 2001]**[Author ID1: at Sat Sep 8 19:59:00 2001]

compuestos isoprenoides, específicamente se trata de[Author ID1: at Mon Sep 10 14:01:00 2001]−−> diterpenoides [Author ID1: at Sat Sep 8 19:58:00 2001][Author ID1: at Sat Sep 8 19:59:00 2001]−−>**ácidos[Author ID1: at Sat Sep 8 19:59:00 2001]**[Author ID1: at Sat Sep 8 19:59:00 2001]−−> **q se s[Author ID1: at Sat Sep 8 19:58:00 2001]**[Author ID1: at Sat Sep 8 19:59:00 2001]−−>**intetizan en la ruta del [Author ID1: at Sat Sep 8 19:59:00 2001]**[Author ID1: at Sat Sep 8 19:59:00 2001]**mevalonato.[Author ID1: at Sat Sep 8 19:59:00 2001]**−−>**[Author ID1: at Sat Sep 8 18:08:00 2001]**[Author ID1: at Sat Sep 8 19:59:00 2001]

Todas las [Author ID1: at Sat Sep 8 18:08:00 2001]giberelinas son un grupo de hormonas relacionadas con el ent−kaureno (metabolismo de los terpenoides)[Author ID1: at Sat Sep 8 18:09:00 2001]−−>**[Author ID1: at Sat Sep 8 15:20:00 2001]**[Author ID1: at Sat Sep 8 18:06:00 2001]

Transporte[Author ID1: at Sat Sep 8 20:11:00 2001]

−−>**Al contrario q en las auxinas, el transporte no es por células adjuntas a los haces vasculares, sino q es por [Author ID1: at Sat Sep 8 20:12:00 2001]**[Author ID1: at Sat Sep 8 20:13:00 2001]−−>**vía[Author ID1: at Sat Sep 8 20:13:00 2001]**[Author ID1: at Sat Sep 8 20:13:00 2001]−−> **tanto xilem[Author ID1: at Sat Sep 8 20:12:00 2001]**[Author ID1: at Sat Sep 8 20:13:00 2001]**á[Author ID1: at Sat Sep 8 20:13:00 2001]**−−>**tica como floematica, y no es polar.[Author ID1: at Sat Sep 8 20:12:00 2001]**[Author ID1: at Sat Sep 8 20:13:00 2001]**[Author ID0: at]**

[Author ID0: at]

[Author ID1: at Mon Sep 10 17:30:00 2001]

Tema 18 citoquininas[Author ID1: at Sat Sep 8 20:40:00 2001] o citocininas[Author ID1: at Mon Sep 10 21:15:00 2001][Author ID0: at]

[Author ID1: at Sat Sep 8 20:40:00 2001]

P[Author ID1: at Sat Sep 8 20:41:00 2001]roducen aumento de la división celular. Si no existiera la [Author ID1: at Sat Sep 8 21:02:00 2001]acción[Author ID1: at Sat Sep 8 21:05:00 2001] de citoquininas tendríamos células grandes sin división.[Author ID1: at Sat Sep 8 21:02:00 2001][Author ID0: at]

Cuando las células se desdiferencian [Author ID1: at Sat Sep 8 21:03:00 2001]forman los cayos y cuando se vuelven a diferenci[Author ID1: at Sat Sep 8 21:08:00 2001]a[Author ID1: at Sat Sep 8 21:12:00 2001]r para el desarrollo final esta diferenciación esta favorecida por las fitohormonas.[Author ID1: at Sat Sep 8 21:08:00 2001]

Las citoquininas son derivados de la purina Adenina.[Author ID0: at]

Se caracteriza por un núcleo se adenina unido a ribosa fosforilada en[Author ID1: at Sat Sep 8 21:09:00 2001] el[Author ID1: at Sat Sep 8 22:06:00 2001] C6[Author ID1: at Sat Sep 8 21:09:00 2001] formando ribósidos. También afectan al desarrollo de tallos, [Author ID1: at Sat Sep 8 21:10:00 2001]raíces[Author ID1: at Sat Sep 8 21:13:00 2001], yema[Author ID1: at Sat Sep 8 21:10:00 2001]s laterales, [Author ID1: at Sat Sep 8 21:11:00 2001]expansión[Author ID1: at Sat Sep 8 21:13:00 2001] celular, desarrollo de

cloroplastos y senescencia foliar.[Author ID1: at Sat Sep 8 21:11:00 2001][Author ID0: at]

[Author ID0: at]

Se descubrieron como una sustancia [Author ID1: at Sat Sep 8 21:13:00 2001]extraída[Author ID1: at Sat Sep 8 21:16:00 2001] a p[Author ID1: at Sat Sep 8 21:13:00 2001]a[Author ID1: at Sat Sep 8 21:16:00 2001]rtir de extractos floem[Author ID1: at Sat Sep 8 21:13:00 2001]á[Author ID1: at Sat Sep 8 21:17:00 2001]ticos q favorecían el desarrollo de cultivos celulares in [Author ID1: at Sat Sep 8 21:13:00 2001]Vitro.[Author ID0: at]

Dependiendo de la [Author ID1: at Sat Sep 8 21:14:00 2001]proporción[Author ID1: at Sat Sep 8 21:17:00 2001] relativa entre auxina / citoquinina se va a producir el control de la [Author ID1: at Sat Sep 8 21:14:00 2001]morfogénesis[Author ID1: at Sat Sep 8 21:15:00 2001]:[Author ID1: at Sat Sep 8 21:14:00 2001][Author ID1: at Sat Sep 8 21:15:00 2001]

- −−>**Cuando la [Author ID1: at Sat Sep 8 21:15:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−>**relación[Author ID1: at Sat Sep 8 21:17:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−> **esta equilibrada se da un callo indiferenciado[Author ID0: at]**[Author ID0: at]
- −−>**Si aumenta la auxina se da ri[Author ID1: at Sat Sep 8 21:15:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−>**zog[Author ID1: at Sat Sep 8 21:16:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]**é[Author ID1: at Sat Sep 8 21:17:00 2001]**−−>**nesis[Author ID0: at]**[Author ID0: at]
- −−>**En [Author ID1: at Sat Sep 8 21:16:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−>**función[Author ID1: at Sat Sep 8 21:17:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−> **de la auxina / citoquinina se da[Author ID1: at Sat Sep 8 21:16:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001] **[Author ID1: at Sat Sep 8 21:17:00 2001]**−−>**el desarrollo [Author ID1: at Sat Sep 8 21:16:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−>**aéreo[Author ID1: at Sat Sep 8 21:17:00 2001]**[Author ID1: at Sat Sep 8 21:16:00 2001]−−>**[Author ID1: at Sat Sep 8 21:16:00 2001]**[Author ID1: at Sat Sep 8 21:17:00 2001]

[Author ID1: at Sat Sep 8 21:18:00 2001]

Biosíntesis[Author ID1: at Sat Sep 8 21:18:00 2001]

Se [Author ID1: at Sat Sep 8 21:18:00 2001]pensó[Author ID1: at Sat Sep 8 21:27:00 2001] q [Author ID1: at Sat Sep 8 21:18:00 2001]derivaban[Author ID1: at Sat Sep 8 21:27:00 2001] del [Author ID1: at Sat Sep 8 21:18:00 2001]ácido[Author ID1: at Sat Sep 8 21:27:00 2001] nucleico y de hecho los [Author ID1: at Sat Sep 8 21:18:00 2001]RNAt tienen como anticod[Author ID1: at Sat Sep 8 21:19:00 2001]ó[Author ID1: at Sat Sep 8 21:27:00 2001]n isopentenil adenosin q es el origen de las citoquininas.[Author ID0: at]

La[Author ID1: at Sat Sep 8 21:19:00 2001] síntesis proviene de la condensación del AMP son derivados o sustituyentes [Author ID1: at Sat Sep 8 21:20:00 2001]ácidos[Author ID1: at Sat Sep 8 21:27:00 2001] al carbono 6 de la aminopurina.[Author ID1: at Sat Sep 8 21:20:00 2001]

El transporte se da [Author ID1: at Mon Sep 10 21:16:00 2001]p[Author ID1: at Mon Sep 10 21:17:00 2001]or el xilema[Author ID1: at Mon Sep 10 21:16:00 2001] y muy limitadamente por el floema[Author ID1: at Mon Sep 10 21:18:00 2001].[Author ID1: at Mon Sep 10 21:16:00 2001][Author ID1: at Mon Sep 10 21:17:00 2001]

[Author ID1: at Sat Sep 8 21:20:00 2001]

Papel fisiológico[Author ID1: at Sat Sep 8 21:21:00 2001]

División celular[Author ID0: at]

Morfogénesis[Author ID0: at]

Formación de las agallas [Author ID1: at Sat Sep 8 21:21:00 2001]motivado por la infección de bacterias capaces de producir heridas en la zona entre la parte [Author ID1: at Sat Sep 8 21:22:00 2001]aérea[Author ID1: at Sat Sep 8 21:26:00 2001] y la [Author ID1: at Sat Sep 8 21:22:00 2001]raíz[Author ID1: at Sat Sep 8 21:27:00 2001].[Author ID0: at]

Senescencia y [Author ID1: at Sat Sep 8 21:22:00 2001]movilización[Author ID1: at Sat Sep 8 21:23:00 2001] [Author ID1: at Sat Sep 8 21:22:00 2001]de nutrientes.[Author ID0: at]

Favorecen el desarrollo de cloroplastos, síntesis de [Author ID1: at Sat Sep 8 21:23:00 2001]proteínas[Author ID1: at Sat Sep 8 21:27:00 2001] q forman parte del [Author ID1: at Sat Sep 8 21:23:00 2001]complejo[Author ID1: at Sat Sep 8 21:26:00 2001].[Author ID0: at]

El [Author ID1: at Sat Sep 8 21:23:00 2001]mecanismo para evitar el envejecimiento o favorecerlo en debido a q son motores del movimiento de nutrientes. Se forman sumideros de nutrientes como [Author ID1: at Sat Sep 8 21:24:00 2001]consecuencia[Author ID1: at Sat Sep 8 21:27:00 2001] del [Author ID1: at Sat Sep 8 21:24:00 2001]aumento[Author ID1: at Sat Sep 8 21:27:00 2001] de los niveles de [Author ID1: at Sat Sep 8 21:24:00 2001]citoquininas[Author ID1: at Sat Sep 8 21:25:00 2001].[Author ID1: at Sat Sep 8 21:24:00 2001][Author ID0: at]

Tienen efecto contrario a la de las auxinas respecto de la dormancia de la yema apical, favorece el cre[Author ID1: at Sat Sep 8 21:25:00 2001]cimiento de las yemas laterales e inhibe la apical.[Author ID0: at]

Contrarresta el efecto inhibitorio de las auxinas.[Author ID1: at Sat Sep 8 21:26:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID1: at Sat Sep 8 21:28:00 2001]

[Author ID0: at]

[Author ID1: at Mon Sep 10 17:45:00 2001]

Tema 19 ácido abscísico ABA[Author ID0: at]

[Author ID1: at Sat Sep 8 21:28:00 2001]

Tiene un papel morfogen[Author ID1: at Sat Sep 8 21:30:00 2001]é[Author ID1: at Sat Sep 8 21:52:00 2001]tico en [Author ID1: at Sat Sep 8 21:30:00 2001]plantas[Author ID1: at Sat Sep 8 21:52:00 2001] semiacu[Author ID1: at Sat Sep 8 21:30:00 2001]á[Author ID1: at Sat Sep 8 21:52:00 2001]ticas[Author ID1: at Sat Sep 8 21:30:00 2001],[Author ID1: at Sat Sep 8 22:19:00 2001] q sumergidas carecen de estoma y no sumergidas tienen unas estructuras [Author ID1: at Sat Sep 8 21:30:00 2001]más[Author ID1: at Sat Sep 8 22:04:00 2001] complejas.[Author ID1: at Sat Sep 8 21:30:00 2001]

Al ABA se le conoce como la señal de q la planta esta sometida a estrés hídrico. La propia supervivencia de la planta como organismo individual o como especie depende de la capacidad de la[Author ID1: at Sat Sep 8 21:31:00 2001] [Author ID1: at Sat Sep 8 21:38:00 2001]planta de [Author ID1: at Sat Sep 8 21:31:00 2001]ralentizar[Author ID1: at Sat Sep 8 21:38:00 2001] o detener completamente [Author ID1: at Sat Sep 8 21:31:00 2001]el crecimiento ante un agente [Author ID1: at Sat Sep 8 21:32:00 2001]estresante[Author ID1: at Sat Sep 8 21:39:00 2001].[Author ID1: at Sat Sep 8 21:32:00 2001]

Dormancia: es la detención del crecimiento. Es un fenómeno [Author ID1: at Sat Sep 8 21:33:00 2001]común[Author ID1: at Sat Sep 8 21:39:00 2001] en la ontogenia de la planta con [Author ID1: at Sat Sep 8 21:33:00 2001]carácter[Author ID1: at Sat Sep 8 21:39:00 2001] adaptativo [Author ID1: at Sat Sep 8 21:33:00 2001]para sobrevivir en condiciones adversas. Cuando retornan las condiciones normales se rompe la dormancia.[Author ID1: at Sat Sep 8 21:34:00 2001]

El ABA produce la señal de condiciones adversas, los niveles de ABA se aumentan y se produce la detención del desarrollo.[Author ID0: at]

Las [Author ID1: at Sat Sep 8 21:35:00 2001]sustancias con propiedad absc[Author ID1: at Sat Sep 8 21:36:00 2001]í[Author ID1: at Sat Sep 8 21:39:00 2001]sica tienen un grupo [Author ID1: at Sat Sep 8 21:36:00 2001]carboxílico[Author ID1: at Sat Sep 8 21:39:00 2001] libre, doble enlace [Author ID1: at Sat Sep 8 21:36:00 2001]d[Author ID1: at Sat Sep 8 21:39:00 2001]el ciclohexano y doble enlace en [Author ID1: at Sat Sep 8 21:36:00 2001]Cys entre C[Author ID1: at Sat Sep 8 21:37:00 2001]II[Author ID1: at Sat Sep 8 21:39:00 2001] y C[Author ID1: at Sat Sep 8 21:39:00 2001]III[Author ID1: at Sat Sep 8 21:39:00 2001].[Author ID0: at]

Los bioensayos se basan en dos propiedades:[Author ID0: at]

- **capacidad de la [Author ID1: at Sat Sep 8 21:40:00 2001]caída[Author ID1: at Sat Sep 8 21:41:00 2001] de las hojas[Author ID1: at Sat Sep 8 21:40:00 2001]−−>[Author ID1: at Sat Sep 8 21:40:00 2001]**[Author ID1: at Sat Sep 8 21:40:00 2001]
- **capacidad de la dormancia de [Author ID1: at Sat Sep 8 21:40:00 2001]yemas[Author ID1: at Sat Sep 8 21:41:00 2001]−−>[Author ID1: at Sat Sep 8 21:41:00 2001]**[Author ID1: at Sat Sep 8 21:40:00 2001]

[Author ID1: at Sat Sep 8 21:41:00 2001]

Biosíntesis de ABA[Author ID1: at Sat Sep 8 21:41:00 2001]

El ABA es un terpenoide = isoprenoide, ruta de biosíntesis de terpenoides, todos son múltiplos de 5, a unidad repetitiva es el isopentenil pirofosfato (IPP) y la ruta la del acetato − mevalonato. El IPP proviene del acetil CoA, 3 unidades de este producen un compuesto de 6C (Ac. Mevalonico) q por descarboxilación forma el IPP. [Author ID0: at]

La síntesis se produce por dos vías, síntesis de novo, o a partir de un tetraterpeno.[Author ID1: at Mon Sep 10 17:49:00 2001]

De la ruta de degradación por la oxidación de ABA se obtiene [Author ID1: at Sat Sep 8 21:42:00 2001]ácido[Author ID1: at Sat Sep 8 21:51:00 2001] faseico y [Author ID1: at Sat Sep 8 21:42:00 2001]ácido[Author ID1: at Sat Sep 8 21:51:00 2001] diludrofaseico.[Author ID1: at Sat Sep 8 21:42:00 2001][Author ID0: at]

[Author ID1: at Mon Sep 10 20:43:00 2001]

Transporte[Author ID1: at Mon Sep 10 20:43:00 2001]

El transporte del ABA[Author ID1: at Mon Sep 10 20:43:00 2001] se realiza fácilmente tanto en el xilema como en el [Author ID1: at Mon Sep 10 20:46:00 2001]floema, y también en las células de [Author ID1: at Mon Sep 10 20:47:00 2001]parénquima[Author ID1: at Mon Sep 10 20:48:00 2001] fuera de los haces vasculares. En las células parenquimatosas no suele [Author ID1: at Mon Sep 10 20:47:00 2001]haber polaridad, y por lo tanto el movimiento se asemeja al de las giberelinas.[Author ID1: at Mon Sep 10 20:48:00 2001]−−>[Author ID1: at Sat Sep 8 21:42:00 2001][Author ID1: at Mon Sep 10 20:43:00 2001]

[Author ID1: at Sat Sep 8 21:42:00 2001]

Papel [Author ID1: at Sat Sep 8 21:42:00 2001]fisiológico[Author ID1: at Sat Sep 8 21:43:00 2001][Author ID1: at Sat Sep 8 21:42:00 2001]

Dormancia de las yemas en [Author ID1: at Sat Sep 8 21:43:00 2001]especies[Author ID1: at Sat Sep 8 21:51:00 2001] leñosas[Author ID0: at]

Dormancia de semillas[Author ID0: at]

Papel contrario a la luz en la germinación. [Author ID1: at Sat Sep 8 21:43:00 2001]([Author ID1: at Mon Sep 10 17:51:00 2001]El fitocromo inhibe la [Author ID1: at Sat Sep 8 21:43:00 2001]germinación[Author ID1: at Sat Sep 8 21:44:00 2001])[Author ID1: at Mon Sep 10 17:51:00 2001].[Author ID1: at Sat Sep 8 21:43:00 2001][Author ID1: at Sat Sep 8 21:44:00 2001]

Función[Author ID1: at Sat Sep 8 21:51:00 2001] contrapuesta a las giberelinas. Inhibe la síntesis de RNAm, para la[Author ID1: at Sat Sep 8 21:44:00 2001] síntesis de −amilasas.[Author ID0: at]

Crecimiento y papel antagónico de las auxinas. ABA inhibe la lib[Author ID1: at Sat Sep 8 21:45:00 2001]e[Author ID1: at Sun Sep 9 16:19:00 2001]ración y [Author ID1: at Sat Sep 8 21:45:00 2001]secreción[Author ID1: at Sat Sep 8 21:51:00 2001] de H[Author ID1: at Sat Sep 8 21:45:00 2001]+[Author ID1: at Sat Sep 8 21:46:00 2001] previniendo la acidificación y [Author ID1: at Sat Sep 8 21:46:00 2001]elongación[Author ID1: at Sat Sep 8 21:51:00 2001] celular.[Author ID0: at]

Cierre estomático: provoca el cierre afectando al modo de regulación de los estomas.[Author ID1: at Sat Sep 8 21:46:00 2001][Author ID0: at]

Toma [Author ID1: at Sat Sep 8 21:47:00 2001]de agua.[Author ID0: at]

Provoca la proliferación de [Author ID1: at Sat Sep 8 21:47:00 2001]raíces[Author ID1: at Sat Sep 8 21:51:00 2001], la planta esta mejor capacitada para explorar niveles [Author ID1: at Sat Sep 8 21:47:00 2001]más[Author ID1: at Sat Sep 8 22:04:00 2001] amplios para captar H[Author ID1: at Sat Sep 8 21:47:00 2001]2[Author ID1: at Sat Sep 8 21:48:00 2001]O.[Author ID0: at]

Disminuye el crecimiento de hoja, facilita la [Author ID1: at Sat Sep 8 21:48:00 2001]economía[Author ID1: at Sat Sep 8 21:51:00 2001] hídrica ya q disminuye la superficie de evaporación.[Author ID1: at Sat Sep 8 21:48:00 2001][Author ID1: at Sat Sep 8 21:49:00 2001]

Provoca la [Author ID1: at Mon Sep 10 17:54:00 2001]senescencia y abscisión. Papel contrario a la citoquinina, acelera la degradación de pigmentos.[Author ID0: at]

Inhibidores de crecimiento.[Author ID1: at Sat Sep 8 21:49:00 2001]

Tienen capacidad como sustancias alelop[Author ID1: at Sat Sep 8 21:50:00 2001]á[Author ID1: at Sat Sep 8 21:51:00 2001]ticas como agentes repelentes de [Author ID1: at Sat Sep 8 21:50:00 2001]fitófagos[Author ID1: at Sat Sep 8 21:51:00 2001] y [Author ID1: at Sat Sep 8 21:50:00 2001]para[Author ID1: at Sat Sep 8 22:05:00 2001] impedir q en las [Author ID1: at Sat Sep 8 21:50:00 2001]cercanías[Author ID1: at Sat Sep 8 21:51:00 2001] de plantas productoras se [Author ID1: at Sat Sep 8 21:50:00 2001]desarrollen otras plantas.[Author ID1: at Sat Sep 8 21:51:00 2001] [Author ID1: at Sat Sep 8 21:44:00 2001][Author ID0: at]

[Author ID0: at]

[Author ID0: at]

[Author ID1: at Sat Sep 8 21:52:00 2001]

Tema 20 etileno[Author ID0: at]

[Author ID1: at Sat Sep 8 21:52:00 2001]

E[Author ID1: at Sat Sep 8 21:52:00 2001]s volátil ya q se trata de un gas, es la hormona de la maduración de frutos, responsable del envejecimiento de las flores, [Author ID1: at Sat Sep 8 21:53:00 2001]r[Author ID1: at Sat Sep 8 21:54:00 2001]esponsable de [Author ID1: at Sat Sep 8 21:53:00 2001]−−>epinastias[Author ID1: at Sat Sep 8 21:53:00 2001][Author ID1: at Sat Sep 8 21:54:00 2001] **(efecto q[Author ID1: at Sat Sep 8 21:54:00 2001] se[Author ID1: at Sat Sep 8 21:55:00 2001] produce sobre [Author ID1: at Sat Sep 8 21:54:00 2001]las hojas q hacen q la punta se doble hacia abajo), engrosamiento radial de los tallos.[Author ID0: at]**

[Author ID1: at Sat Sep 8 21:55:00 2001]

Síntesis[Author ID1: at Sat Sep 8 21:55:00 2001]

Se sintetiza a partir de la metionina en la membrana de la vacuola (tonoplasto) y membrana citoplasmática (plasmolema).[Author ID1: at Sat Sep 8 21:56:00 2001]

El CO[Author ID1: at Mon Sep 10 19:21:00 2001]2[Author ID1: at Mon Sep 10 19:21:00 2001] a altas concentraciones (5−10%) [Author ID1: at Mon Sep 10 19:21:00 2001]inhibe la acción [Author ID1: at Mon Sep 10 19:22:00 2001]del etileno ya q impide al etileno catalizar su propia formación. [Author ID1: at Mon Sep 10 19:24:00 2001]Por ello se utiliza [Author ID1: at Mon Sep 10 19:22:00 2001]industrialmente para evitar la sobremaduraci[Author ID1: at Mon Sep 10 19:23:00 2001]ó[Author ID1: at Mon Sep 10 19:24:00 2001]n de frutos y hortalizas cosechados[Author ID1: at Mon Sep 10 19:23:00 2001].[Author ID1: at Mon Sep 10 19:24:00 2001] [Author ID1: at Mon Sep 10 19:22:00 2001]−−>**[Author ID1: at Sat Sep 8 21:56:00 2001]**[Author ID1: at Mon Sep 10 19:21:00 2001]

Efectos[Author ID1: at Sat Sep 8 21:57:00 2001][Author ID1: at Sat Sep 8 22:41:00 2001]

−−>**Provoca [Author ID1: at Sat Sep 8 22:41:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]−−>**el efecto[Author ID1: at Sat Sep 8 22:42:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001] **o respuesta[Author ID1: at Mon Sep 10 18:16:00 2001]**−−> **triple:[Author ID1: at Sat Sep 8 22:42:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]**

- **I[Author ID1: at Sat Sep 8 22:43:00 2001]nhibe el alargamiento del tallo[Author ID1: at Sat Sep 8 22:42:00 2001]−−>[Author ID1: at Sat Sep 8 22:42:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]
- **Aumenta su engrosamiento[Author ID1: at Sat Sep 8 22:42:00 2001]−−>[Author ID1: at Sat Sep 8 22:42:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]
- **Es[Author ID1: at Sat Sep 8 22:43:00 2001]timula un h[Author ID1: at Sat Sep 8 22:42:00 2001]á[Author ID1: at Sat Sep 8 22:44:00 2001]bito [Author ID1: at Sat Sep 8 22:42:00 2001]horizontal[Author ID1: at Sat Sep 8 22:43:00 2001] [Author ID1: at Sat Sep 8 22:42:00 2001]de crecimiento[Author ID1: at Sat Sep 8 22:43:00 2001]−−>[Author ID1: at Sat Sep 8 21:57:00 2001]**[Author ID1: at Sat Sep 8 22:42:00 2001]

Hormona de la maduración. Su mayor efecto se da en los lugares de almacenamiento de las cajas con fruta.[Author ID1: at Sat Sep 8 21:57:00 2001]

Conexión con auxinas[Author ID1: at Sat Sep 8 21:58:00 2001] (las auxinas estimulan la producción de [Author ID1: at Mon Sep 10 19:15:00 2001]etileno[Author ID1: at Mon Sep 10 19:17:00 2001])[Author ID1: at Mon Sep 10 19:15:00 2001].[Author ID0: at]

Germinación de dicotiledóneas[Author ID1: at Sat Sep 8 21:58:00 2001] (el fitocromo inhibe la síntesis de etileno).[Author ID0: at]

Abscisión. Se mide en la [Author ID1: at Sat Sep 8 21:59:00 2001]relación[Author ID1: at Sat Sep 8 22:01:00 2001] entre las auxinas y el etileno.[Author ID1: at Sat Sep 8 21:59:00 2001] Cuando en el punto de abscisión la [auxina] aumenta y la [etileno] [Author ID1: at Sat Sep 8 22:00:00 2001]diminuye, se [Author ID1: at Sat Sep 8 22:01:00 2001]produce[Author ID1: at Sat Sep 8 22:03:00 2001] la abscisión de la hoja.[Author ID1: at Sat Sep 8 22:01:00 2001][Author ID0: at]

Factores ambientales adversos producen la síntesis de etileno (déficit hídrico, baja Tª[Author ID1: at Sat Sep 8 22:02:00 2001] o los primeros estadios de la germinación).[Author ID1: at Sat Sep 8 22:03:00 2001] [Author ID1: at Sat Sep 8 22:00:00 2001]−−>**[Author ID1: at Sat Sep 8 21:40:00 2001]**[Author ID1: at Sat Sep 8 21:57:00 2001]

−−>[Author ID1: at Thu Sep 6 20:18:00 2001]

Fisiología vegetal[Author ID1: at Sun Sep 2 21:44:00 2001] − [Author ID1: at Wed Sep 5 23:07:00 2001][Author ID1: at Wed Sep 5 23:07:00 2001][Author ID1: at Wed Sep 5 23:07:00 2001]13[Author ID1: at Wed Sep 5 23:07:00 2001] −[Author ID1: at Wed Sep 5 23:07:00 2001]

[Author ID1: at Wed Sep 5 23:08:00 2001][Author ID1: at Wed Sep 5 23:08:00 2001][Author ID1: at Wed Sep 5 23:08:00 2001]47[Author ID1: at Wed Sep 5 23:08:00 2001][Author ID1: at Wed Sep 5 23:08:00 2001][Author ID1: at Wed Sep 5 23:08:00 2001]

[Author ID1: at Mon Aug 27 21:50:00 2001][Author ID1: at Mon Aug 27 21:50:00 2001][Author ID1: at Mon Aug 27 21:50:00 2001]

−−>[Author ID0: at]