**Zeemann FS2014**

**Q1**

FRAGE KOMT IMMER. WIE VIELE é KOMMEN von WO?

**Wie Licht die Synthese von ATP während der Photosynthese antreibt. Biochemische& Biophysikalische Prozesse**

* Light captured by chlorophyll in the thylakoid membrane in chloroplast

* Charge separation (light-driven oxidation) in PSII liberates electrons é and water splitting creates protons in the thylakoid lumen
* Transfer of é moves protons from the stroma into the thylakoid lumen
* Proton gradient established across thylakoid membrane
* Protons flow back into the stroma via the multisubunit proton ATPase, causing

molecular rotation

* The stromal head oft he ATPase takes ADP and Pi undergoes conformation changes and makes ATP

**Q2**

Klassische Frage, C3/C4 Photosynthese Vor-& Nachteile

**Wie wird Kohlendioxid in Maispflanze fixiert? Welche Art Photosynthetischer Metabolismus hat Mais? Vorteil, Mais gegenüber Reis?**

* *Maize fixes CO2 first as a C4 acid (z.B Malat) in the leaf mesophyll using PEP carboxylase*
* *C4 acid diffuse in bundle sheath cells and is decarboxylated to release CO2 again.*
* *Released CO2 is then re-fixed through Calvin-Cycle*
* *Maize plant is therefore a C4 plant*
* They have Kranz Anatomy
* Rice is a C3 plant, lacking Kranz anatomia, the spatial separation of C-fixation and assimilation
* C4 Photosynthesis is more expensive in terms of energy BUT, because bicarboate rather than CO2 is fixed by PEP carboxylase it is no susceptible to competition form oxygenation i.e. no photorespiration
* In conditions where photorespiration is a problem (hotter, dryer climates) C4 photosynthesis is more productive than C3 and more efficient in water and nitrogen.

**Q3**

**Sucrose transportet from photosynthesizing leaf to plant root.**

**Details of the intercellular transport process occuring in leave?**

* Sucrose made in leaf mesophyll cells & diffuses within the leaf symplast via plasmodesmata
* Sucrose is transported out of the leaf via phloem- a series of anulcete living cells with thick cell walls connected via sieve plates to form a tube
* Phloem vessels can be either type 1 (sympastically connected to mesophyll) ore Type 2 (symplastically isolated from mesophyll)
* 2 Wege symplastisch und aploid
* Both systems draw in H2O by osmosis creating a high pressure which drives flow
* Phloem loading type 1 -> polymer- transport model, sucrose enters intermediary cells is converted to a larger sugar (raffinose) that cannot diffuse back out into mesophyll
* Phloem loading type 2-> secondary active loading of a sucrose, sucrose released from cell adjacent to Phloem and taken up again by phloem compagnio n cells via proton sucrose sympast (?)

**Q4**

**Unterscheide Respiration und Photorespiration**

**3 Haupt-Stoffwechselwege der Respiration, Substrate und Produkte jedes Stoffwechselweges**

* Respiration process sugars and other metabolism intermediates oxidized to drive the production of energy reducing power
* Respiration involves release of CO2 in case of aerobic respiration via the Krebs (TCA cycle), O2 consumption
* Photorespiration, CO2 release and O2 take- up, light-dependent way but does NOT result in production of energy /reducing power rater consummation energy/reducing power
* Photorespiration, O2 is taken by fraction of RUBISCO which will use O2 and CO2
* O2 fixation cause product of 2-C intermediate phosphoglycerate needs to recycle into 3-C compounds whereby 1 CO2 is lost for each 2 O2’s that are fixed.

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| Haupt-Stoffwechselwege der Respiration | Substrate | Produkte |
| 1. Krebs TCA cycle | Pyruvat | ATP, precursors, reducing power |
| 2.Gylcolysis | 1Glucose | 2pyruvat |
| 3. Oxidative pentose phosphate pathway | Glucose 6-phosphat | Ribulose 5-phosphat |