free-running conditions. Different sulfur fertilization was applied to analyze the effects on pathogenesis-related compounds. Results from these experiments could help to optimize the use of fertilizer and if applicable reduce the amount of fungicides/pesticides.

19) The effect of the continuous light in combination with sulfur deprivation on the chlorophyll levels and carotenoids in young maize leaves

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Light fulfills two significant roles in plant growth. At first, light drives photosynthesis by providing energy and second it is perceived by several photoreceptors, thus activating signal pathways. Continuous light changes plant physiology by affecting both roles, thus creating difficulties in identifying the factors that are responsible for injuries under such treatment. As far as we know, the effect of continuous light in combination with plant's nutritional status or nutritional deficiency on its physiology is poorly studied. In particular, there are no references with regard to sulfur deficiency. Towards this direction, the responses of *Zea mays* plants to light environment in combination with nutrition were studied in four treatments; C: normal photoperiod & complete nutrient solution, Cc: continuous light & complete nutrient solution, −S: normal photoperiod & nutrient solution without sulfur, −Sc: continuous light & nutrient solution without sulfur. Plants were grown for seven days under normal photoperiod condition and then the treatment was applied for 3 weeks. The photon flux density was not modified during this period. The effect of the above mentioned cases on growth was monitored via fresh mass measurement, whilst the corresponding effect on the photosystems antennas was followed by determining the extractable levels of Chl *a*, Chl *b* and carotenoids from leaf lamina or sheath, by means of dimethyl sulfoxide. Our results showed that the treatments affected the time of organ appearance as well as their presence itself. The ratio of Chl *a/b* as well as the ratio of carotenoids to total chlorophyll proved to be useful response indicators to each treatment. The dynamic of adjustments presented by the sheaths (Sh) were different than the corresponding ones presented by the laminas (L).

Under continuous light and complete nutrition, the influence focused on L_4, L_5, L_6, whilst L_7 did not occur. Sheaths appearance was not affected except for Sh_5. Injuries due to this condition focused on youngest leaf from L_4 onwards and Sh_4 onwards. The lamina overall average of Chl a/b ratio was 4.1 (an increase by 13.9%), whilst in sheaths it was 2.7 (decreased by 6.9%). The laminas average Car:Chl ratio was 2.1 (decreased by 4.5%), whilst in sheaths it was 3.1 (increased by 10.7%).

A two days delay was observed in laminas L_5, L_6, L_7 and sheaths Sh_2, Sh_3 during the treatment of sulfur deficiency under normal photoperiod. No injuries were caused in laminas. The average Chl *a/b* ratio of the laminas was 3.8 (increased by 5.6%), whilst the average one in sheaths was 2.6 (decreased by 10.4%). In laminas, the average of Car:Chl ratio was 2.5 (increased by 13.6%), whilst in sheaths the corresponding average was 2.9 (increased by 3.6%).

With regard to treatment with continuous light combined with sulfur deficiency, the appearance of organs took place at the same time as in control plants, with the exception of L_7 and Sh_2. This fact indicates that the deficiency eliminated the effect of continuous light. Aging and collapsing was observed at the oldest organs L_0, L_1, Sh_0, Sh_1. In laminas, the average value of Chl *a/b* ratio was 3.8 (increased by 5.6%), whilst in sheaths the average was 2.7 (decreased by 6.9%). At the end of the experiment, in laminas the average of Car:Chl ratio was 2.7 (increased by 22.7%), whilst in sheaths the corresponding average was 2.8 (as in control plants).

20) Aerenchyma formation in maize leaves during sulfate deprivation

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Aerenchyma is the term given to plant tissues containing enlarged gas spaces exceeding those commonly found as intracellular spaces. So far, aerenchyma formation under nutrient deficiencies and especially under nitrogen- or phosphorus- or sulfur deficiency has been reported only in the adventitious roots of maize by lysis of cortical cells. Seven-day-old maize plants were grown in a hydroponics setup for nineteen days under sulfate deprivation against plants grown under full nutrition and samplings were taken at day 17 and 26 from sowing (day 10 and day 19 of the deprivation respectively). Samples from the fresh laminas of the 2nd leaves were fixed and embedded in paraffin. Sections were received with microtome from the top, middle and base of the lamina and stained with safranin-fast green. The dry mass and water amount, the sulfate and total sulfur contents and the specific surface area of the 2nd leaf lamina and the transpiration rate of the plant were determined.

Under the circumstances we observed the presence of enlarged spaces in this lamina of the S-deprived plants, a fact that to our knowledge has not been reported so far. More specific, on the 10th day under the deprivation, the cross sections from the top of the 2nd leaf lamina of the S-deprived plants, revealed larger substomatal chambers compared to the control plants under full nutrition. In the middle of the S-deprived plants lamina-enlarged spaces appeared among the vascular bundles probably caused by lysis of mesophyll cells. These enlarged spaces stretched from the upper to the lower epidermis or between the stoma and the epidermis with equal frequency of appearance, whilst they appeared fewer times between the upper and the lower stoma. The percentage of the aerenchyma in relation to the total cross section area reached 4.9%. On the base of this lamina enlarge gas spaces appeared too, however to a very small extent, since the percentage of the aerenchymatous area was 0.3% of the total area of the section. On this day, the 2nd leaf of the S-deprived plants contained a significantly lesser amounts of sulfate, organic sulfur and total sulfur by 74%, 38% and 48% respectively compared to control plants. The S-deprived lamina's dry mass and water amounts were as in control. The specific surface area of the lamina (dry mass per lamina surface area) of the S-deprived plants was less by 19% compared to control plants. The S-deprived plants presented a larger transpiration rate by 28% than the control plants. These data indicate that on the tenth day of deprivation, aerenchyma may be formed in maize leaves in response to sulfur deficiency following the described pattern between the vascular bundles.

On the 19th day under the deprivation, such enlarged spaces appeared only in the middle of the lamina of the S-deprived plants 2nd leaf and the percentage of this aerenchyma reached just the 0.7% of the total cross section area. On this day, the 2nd leaf of the S-deprived plants presented less amounts of organic