SO_4^{2-} Uptake and Its Assimilation in the Different Genotypes of Rape on the S-Deficient

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SO_4^{2-} uptake and its assimilation in the different genotypes of rape on the S-deficient

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Key words: S uptake, N uptake, S deficiency, ATP sulfurylase, glutathione

Introduction Sulfur is an essential nutrient required for plant growth and is mainly taken up by plants as inorganic sulfate from soil.

Materials and methods Ten cultivars of rape (*Brassica napus* L.) were grown hydroponically in controlled environment and fed with complete nutrient solution (Hoagland, 2001). Solution sampling for uptake measurement was taken every day for 5 days. Uptake of SO_4^{2-} and NO_3^- were measured by decrease in concentration in the nutrient solution. Under S-deficiency treatment, seedlings were fed with 0.2mM SO_4^{2-} for 5 days. The concentration of SO_4^{2-} and NO_3^- were measured using ion chromatography. ATP sulfurylase activity and glutathione concentration were also analyzed under 2.0 and 0.2mM SO_4^{2-} supply level.

Results SO_4^{2-} uptake was higher in Saturnin and Youngsan whereas it was significantly lower in Mosa and Pollen under complete nutrient solution (2.0mM SO_4^{2-}) (Figure.1A.). Under S-deficient condition (0.2mM SO_4^{2-}), high S-uptake was also shown in the cultivars Saturnin, Mokpo and Youngsan and low uptake in Pollen (Figure.1B.). ATP sulfurylase activity in young leaves was found to be relatively lower in Saturnin and Youngsan (Figure.2A.). However, the cultivars having high S-uptake exhibited high ATP sulfurylase activity in old leaves (Figure.2B). High concentration of glutathione was also found in Saturnin under complete nutrient solution (Figure.3B.). These results suggest that Saturnin is a rape cultivar which may have the highest S-use efficiency.

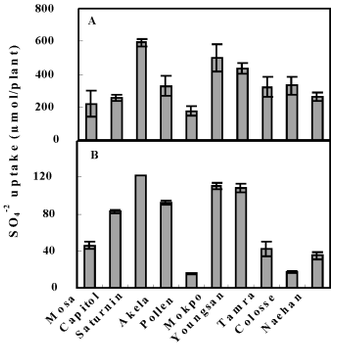

Figure 1 *Sulfate uptake measured by a depeltion method under hydroponic culture with (A) complete (2.0 mM SO_4^{2-}) or (B) S-deficient (0.2 mM SO_4^{2-}) condition.*

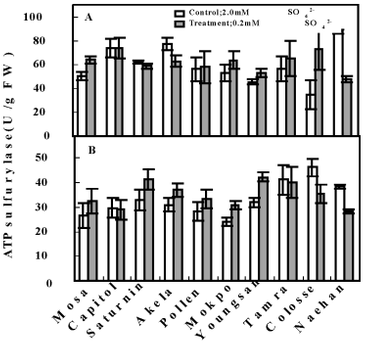

Figure 2 *ATP sulfurylase activity in young leaves (A) and in old leaves (B) under complete (2.0 mM SO_4^{2-}) or S-deficient (0.2 mM SO_4^{2-}) condition.*

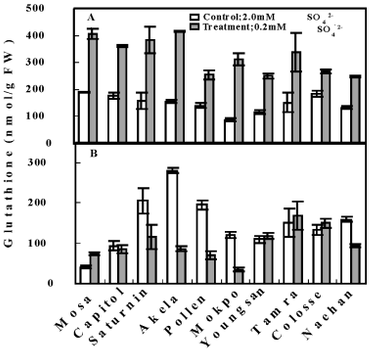

Figure 3 *Amount of glutathione (GSH) in young leaves (A) and in old leaves (B) under complete (2.0 mM SO_4^{2-}) or S-deficient (0.2 mM SO_4^{2-}) condition.*

Conclusions Results of this experiment suggest that the cultivars having high S-uptake also have high activation of ATP sulfurylase even under S-deficient conditions. The high amount of GSH, playing an important role in resistance of plants under stress, was also found in the cultivars having high S-uptake.