Study the effect freezing stress on photosynthesis system of fall Sugar beet Varieties

Freezing is one of the most important environmental stresses which reduce crops growth and yield in many regions. In order to evaluate the effect of freezing stress on photosynthesis of different sugar beet varieties, an experiment was conducted based on a completely randomized design on faculty of agriculture, Ferdows University of Mashhad, during the 2009-2010. The studied factors were seven fall sugar beet varieties (Glo, Mano, Gloa, Super Ma, Sbsi, and PP8) and low temperatures at 10 level (0, -2, -4, -6, -8, -10, -12, -14, -16, -18°C). Photosynthesis was measured at five stages (twelve and two days before freezing and eight, sixteen and twenty for days after freezing, during the recovery period).

Results showed that freezing stress leads to reduced photosynthesis amount in all treatments and varieties. Mano had the highest amount of photosynthesis before freezing. Recovery process which is an important indicator of freezing tolerance was observed at all varieties, as until -14°C growth rate the majority of studied varieties could reconstruct the photosynthetic system and so restitute the damage, nearly. In this treatment the best photosynthesis recovery trend was observed on Gloa var. In the -16°C and -18°C treatments a drastic photosynthesis reduction was observed. Moreover, no recovery process was recorded on these 2 treatments and photosynthesis reduction was continued until the 5th stage of measurement. Photosynthesis amount for Gloa, Super Ma, Sbsi, and Foliage varieties at 4th stage of measurements and for Super Ma and PP8 varieties at 5th stage of measurements got zero, respectively. Generally, Gloa and Super Ma varieties had the highest photosynthesis amount, before and after freezing. So compared with others, recovery process was also better in these varieties. Results showed that all of the freezing temperature had the severe effect on the photosynthesis until -14°C treatment, but this damage was reversible. While -16°C and -18°C treatments had the destructive and irreversible effect on photosynthetic system.

Key Words: Fall Sugar beet, Freezing stress, Photosynthetic System, Recovery Process.