

Photosynthetic apparatus of psammophytes *Alyssum desertorum* Stapf and *Secale sylvestre* Host under soil flooding

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Sand plants *Alyssum desertorum* (family Brassicaceae) and *Secale sylvestre* (family Poaceae) belonging to the ecological group “psammophytes” grow in Ukraine in the Forest-Steppe and Steppe zones, ephemeral. One of the significant abiotic factors that negatively affects plant growth, up to death, is soil flooding which quickly depletes oxygen. Since the photosynthesis is very sensitive to the effects of drought and flooding, we for the first time investigated the effect of 5- and 10-day soil flooding on the photosynthetic apparatus of these sand species using the methods of light and transmission electron microscopy, biochemistry and chlorophyll fluorescence induction (JIP test). Seeds for the experiments were collected from plants of dry sandy areas of the ravine forest in the Steppe zone of the Dnipropetrovsk region. The general organization of mesophyll cells on the 5th and 10th days of soil flooding was basically similar to that in the control. Changes in the ultrastructure and functional state of chloroplasts under soil flooding revealed in the transient starch grain volume, quantity and size of plastoglobules, swelling of granal and stromal thylakoids, pigment amount, the JIP test parameters, integral indicators of photosynthesis efficiency and coincided with those in mesophytes studied in this respect. Thus, photosynthesis occurred and contributed to the survival of seedlings during the first 10 days. The subsequent yellowing of leaves caused by decreased chlorophyll synthesis and ultimately plant death indicate that both species are capable only to short-term systemic metabolic adaptation to root hypoxia according to such indicators as the rate and level of synthesis of stress proteins HSP70 and alcohol dehydrogenase – a key enzyme of anaerobic energy metabolism.