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Physio-ecological responses of different *Elymus dahuricus* and *Elymus sibiricus* to soil drought stress

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Key words: *Elymus* L., drought stress, physio-ecological responses, seeding stage, evaluation

Introduction *Elymus dahuricus* Turcz. and *Elymus sibiricus* L. are important grasses and are of great value for establishing perennial artificial grasslands and ecosystem restoration. However, most parts of north China are drought and rainless, water stress is the most common factor that limited plant growth (Liu et al., 1994). The goal of this study was to study the change of morphological characters and physiological and biochemical characters of every *Elymus dahuricus* and *Elymus sibiricus* materials from different habitats under different drought stress in seeding stage.

Materials and methods A total of 10 materials (wild) of *Elymus dahuricus* (SXD1, XJD2, NMD3, NMD4, GSD5 and NMD6) and *Elymus sibiricus* (GSS1, JLS2, SXS3 and NMS4) were collected from 5 different regions of China (Inner Mongolia, Xinjiang, Shanxi, Jilin, Gansu). The methods of potted plant and continue drought were adopted in the Taipusiqi Experiment Base of Grassland Research Institute of CAAS in July, 2007. Seedlings were maintained in one well watered (Control) and two different water deficit conditions. Leaf height, leaf area, leaf water potential, membrane permeability, free proline content, SOD and POD content were measured during a set of stresses.

Results Different origin materials held different drought resistant and their own physiological and biochemical mechanisms. Under water stress, the plant height and the specific leaf area of all materials decreased. The relative water content of leaves in 10 materials fell with aggravation of drought resistance and also had significant correlation ($r=0.8103$, p) with it. The membrane permeability had negative correlation ($r=-0.5388$) with drought resistance. Proline content, SOD and POD content all increased along with the increasing of drought degree. These did consistent with the results made in other species by previous researchers (Zhao Yuguang, George C.J. Fernandez, et al., 1994; Bingru Huang, Hongwen Gao, 2000). The value of jurisdiction function of SXD1, XJD2, NMD3, NMD4, GSD5, GSS1 and JLS2 is 0.507, 0.497, 0.465, 0.401, 0.457, 0.539 and 0.598 among 0.4-0.7 belong to middle drought resistance respectively; NMD6 and SXS3 is 0.334 and 0.353 among 0.3-0.4 belong to lower drought resistance; NMS4 is 0.284, less than 0.3 is relatively bad drought resistance.

Conclusions Plant drought-resistant is a complex quantitative trait controlled by more genes. It is important to adopt comprehensive criteria for drought-resistant evaluation. Adopting fuzzy to under the jurisdiction of function law, we came to a conclusion that JLS2, GSS1, SXD1, XJD2, GSD5, NMD3, NMD4 are relatively high drought resistance; NMD6 and SXS3 are moderate resistance; while NMS4 is the low resistant one.

References

- Zuqi Liu, Shicheng Zhang. Plant Resistance Physiology 1994. Beijing: China Academic Press. 121-124.
Yuguang Zhao, George C.J. Fernandez, et al., 1994. Selection Criteria for drought-resistance breeding in turf grass *J. Amer. Soc. Hort. Sci.*, 119(6):1317-1324.