Genetic Analysis of Genotype X Environment Interaction for Yield Components of *E. canadensis*, *E. sibiricus* and Their Hybrids

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Introduction *E. canadensis* and *E. sibiricus* are plants whose combining ability and synthesis performance are all good. In this paper, genetic effect of fresh grass yield components of *E. canadensis*, *E. sibiricus* and their hybrids (F_1 and F_2) were studied in two different environments. It was known how the relative size of kinds of genetic diversity and genotype×environment interactions affect fresh grass yield. All these provided the theory basis for selection of traits in forage breeding for yield and the heterosis utilization of forage.

Materials and methods Single plants of *E. canadensis* (maternal plant), *E. sibiricus* (male parent) and their hybrids (F_1 and F_2) were transplanted at spacing of 60 cm×60 cm in the field of experimental farm at DaTai and HaiLiuTu, in huhhot Inner Mongolia, China, in 2006 respectively. There were 15 plants in each block with three replications in each environment. There were 4 seedlings per hole. During ripening, 5 samples were gotten at random from each block of parents and their hybrids. Quantitative traits, i.e, height, no. of tiller, no. of internodes, stem diameter and yield of grass, were measured with three replication for each sample of parents, F_1s and F_2s. All the data were analyzed by QTModel which was mixed model of genotype×environment about complex quantitative traits (Zhu J. 2004).

Results and discussion Many yield components were affected by not only additive gene action (V_A) and dominant gene action (V_D) but also by genotype×environment interactions (Table 1). Their importance differed for different yield components, such as no. of tiller, no. of internodes and diameter of stem that were mainly affected by additive gene action (61%, 62% and 44%, respectively), no. of tiller, no. of internode and grass yield were also affected by dominant gene action×environment interactions (V_{DE}), especially yield of grass (81%). Although plant height was mainly affected by additive gene action×environment interactions (V_{AE}-56%).

Table 1 *Estimated proportions of variance component for yield components.*

Parameter	Height	No. of tiller	No. of internode	Stem diameter	Grass yield
V_A/V_P	0.00	0.61*	0.62*	0.44*	0.00
V_D/V_P	0.00	0.00	0.05	0.02	0.12
V_{AE}/V_P	0.13	0.00	0.00	0.01	0.00
V_{DE}/V_P	0.56*	0.03	0.25	0.00	0.81*
Ve/V_P	0.31	0.36	0.08	0.53*	0.07

Conclusions If phenotypic variance of a trait was desided by genetic effects, we may improve the genetic compositions of inbreeding populations by means of genetics and breeding (Zhu, 1992). No. of tiller, no. of internode and diameter of stem can be selected in early generation, but plant height and grass yield were used by tapping Heterosis potential.

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