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GENETIC VARIATION FOR CA, MG AND K CONCENTRATIONS IN AGROPYRONS AND PSATHYROSTACHYS

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OBJECTIVES

We had three goals in this series of studies. We wished to 1) determine the extent of genetic variability and broad sense heritability for Ca, Mg and K concentrations in these forage grasses, 2) obtain an estimate of the relative magnitude of genotype x environment interaction, and 3) develop a breeding and selection program for lines having reduced tetany potential (RTP) indices.

METHODS

The genetic material included three populations of crested wheatgrass (Agropyron spp.) and one population of Russian wildrye (Psathyrostachys juncea). Ten lines of crested wheatgrass representative of the genetic diversity among Agropyron spp. were planted in replicated nurseries at Lincoln and Alliance, Nebraska. Twelve lines of A. desertorum, 16 lines of hybrid A. desertorum x A. cristatum, and 45 lines of Russian wildrye were planted in replicated nurseries at Logan, Utah. Forage was harvested twice annually for two years. Samples were analyzed for Ca and Mg by atomic absorption and K by flame emission.

RESULTS/DISCUSSION

Significant genetic variation in the measured and calculated traits occurred among lines in each of the populations. Main effects of lines, harvest times and years were generally significant ($P<.05$). Elemental concentrations declined as expected with increasing physiological maturity. Year to year differences were also expected because of differences in temperature and soil moisture. The significant year to year differences were corroborated by the variation also noted in the occurrence of grass tetany.

Location x line interactions in the Nebraska study were not significant, except for K and K/(Ca+Mg). These lines would be expected to rank similarly in different environments for Ca and Mg concentrations. In the 3 Utah populations, line x year, line x harvest and harvest x year were sometimes significant ($P<.05$), but the mean squares were generally much smaller than those for the main effects.

Broad-sense heritability values ranged from 0.36 to over 0.50 and the range in values for each trait was sufficiently wide, that progress would be expected in a breeding and selection program for reducing the tetany potential in any of these populations. The very high K levels observed in Russian wildrye present a high risk to animals grazing this species. Incorporating the RTP as one of the traits in the early phases of Russian wildrye selection would be desirable.

RELATED LITERATURE
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