FORAGE YIELD COMBINING ABILITY AND HYBRID PERFORMANCE IN ALFALFA CORE COLLECTION ACCESSIONS

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Genetic combining ability and heterosis for forage yield in alfalfa were investigated in two independent diallel sets. Each diallel involved nine alfalfa germplasms previously identified as possessing high forage yield potential from among 200 accessions of the USDA-ARS National Plant Germplasm System core collection. Set I involved five moderately fall dormant germplasms that originated from Turkey, South Africa, Greece, Afghanistan, Israel, and the U.S.A., and three fall non-dormant germplasms that originated from Uzbekistan, Mexico, and Morocco. Set II involved six moderately fall dormant and/or non-dormant germplasms that originated from Peru, Australia, Turkey, and Uzbekistan, and three very fall dormant introductions from Argentina and the U.S.A. The parents and their 36 F_1 hybrids for each diallel set were evaluated for forage yield near Las Cruces, NM, during 2003 and 2004. Results from both diallels demonstrated that general combining ability (GCA) and specific combining ability (SCA) were significant in their contribution to forage yield of alfalfa hybrids. The magnitudes of GCA effects were less than 6% of the mean performance of the parents. Five hybrids from set I and three hybrids from set II demonstrated significant positive SCA effects, and the SCA effects were larger compared to GCA effects. Seven of the eight hybrids demonstrating positive SCA effects were among the hybrids that numerically outperformed six commercial checks. Mid-parent heterosis (MPH) ranged from -17% to 17% in set I, and from 0% to 32% in set II. Significant amounts of high-parent heterosis (HPH) in hybrids between accessions from Australia and Argentina indicated that these two sources might represent different heterotic groups. All the hybrids that outperformed the commercial checks, involved parents that possessed different fall dormancy responses and at least one parent that had high *per se* performance. The results indicate that a greater proportion of high yielding hybrids may be obtained by crossing between high yielding germplasms that possess different fall dormancy responses.