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Heritability and genetic correlations of forage yield traits in alfalfa (*Medicago sativa* L.) for central valley of Mexico

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Introduction Alfalfa, originally from Iran and the Trans-Caucasian region of Asia, is now found worldwide, because of its ability to survive a wide range of temperate climates and varying moisture levels and soil types. Highland Central Valley of Mexico includes the state of Hidalgo, Mexico, Puebla, Queretaro and Tlaxcala, and alfalfa is the fifth agro-economical crop, widely used for dairy and beef cattle and sheep feeding under harvesting or grazing conditions. However, no cultivars evaluation and breeding program exists for this region, and our task is to screen and genetically characterize novel germplasm highly adapted, persistent and yielder to Highland Central Valley of Mexico (Alarcon-Zuniga, 2007).

Material and methods 65 alfalfa cultivars were sown in 4.5x1m plots with three replications in a rectangular lattice design on October, 2005. Irrigation, weed control and 60-80-40 annual fertilization were provided. Nine harvests from April 2006 to March 2007 were done and the ten high yield cultivars are reported herein. Half sib families were derived of the ten high yield cultivars, transplanted in June 2007 in a 10x15 rectangular lattice design with four replications, and three harvests done in the first year of establishment to estimate heritability and genetic correlations among yield traits.

Results Table 1 illustrates the forage yield traits means of the ten most prominent alfalfa cultivars. There was significant variation among cultivars, with cvs commonly used in Mexico were intermediate to low yield. All cvs showed same yield pattern through the nine harvests, with high forage yield during summer and low in winter (Figure 1).

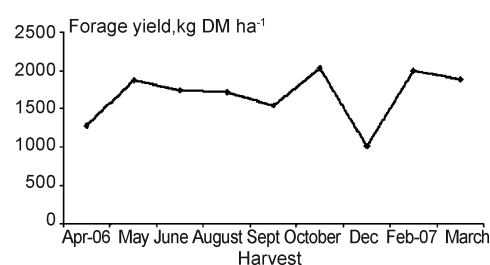


Figure 1 Forage yield per harvest of 65 alfalfa cultivars in Central Valley of Mexico, Chapingo, Mex.

Table 1 Dry matter per plant (DMP), forage yield per harvest (DM ha) and plant height of the ten high yield cultivars in nine harvest and broad sense heritability.

	DMP, g	DM ha Kg ha ⁻¹	Plant Height	cm
Florida 77	58.9	2116	African Population	60
Tshyuwakaba	58.7	2175	Indian Population	58
Indian Population	53.3	2161	Tshyuwakaba	56
Hisawakaba	48.4	2324	Tanverde cv.1	53
African Population	44.4	2925	Peruvian Population	52
Peruvian Population	44.2	1894	Hairy Peruvian	52
Polesana	42.2	2287	INIA-76	52
San Miguelito cv.1	42.2	2395	VIR 8123	52
Hairy Peruvian	40.8	2161	Macate 2	52
Mediterranea	40.3	1807	Hisawakaba	51
Mean	47.3	2137		54
Heritability	0.31	0.38		0.45

Broad sense heritability on an HS family basis of DMP, DM ha and plant height were from intermediate to high. Phenotypic and genetic correlations of half sib families for all ten high yield cultivars between plant height and forage yield were 0.53 and 0.411 ($p > 0.001$), and were consistent for every harvest, indicating that taller plants are more productive. As expected, dry matter per plant and forage yield were genetically correlated (0.71**). These results indicate that selection of variables for the productivity could enable breeders to increase forage yield of alfalfa, both within and among populations.

Conclusions Alfalfa cultivars screening for forage yield components showed a wide variability to adaptation to Central Valley of Mexico, with cvs. African and Indian Populations, Tshyuwakaba and INIA-76 to be used as parental genotypes.

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