

## QUANTITATIVE GENETIC COMPONENTS OF ALFALFA POPULATIONS IN THE MEZQUITAL VALLEY. I AGRONOMIC AND MORPHOLOGICAL TRAITS

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Alfalfa is widely cultivated in Central Valley of Mexico under diverse agronomic practices, also including with wastewater irrigation from industries and urban areas. The Mezquital Valley in Hidalgo State cultivates around 46K ha of alfalfa under waste water irrigation, and no breeding program is developed for such crop production system. With this attempt, UACH-alfalfa started since 2005 to screen 331 genotypes with the main task to identify breeding germplasm and develop novel populations adapted to the Mezquital Valley alfalfa production system ([www.chapingo.maizedb/ALFALFA](http://www.chapingo.maizedb/ALFALFA)). The results of agronomic and morphological traits in alfalfa populations at 21 harvests (2006-2009) in three locations, showed that accessions Atlixsco, Mediterranea, Jupiter, Natsuwakaba, San Miguelito, and UC1465, were the most adapted, forage productive and persistent under such production system (13,5 to 15,7 ton DM/ha). From these alfalfa populations, 23 half-sib families per population were developed to determinate genetic components and GxE interactions. Half sib families (n=10) were transplanted in October 2008 in a 10x15 rectangular lattice design with three reps and two locations, and ten harvests done to estimate heritability and genetic correlations among yield traits. Eventhough has been reported no differences among big set of *M. sativa* spp *sativa* genotypes, there was significant variation among alfalfa genotypes, with cultivars commonly used in the Mezquital Valley were intermediate to low forage yield (7-11 tonDM/ha). Narrow sense heritability on an HS family basis of yield, stem numbers, leaf/stem biomass, leaf/stem ratio and seed yield, were from 0.09 to 0.21, indicating an GxE interaction for these traits. Seed yield was highly depending on the genotype, being Jupiter, San Miguelito, CintaLarga and UACH-San José populations the most productive; however additive genetic variance within families was higher than dominance variance indicating seed yield can be improved by GRS. Flowering time, plant height, root biomass, and stem branching, were from intermediate to high heritability. Data are presented about the response to selection and genetic gains using the among and within Half-Sib family selections methods. These results indicate that selection of variables for the productivity could enable breeders to increase forage and seed yield of alfalfa, using the within and among half-sib families methods using different populations.

1.- Casler M, and C. Brummer. 2008 Theoretical expected genetic gains for among-and-within-family selection methods in perennial forage crops. *Crop Sci.* 48:890-902.