

INFLUENCE OF FLORAL TRAITS ON ALFALFA SEED PRODUCTION

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Objective 1. Evaluate selection gain of easy to trip and hard to trip populations under greenhouse conditions (1991).

Progress - Data collection from greenhouse experiments to determine selection progress for ease of tripping has been completed. Data analysis is in progress. Preliminary analysis of 'CUF101' derived easy- and hard-to-trip populations, clearly shows these populations are different in ease of tripping. Analysis of 'Saranac' derived populations and comparison of actual and predicted progress will be complete by the end of 1991.

Objective 2. Continue studies to determine the effect of ease of tripping on the rate of selfing of alfalfa florets (1989-1992).

Progress - The second year of data collection is complete. Data analysis are proceeding. First year data show that altering ease-of-tripping has no influence on rate of self pollination. This is very exciting. We had been concerned that easy tripping would increase selfing. The increase in selfing would then result in reduced forage productivity of subsequent plantings.

Objective 3. Investigate how ease of tripping influences pollen dispersal (1990-1992).

Progress - All seed has been produced and analyses are proceeding.

Objective 4. Determine the inheritance of ease-of-tripping.

Progress - The second year of data has been collected to determine the inheritance of ease-of-tripping in CUF101. Data analysis is complete. Ease-of-tripping is controlled by both additive and nonadditive genetic variance. Additive genetic variance is substantially larger than nonadditive variance. Genotype X environment interactions were not significant. The latter results are in complete agreement with our earlier experiments (Crop Science, 1990, pages 270-275). The previous results demonstrated that environment had very little influence on ease-of-tripping and that any affect of environment was substantially less than genetic differences.

Objective 5. Conduct a comprehensive analysis of the aroma producing compounds (APC's) associated with the alfalfa flower, pollen, and nectar (1991-1992).

Progress - This study was established in the fall of 1991. Data collection will begin in the summer of 1992.

Objective 6. Complete determination of the genetic control of specific alfalfa floral APC's (1991).

Progress - Data collection for the second year of the floral volatiles inheritance study is proceeding. Samples stored at -70°C still need to be analyzed. We anticipate that these data will be complete by January 1992 and that data analysis will be complete by June 1992. This will permit development of genetically determined selection criteria for altering floral aroma to enhance honey bee activity.

Objective 7. Initiate studies to develop and evaluate germplasm with a floral aroma suited to visitation by honey bees (1991) (estimated completion of study 2000).

Progress - Seed of easy- and hard-to-trip populations was increased in isolation under honey bee pollination. We expect to submit data regarding the performance of these germplasm pools to the Germplasm Release Committee of the Department of Agronomy and Range Science by December 1991. These materials should be approved for release and available for distribution by June 1992. Seed to be used in floral aroma breeding populations was produced in 1991. Half-sib families representing this population will be established in the spring of 1992.

Objective 8.(new) Experiments to test honey bee response to combinations of aroma producing compounds have not been completed. These experiments were attempted in September and October 1991, but lack of honey bee activity prevented successful completion. The lack of activity probably can be attributed to a composite influence of the time of year and virus disease in the test honey bee colonies. We will repeat these experiments in the spring of 1992.

Research on the Lygus bug¹

Objective 1. - A literature review of published information on the biology of Lygus bugs is in progress. This search has lead to one very encouraging set of information. That is research dating back several years which demonstrates the presence of a sex attractant produced by reproductively mature female Lygus bugs. This attractant is perceived by the antennae of male Lygus bugs. Our GC/EAD system can be used to further our knowledge of this sex attractant. We expect that the development of this new information will lead to the development of practical control measures for the Lygus bug that can be applied to alfalfa and all other susceptible crop species. A post-doctoral student (Ph.D. in Entomology) will be joining my laboratory in late November to work on this research. Continuation of this research will be dependent on maintaining and possibly increasing our existing funding.

Objective 2. - Prior to this past summer all screening studies using the "small cage" technique were conducted without any attempt to control factors such as Lygus age, Lygus sex, and flower age. The proper duration for alfalfa plants to be exposed to the Lygus bugs during screening also had not been addressed. Standardization studies were conducted at the Desert Agriculture Research Center (formerly the Imperial Valley Agriculture Research Center) for the small cage screening technique. These studies are complete and the data are being analyzed. Results will be used to refine the procedures used in screening using the "small cage" technique. I am still skeptical about the potential of the small cage technique for identifying alfalfa plants with tolerance to Lygus bugs. However, the refinements we will be making should increase the potential of the technique.

¹This research was not funded by the ASPRB during 1991

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Seed Crop Notes is produced by
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