well as to local lines, as examples. To the R line(s) various genes or chromosome segments would be added by backcrossing, for example; Transec for leaf rust and mildew resistance. Transec and genes for stem rust resistance also would be part of the input to the A line. The consequent homozygosity of genes at certain loci in the F1 must be considered a necessary genetic load for the population to carry and any reduction in heterosis would be more than compensated by the added protection against diseases.

Two restrictions affecting the commercial hybrid crop must be imposed in this scheme: 1) a relatively narrow range of maturity to facilitate harvesting and seed handling and 2) attention to quality of the harvested crop to meet accepted standards. Concerning maturity, a range of 7 to 10 days from first ripe to all ripe might be feasible. Concerning quality, the intended use would influence the range and degree of heterogeneity permissible in the harvested seeds; designing a broadbase hybrid to meet specific quality requirements (e.g., milling and baking) would logically involve the analysis of the products of experimental hybrids made up using combinations of different genotypes in the B line composite or in the single (or seed blend of two or more) R line(s); wheats for feed or other purposes might have less stringent design requirements.

A word of explanation for the absence of visual population uniformity as a requirement for the commercial crop: in a 1952 paper (2) I specified phenotypic uniformity as a requisite feature of multiline varieties. I have changed my opinion. Observation and recent investigation (3, 4, 5) suggest that phenotypic non-uniformity of individuals in a population can add significantly to the productive yield potential through over-compensatory responses in competitive genotype-environment interactions, where other genotypes are considered as a part of the environment. Such bonus situations may be erroneously credited to heterosis in hybrid wheat; rather, they are competitive responses attributable to population structure and, in fact, cannot occur in the purest form of heterosis, the single cross, where unvarying uniformity precludes individual phenotypical differences in such things as height, maturity, tillering, leaf angle, awn or head type and so forth. There are several ways of insuring crop uniformity but little attention has been given to design problems associated with productive nonuniformity; the formation of the latter type of population is a principal objective of this method. If a significant productivity advantage can be gained from phenotypic nonuniformity it is time to educate growers to judge such nonpure line varieties on merit.


HERITABILITY OF ‘EASE OF TRIPPING’ IN ALFALFA AND ITS POSSIBLE RELATION TO SEED SETTING

Thad H. Busbice and C. P. Wilsie

Ease of tripping of alfalfa flowers often has been considered a possible factor in seed setting (1, 2, 4, 7). Pankiw and Bolton (5) suggested that honeybee pollination might be improved if the flowers had an exposed stigma, or a vestigial standard petal with delayed self-tripping. One exposed staminate plant was found, by Marcus and Pankiw, to set no seed under field conditions. Further studies of easy tripping, normal-appearing flowers are needed.

An S2 clone, 2412-1-7, from 'Du Puits,' was found to bloom profusely and to possess large racemes of flowers that tripped with very slight pressure. The clone was self-sterile but highly cross-fertile. It was crossed (as a female) with 15 randomly chosen plants from the 'Vernal' variety. Fifteen F1 progenies were established in a space-planted trial in the field with replicates of 5 plants each. Included also, was a sample of plants from Vernal and Du Puits, propagated as clones, were grown for the F1 experiment.

When plants had reached approximately the bloom stage, they were rated for vegetative vigor, stage of flowering, and ease of tripping. Ease of tripping was determined by removing a raceme from the plant, placing it in one hand and tripping flowers with the flat end of a toothpick held in the other hand. A subjective scale of 1 to 10, was given to that raceme. When 10 flowers had been tripped, a subjective scale was used, with 1 being the easiest to trip and 10 being the most difficult.

Self-fertility of the F1 progenies and of the variety Vernal was determined in the field. Ten flowers per plant were harvested (5 flowers on each of 2 racemes), after each plant was harvested, the racemes were bagged and bags remained undisturbed until the plant was mature. Self-fertility of the parents had been determined previously in the greenhouse, but the actual magnitude of self-fertility has not been the same in the field and in the greenhouse, respectively.

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