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Stability Parameters For Pinto Bean Cultivars Grown In The
Cooperative Uniform Nursery in 1977 and 1978

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The response of crop cultivars for such traits as yield of grain, protein content and protein quality characteristics vary when tested over different environments. Such variability may cause the relative ranking of a set of cultivars for a trait to differ from location to location and from year to year.

Eberhart and Russel (Crop Sci. 6:36-40, 1966) suggested that stability of performance may be a genetic trait. They presented a model to be used to calculate parameters that described cultivar stability. These parameters have since been reported for cultivars of a number of crops. In this paper stability parameters are reported for pinto bean cultivars for the following traits: yield of beans, percent protein and available methionine per gram protein. Attention to these protein-quality attributes was justified because beans were an important source of protein for many people. Available methionine, was considered because it was an important indicator of the capacity of bean protein to yield the essential amino acids upon hydrolysis in the digestive tract of the consuming individual.

The data was collected from the 1977 and 1978 Cooperative Uniform Dry Bean Nurseries. We used the data for the yield reported by the cooperators who furnished us samples for protein analysis. Cooperators were asked to send us 100 grams of beans from each replication of pinto cultivars included in the yield nursery. We thank the cooperators for their assistance.

Protein content was measured by the Udy procedure. Available methionine was assayed with Streptococcus zymogenes after digesting the meal with papain, a protease.

The cultivars for which we had complete data were Olathe (formerly 63439), 3385, U. I. 114, U. I. 111 and NW 410 (formerly 6R410). The locations included in the study were Fort Collins, and Grand Junction, Colorado; Kimberly, Idaho; Sidney, Montana; Othello, Washington; and Aurora, New York.

An environmental index calculated for each location was the deviation of the mean of the measured trait for all cultivars at a particular environment from the grand mean for that trait for the experiment. The stability parameters were the regression coefficient that measures the response of each variety to the varying environments as expressed in the environmental indices and the squared deviation from regression for each cultivar over all environments.

A cultivar was considered stable if the regression coefficient had a value not significantly different from one and the squared deviation was not significantly different from zero.

Regression coefficients for the yield data were found to be not significantly different from one for all the cultivars for the two years, 1977 and 1978. Thus, each cultivar responded to increasingly productive environments. Only Olathe and U.I. 111 however, had squared deviations that were not significantly different from zero. Thus, Olathe and U.I. 111 met both criteria for yield stability.

No cultivar was found to be stable for the trait percent protein. Although Olathe, 3385 and U.I. 111 had regression coefficients not significantly different from one, U.I. 114 was the only cultivar with squared deviations not significantly different from zero. The genotype-environment response for the trait percent protein was quite diverse in this sample of cultivars. An effort should be made by breeders to select genotypes more stable across all environments for this trait.

All cultivars were stable for the third characteristic available methionine per gram protein.

An interesting observation on the inheritance of the stability parameters for yield was made by examining the cultivars Olathe and 3385. Olathe was found to be stable and 3385 was found to be not stable. However, 3385 and Olathe had a common parent. In one case, the common parent was crossed on U.I. 111 to produce 3385 and in the other case on B23 red kidney to produce Olathe. Since U.I. 111 was found to be a stable cultivar, a study of the inheritance of stability for yield might be a fruitful research area.

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Survival of Pseudomonas phaseolicola And Xanthomonas
phaseoli In A Stirred Settling Chamber

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In a stirred settling chamber, we evaluated survival of airborne Pseudomonas phaseolicola, the halo blight organism, and Xanthomonas phaseoli, the common blight organism, at various relative humidities. The organisms were made airborne with a Wells-type