three yield components in this cross. The three yield components are number of pods per plant, number of seeds per pod and mean seed weight. If one yield component was found to be more highly heritable than total seed yield itself, and if a high correlation coefficient existed between these traits, it might be possible to increase total seed yield by selecting one particular component.

In 1966, 70 plants were selected at random from the (219 plants) F_2 G.N. 1140 x PI 165078. Also, the top 5% of this F_2 was selected separately for total seed yield, and each of the three yield components. These populations were grown in replicated experiments in 1967. Heritability estimates for yield and components of yield was calculated by regression of F_3 progeny means (1967) on individual F_2 plant values (1966). Low heritability estimates were obtained for total yield and each component of yield and no yield improvement was realized through selection. No progress was achieved through selection because of the large environmental effect on the expression of these traits making it difficult to identify genetically superior individuals, and also the additive genetic variance was probably low in this population. It is suggested that bulk population breeding would be more efficient and productive breeding procedure in selecting for higher yields in populations derived from this cross than the pedigree method. Physiological factors which were found to be associated with high yield by other workers may not be useful in the identification of genotypically superior yielding segregates in the field because these traits would be quantitatively inherited like yield components and subject to large variations due to environment. It would seem more desirable to identify varieties which possess one or more of these physiological factors and then to intercross these types in order to possibly obtain some favorable gene recombinations for these different yield factors. A bulk population breeding system could then be adopted as mentioned previously.

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Breeding Behavior of a Variegated Mutant in Green Beans

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Some plant species possessing variegated foliage are desirable for ornamental purposes. However, in crop plants some types of variegation cause a stunting and a distortion of growth. In some cases, it has been a difficult problem to eliminate this rogue from seed stocks.

Different types have been reported by several workers. Coyne (Crop Sci. 6, 1966 and J. Hered. 58, 1967) found variegated segregates in some P. vulgaris crosses. The development of these types was explained on a two-element control system, one gene being unstable in the presence of a mutator gene.

The type of variegated mutant reported here was found by Dr. R. Goth (U.S.D.A., Beltsville, Maryland) in Stringless Green Refugee. This mutant was crossed to another variegated type (Crop Sci. 6:307-310). The reciprocal F_1 between the two mutants showed good complementation indicating that these two types were controlled by different genetic systems.

The seedlings of the Stringless Green Refugee mutant appear normal but later-formed trifoliate leaves are severely variegated, crinked and distorted.

Many pods are also curled and distorted. The symptoms simulate a virus infection. It was not possible to infect normal plants with this condition when normal scions were grafted on mutant plants. Virologists inform me that this does not completely rule out that no virus is present because a particular virus with a low transmission rate could be present. The degree of expression of the symptoms was significantly affected by temperature and most plants had normal foliage when grown at 80 F (BIC 1968).

The variegated mutant was crossed reciprocally to a normal foliage variety G.N. 1140 and F_1 and F_2 populations were grown. F_1 plants were normal. Segregation in the F_2 grown in two years indicated monogenic control, with the variegated trait being recessive. Variable expression of this trait was observed under field and greenhouse conditions. Near complete elimination of variegated plants was observed in the F_2 and F_3 derived from the reciprocal crosses of two Bush Blue Lake lines OSU 2065 and 2051 x variegated plants. All F_1 plants were normal. This result may be due to gamete elimination in this particular varietal cross. The results of these different experiments suggest that perhaps a gene, cytoplasmic, environment interaction similar to a serotype mechanism in Paramecium may be involved (Beale, Int. Rev. Cytol., 1957). There is also a similarity between these results and the gene-controlled virus tolerance reaction at different temperature levels in beans (Hubbeling, BIC 1969).

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Effect of Growth Regulators on Time of Flowering of a Photoperiodic Sensitive Bean (Phaseolus vulgaris L.)

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Some photoperiodic sensitive bean varieties are unadapted to areas with short growing seasons because of late flowering and maturity. It would be useful to bean growers if early flowering could be promoted in a late-maturing, short-day bean variety. The three growth regulators, Gibberellin A-7, N-dimethyl amino succinamic acid (B-9) and two chloro-ethyl trimethyl ammonium chloride (CCC) were sprayed on the short-day bean line Great Northern((GN) Nebraska #1 sel. 27 to determine if early flowering could be promoted under long days. The plants were grown in pots on the greenhouse bench at 80 and 70 F day and night, respectively. The plants were grown under photoperiods of 8 and 14.5 hours from time of emergence until maturity. The design used was a split-plot, with two photoperiods as main plots and four treatments as subplots replicated three times. The following sprays were applied when the first trifoliate leaf was emerging: Gibberellin A-7 at 100 ppm, B-9 at 1,500 ppm, and CCC at 500 ppm.

CCC promoted early flowering under the long photoperiod and these CCC-treated plants flowered as early (37 days) as the control plants grown under short days. The control plants under long days flowered in 49 days. CCC did not promote earlier flowering under short-day conditions. Under long and short photoperiods, the B-9 and Gibberellin A-7 sprayed plants flowered at about the same time as the control plants.