

Attempts to Improve Growth Habit in
"Backcross Derived" Blue Lake Bush Beans via Mutants

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To induced mutations for improved habit in bushes derived by backcrossing to the FM-1 Blue Lake pole bean, seed of several massed lines representing 7 or more backcrosses was irradiated with thermal neutrons at Brookhaven National Laboratory in 1961. Also, the mutagen diethyl sulfate was used on non-irradiated seed of one of these lines. All lines possessed Blue Lake pod quality but were rangy and floppy and lacked the sturdy, upright growth habit characteristic of commercial bush bean varieties.

In the R₁ generation seed was massed from approximately 1200 plants from chemical-mutagen treated seed and from more than 20,000 plants from irradiated seed. Approximate population sizes in the R₂ generation were: 16,000 control; 5,000 from chemical-mutagen treatment; and 44,000 from radiation treatment.

Of the improved growth habit types selected in these three populations in the R₂ generation, three of diethyl-sulfate-treated origin appear, on the basis of progeny testing in the greenhouse and field in 1962 and 1963, to possess distinct new habits. The "habit" alteration, however, is associated with pleiotropic effects involving apparent major chlorophyll mutations. One, termed "dark green", has an unusually dark green leaf, with reduced plant size, pod size, and pod set.

Another mutant, termed "silver" results, under bright sunshine of summer, in bleached appearance of leaves and greatly reduced growth, yield, and pod size. Shading of "silver" results in more vigorous growth. In the greenhouse, under greatly reduced light of the winter months, "silver" is not noticeable. Stability of the mutant and our ability to increase seed of it requires further exploration. A somewhat similar but less marked "silver" appearance of leaves has been noted, in our summer climate, in certain derivatives of the Phaseolus lunatus - Phaseolus coccineus cross originally made by S. Honma.

The third mutant, termed "small leaf" has somewhat smaller leaves than parental Blue Lake derived bush material, and a leaf color which is duller green than that of the parent. This mutant is more productive in the field than the other two mutants, but pods are smaller than those of the parent.

Our experience with diethyl sulfate indicates that it may be relatively effective in producing distinct mutants in Phaseolus vulgaris -- particularly mutants involving chlorophyll. This report is made after limited experience, however, and the ultimate behavioral patterns, as well as possible value of such mutants in breeding work, remain for the future.

Total flux of thermal neutrons used for the bean seed irradiation ranged from 6.70×10^{12} to 7.07×10^{12} . Plants were distinctly weakened, but most of them survived, after delay in germination and early seedling growth. The authors are indebted to Dr. S. Shapiro and Dr. Jerome P. Miksche of Brookhaven laboratory for irradiation of the seed and information on flux data. (Dr. Shapiro is now at University of Oregon, Eugene, Oregon.)

Information on use of diethyl sulfate for bean seed is given in another note in this report.

NOTICE TO SEEDSMEN AND COLLABORATORS
OF THE RELEASE FOR SEED INCREASE OF SNAP BEAN SELECTION B3370

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The Crops Research Division, Agricultural Research Service, United States Department of Agriculture, announces the release for seed increase, pending introduction, of the new snap bean selection B3370, developed at the U.S. Vegetable Breeding Laboratory, Charleston, South Carolina. Snap bean selection B3370 has been widely tested in its present form since 1956. It has been grown in 183 Southern Cooperative Snap Bean Trials. It rated very high in the majority of these trials, ranking first in final score for 4 years and second for 3 years. In several extensive grower trials this bean has yielded well and sold at a premium on the fresh market.

The variety is distinct, with a combination of characters that occur in Wade and Topcrop. It is early, often as much as 5 days earlier than Wade when produced under favorable growing conditions. The seed is purple, with good germination. The pods are round to heart-shape, generally straight, and averaged 5.2 inches in length in all test locations. The color is medium-dark green, darker than Topcrop but not so dark as Wade. The pods are generally smooth when harvested at optimum stage of development; they can be very smooth if harvested earlier or slightly rough if harvested later. This bean is very hardy and produces high yields in some districts where beans are not usually well adapted. This includes certain parts of Oklahoma, Tennessee, Kentucky and Texas. It will grow well on some marginal soils, a characteristic which seems to be associated with its strong root system. The plants in all tests have averaged 15.8 inches in height. The variety is resistant to common bean mosaic, to pod mottle virus, and to New York 15 virus, and has considerable tolerance to powdery mildew. It is highly resistant to several races of rust, but has not been tested against all known races.

B3370 is a concentrated yielder; it has a short picking season, resembling Topcrop in this respect more than Wade. It is well adapted to machine harvest. The pods are located mainly on the branches rather than in the crown. The abscission layer between the peduncle and plant forms early. This is conducive to easy fresh harvest but may cause some loss of dry pods during seed harvest, as has been observed in the West.

Selection B3370 originated from a series of crosses and single plant selections having a long history. Its parentage includes Commodore, Valentine, Logan, Ashley Wax, and Asgrow Stringless Greenpod. The last single plant selection after final cross, was made in 1954.

The initial demand for this bean for home garden, fresh market and processing is expected to be moderate, but should increase gradually for some years. Its unusually wide adaptability, and apparent relatively low fertility requirements suggest that it is well worth testing in areas where soil fertility is relatively low and fertilizer supplies are limited.