(2) Determinate Pole -- plant has long internodes and may terminate at various leaf nodes, reaching a height of from 18" to 48" in the field. It is possible to make an incorrect count of determinate plants if all plants are not allowed to grow at least 4' high in the field.

(3) Indeterminate Poles -- long internodes and indeterminate growth similar to Blue Lake pole.

Although determinate vs. indeterminate growth is probably governed by a single gene and is stable under varying environmental conditions, length of internode and the node at which plants terminate appear to be conditioned by a large number of genes and are modified greatly by environmental conditions.

In taste panels, solidity and smoothness (non-pubescent) of pod have been found to be very characteristic of Blue Lake quality in addition to the distinct flavor and dark green color.

The results from the work concluded indicate that the most efficient breeding method would be (1) to make selections of bush types in the F_2 generation on the basis of taste tests and (2) cross these selections to desirable commercial bush types, select for flavor, color, solidity, and smoothness and backcross to the desirable bush until the desirable combination is obtained. It appears that time would be lost in using a backcross method with Blue Lake pole as the recurrent parent since a desirable bush type growth is much more difficult to isolate than a bush type having the Blue Lake flavor.

Breeding Root Rot Resistant Beans at Cornell

D. H. Wallace and H. M. Munger

Professor R. A. Emerson worked nearly 30 years at Cornell to develop bean varieties with resistance to root rot. Testing for resistance was done in a field which had been thoroughly infested with the causal fungus Fusarium solani f. phaseoli. This field is still being used for root rot studies after having been planted to beans continuously for nearly 40 years. After Dr. Emerson's death in 1947, his strains were evaluated and although their level of resistance was considered high enough to be of real value under field conditions, their horticultural type was not quite good enough to warrant introduction, and resistance was not high enough to justify their use as parents for further crossing.

In 1950, approximately 900 accessions were grown in the field. Further accessions were tested in 1951 and another 500 in 1953. Screening of these selections indicated several lines of Phaseolus coccineus (Scarlet Runner) and N203 a viney, black seeded P. vulgaris to have excellent resistance. N203 was collected from Mexico by Oliver Norvell of the Carnegie Institution of Washington at Stanford, California. It is exceedingly late and viney but has very good resistance as indicated by our tests and the tests of others.

The current breeding program was begun by attempting crosses with some of the resistant P. coccineus lines. The bulk of our current breeding lines trace to a single F_1 plant derived from such a cross. Selections from the F_3 generation were backcrossed to various varieties of P. vulgaris. The progenies from this first backcross to P. vulgaris are currently in the F_7 and F_{10} generation. At a later date N203 was crossed with several commercial varieties. These progenies are currently in the F_4 and F_6 generations.

Evaluation of this material has been complicated by a number of factors, principally the extreme lateness of maturity of the resistant P. coccineus and P. vulgaris (N203). In the segregating progenies there has always been a tendency for the later maturing plants to show the least root rot damage, raising a question as to whether this freedom from root rot is a result of the late maturity or if the lateness is a consequence of or accompanies the resistance. Further complicating this relationship is the fact that plants of segregating generations cannot be evaluated until very near maturity since progeny evaluation requires a supply of seed and the maturing of the seed pods is accompanied by a senescence of the roots making it difficult to obtain root rot ratings.

Earliness of maturity, plant habit, and seed type have all been improved but none of the breeding lines currently available are near commercial acceptability. None of them appear to have as high a level of resistance as the resistant parents and the variability of root rot damage from plant to plant within a line and from location to location within the field for a given line is apparently greater for the derived lines than it is for the resistant and susceptible parental line, even after eight to ten generations of selection.

The current plans for this program are to increase the most resistant lines so that they can be better evaluated in our own plots. We would also hope to obtain enough seed so that they can be evaluated by workers at other experiment stations. Such evaluation would be extremely helpful to the over-all problem of breeding for root rot resistance. We invite all who can possibly do so to grow some of our breeding lines on their root rot plots and thus to better evaluate these lines. We intend to utilize the best of these lines as resistant parents for further crosses to commercial varieties as well as to intercross the best lines, particularly those deriving their resistance from the different sources, in the hope that the level of resistance might be improved. Other breeders are welcome to use them as parents, also.

A New Race of Downy Mildew of Lima Beans

R. E. Wester and Hans Jorgensen

Since the discovery of downy mildew of lima beans caused by Phytophthora phaseoli, Thaxt. by Thaxter in 1889 (1) no new races of this fungus have been identified. However, in October 1958 a new race designated as race "B" was isolated from pods of the U. S. No. 355 lima bean collected in a 20-acre field at the Newkerk Farm of Seabrook Farms, New Jersey. This line had shown high resistance to the fungus collections used in tests during its development.

Breeding for downy mildew resistance in lima beans was started by the U. S. Department of Agriculture in 1948 using a race of the fungus now called "A"