

A New Race of Downy Mildew on Lima Beans

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Downy mildew of lima beans (*Phytophthora phaseoli* Thaxt.) was first described by Thaxter in 1889 (1). This fungus causes a severe pod blight on lima beans, and the species is host-specific.

In 1948 the USDA initiated a program to breed for resistance to this organism. That variants, or races, of the fungus existed was unknown at that time. After an extensive breeding program, the cultivar Thaxter was released in 1959 (4) as resistant to the then widely prevalent race A of the fungus.

A second race of the downy mildew organism, race B (5), was isolated in 1958 from pods of U.S. 355 lima beans. U.S. 355 is a sister line of the race A-resistant Thaxter cultivar. After the discovery of race B, a search for resistance was made in a collection of 125 lines from Central and South America. This search uncovered a resistant red-seeded bush cultivar, Pilyo (P.I. 189403) (2), from Guatemala. The resistance in Pilyo was then incorporated into a baby bush lima cultivar, Dover (3), and its sister line, G 2.

For the past 3 years, race B has been widespread on the Thaxter cultivar in New Jersey, Maryland, and Delaware (6). However, where Dover and G 2 lima beans were grown in the mid-Atlantic States in 1968 and 1969, they proved to be resistant to race B in all trials.

In October 1969 some infected pods of Dover cultivar were found by Vernon Ichisaka of Seabrook Farms Co. These were found on a farm near Elmer, New Jersey, in the same vicinity as that in which race B had been found in 1958. When seedlings of Dover and G 2 were subjected to controlled-environment tests with this newly found strain of downy mildew fungus, these seedlings became severely infected after 5 days at 65-70 F. Control inoculations, under the same conditions with known races A and B, produced no infection on these seedlings, whereas the susceptible

TABLE 1. Differential reactions of some key lima bean cultivars to known races of downy mildew

Cultivar	Race		
	A	B	C
Early Thorogreen	S ^a	S	S
Fordhook 242	S	S	S
Thaxter	R	S	S
Green Fordhook 861	R	S	S
Dover (G 1)	R	R	S
G 2	R	R	S

^a S = Susceptible; R = Resistant.

cultivars Thaxter and Early Thorogreen were 100% infected with both the A and B races (Table 1).

The new race, designated race C, cannot be distinguished from races A and B when cultured on cornmeal agar. Neither can it be detected by its symptomatology on the above-mentioned lima bean varieties. Race C can only be differentiated by variety-specificity. At this time, this varietal sensitivity to races of the fungus appears to be the only reliable criterion for race identification.

The lima bean estimated annual farm income value in the mid-Atlantic States is about \$22 million. The existence of another new race poses a very serious potential threat to the lima bean-growing area in the East. To offset possible disastrous losses to the crop from distribution of a new race, an emergency program should be instigated immediately to find new sources of resistance to race C.

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