

# Root-knot Nematode

## Westan variety of baby limas is highly resistant to the pest

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**Lima beans** are susceptible to the root-knot nematode—a nearly microscopic worm—whose attacks on the roots lead to severe curtailment of yield or to death of the plant.

This pest is particularly serious in the lima producing areas of the San Joaquin Valley where baby lima production was seriously jeopardized for several years.

Partial and temporary relief may be obtained by crop rotation with cereals, or fumigation of the soil. Neither measure is popular with farmers because of the loss of net income involved and resistant varieties are a more satisfactory solution to the problem.

Lima beans are among the most exacting of crops in their climatic requirements. Especially important in the production of dry edible limas is dry weather during the harvest season in the early fall. As a result of proper conditions during the growing season and dry early fall weather, California enjoys a virtually complete climatic monopoly in the production of this crop.

Approximately 1,200,000 bags of baby limas and 900,000 bags of standard limas are produced annually in California making these two market classes of beans the leading ones of the state. Together they account for about one-half of the total dry

bean production in the state of California.

The chief distinguishing characteristic between the two types is seed size. The seed of standard limas is about three times as large as the seed of baby limas.

Standard limas are not tolerant of high temperatures but require an even, warm growing season. Consequently they are limited to a narrow coastal strip, seldom as much as 10 miles wide, extending from Santa Barbara County south to San Diego County.

Baby limas, however, are highly heat resistant and nearly all of the crop is produced in the west side districts of Stanislaus and San Joaquin counties and in Sutter County.

Before 1943 several attempts to incorporate into an agronomically suitable variety the moderate nematode resistance possessed by a noncommercial baby lima obtained from the Hopi Indian Reservation of Arizona were only partly successful. Because of late maturity, shattering, or other undesirable characteristics the varieties produced did not become popular although they did allow production in nematode infested soils.

In 1935 excellent resistance to nematodes was discovered in some limas introduced in Puerto Rico. By 1944 this resistance had been transferred into a

baby lima variety which had acceptable agronomic qualities. This variety was increased in 1944 and 1945 and was released for commercial production in 1946 under the name Westan, a contraction of West Stanislaus, the area where the variety was developed. Westan immediately became a popular variety and it now occupies nearly all nematode infested fields.

A comparison of Westan with the Wilbur variety, for many years the most widely grown baby lima variety is given in the accompanying table:

Wilbur is superior to Westan in nearly every characteristic except nematode resistance. Consequently the Westan variety should not be grown unless the soil is nematode infested.

Both the Wilbur and Westan varieties are certified as superior varieties. When nematodes are not present, Wilbur is superior to any known variety of baby limas and in nematode infested soil Westan has no equal.

When any evidence of nematode is noted in a previously nematode-free field, it is desirable to shift immediately to the Westan variety. This will tend to curtail spread of the nematode.

None of the present varieties of standard limas possesses resistance to nematodes but a backcrossing program is under way to add the resistance of Westan to Ventura, the most widely grown standard lima variety. Similarly, the nematode resistance of Westan is being added to the more important processing types of limas, none of which possesses resistance at present.

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Roots of Westan and Wilbur from adjacent rows in Stanislaus County. Westan, nearly gall free; Wilbur, heavily galled.

	Wilbur	Westan
<b>Maturity</b>	Approximately 100 days	Approximately 105 days
<b>Habit</b>	Small vine	Very slightly more viny than Wilbur.
<b>Seed Quality</b>	Good	Good
<b>Yield</b>	Very consistent even in poor soil and excellent in good soils.	Averages about 9% poorer than Wilbur in the main producing areas when nematode is not present.
<b>Shattering</b>	Does not shatter easily in cutting and windrowing but threshes easily when cured.	More easily shattered than Wilbur during cutting but satisfactory in this character. Threshes easily.
<b>Threshing</b>	Among the most tolerant of limas to threshing damage.	More easily damaged than Wilbur but much less tender than processing varieties or standard limas.
<b>Emergence</b>	Emerges well for a lima under adverse planting conditions, as when cold rain falls immediately after planting.	Less tolerant of poor conditions than Wilbur.
<b>Wireworm Tolerance</b>	Damaged more easily than Westan.	Heavy root system allows more plants to survive attack.
<b>Reaction to Nematode</b>	Susceptible	Highly resistant
<b>Heat Resistance</b>	Excellent	Excellent
<b>Resistance to Root-rotting Organisms</b>	Poor	Poor
<b>Water Damage</b>	Pods set very low in crown of plant leading to damage by late irrigation.	Pods set higher in crown leading to less water damage to pods.