

# New Spinach Immune to Mildew

hybrid variety developed by plant breeding program intended for use where Viroflay is adapted, produces comparable yield

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**Califlay**, a new variety of spinach that is completely immune from downy mildew—blue mold—has been planted in most of the spinach-growing areas of the state during the past two years and growth appears to be satisfactory in all areas.

Epidemics of downy mildew have plagued growers and processors of spinach in California, and virtually all other spinach-growing areas, for many years. The disease—favored by cool moist weather—attacks plants of all ages, checking the growth and causing spots on the leaves. The spots—yellow on top and gray beneath—later on die, producing light brown areas on the leaves. Before marketing or processing, the infected leaves must be removed, which reduces yield and is costly.

Control of the disease by sprays has not been possible because the complete coverage needed on all leaf surfaces is prevented by the dense prostrate growth of spinach. Moreover—even if spraying were feasible—rainy weather would often prohibit the use of spray equipment. Resistance therefore appeared to be the only method of control.

A search for resistance was begun in 1946. Over 40,000 plants from 19 commercial varieties were inoculated without

finding any healthy plants. In 1947, nine lots of wild spinach from Iran, obtained from the U.S. Department of Agriculture, were tested. Two lots—P.I. 140,464 and P.I. 140,467—were found to have a few plants which remained free of downy mildew. These plants—which looked more like a weed than a vegetable—were small, with thin pointed leaves and red petioles. Repeated inoculations showed them to be completely immune from the fungus, and the immunity was found to be inherited as a single dominant gene.

The new variety, Califlay, is the result of crossing P.I. 140,467 to the standard commercial Viroflay variety—the most important in California—and then crossing it to Viroflay four more times. Immune segregates were then allowed to interpollinate—spinach has males and female flowers on separate plants—and in the next generation a search was made for the relatively rare hermaphroditic plants—those with both male and female flowers on the same plant. A number of these were found, and each kept by itself to produce seed. Califlay comes from one of these—C 005-23.

Califlay is intended for use where the Viroflay variety is adapted. Although derived from Viroflay, it has a slightly

darker color, is a little more prostrate, and has center leaves which are somewhat more wrinkled. It produces seed-stalks two to three days earlier than Viroflay. Yield data obtained near Davis and near Salinas revealed no difference in yielding ability between Califlay and Viroflay.

In tests of Califlay made in many places in the United States and also in Holland, no mildew has ever been found. Evidently there are no physiologic differences in the races of the fungus causing the downy mildew, or if there are differences, Califlay is resistant to all of them.

Seed has been released to a number of seed companies for increase. Supplies will be limited in 1957 but will probably be ample thereafter.

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Looking directly downward at mature plant of the standard Viroflay spinach, left, and a mature plant of the immune Califlay spinach, right. Straightedge is a 12" ruler.

