Sulfur and Bayleton compared in control of sugar beet powdery mildew

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Bayleton is seen as a convenient and effective systemic fungicide responsible for increasing yields in sugar beets.

A powdery mildew epiphytotic caused by the fungus *Erysiphe polygoni* D.C. was first reported on sugar beets in the United States from California's Imperial Valley in April, 1974. Since then the disease has occurred every year in the valley.

To control the causal fungus, sulfur dust 98 percent, at the rate of 20 to 30 pounds per acre, is commercially applied once or twice. The first application coincides with the appearance of symptoms and, if disease persists, a second application is made 3 to 4 weeks later. The effectiveness of the dust against powdery mildew in desert areas has been outstanding. Application, however, of sulfur dust close to residential areas and at high wind velocity is objectionable—or not permissible. Depending on severity of infection and time of initial infections, more than one application of sulfur dust may be required for effective protection.

The systemic fungicide Bayleton (Baymeb 6447, 1-(4-chlorophenoxy)-3, 3-dimethyl-(1H-1, 2, 4-triazol-1-yl)-2-butanone) was tested as a spray against sugar beet powdery mildew fungus in the Imperial Valley and proved effective for control *(California Agriculture,* January, 1976). Since then the same chemical has been tested in other parts of the state as seed treatment, as a soil treatment (granular) at planting or 6 weeks later on crowns of 8-week-old beets, and as a spray at first signs of disease and again 4 weeks later. These treatments, except the seed treatment, have generally given good results.

Materials, Methods, Results

Plots, each consisting of a 42-inch-wide bed, 50 feet long, with one plant row per bed, were dusted with either Bayleton 5G (January 26, 1978) or sulfur dust 98 percent (January 26 and June 4, 1978) 1 pound active ingredient and 30 pounds formulation per acre, respectively. A wide-mouth jar with a perforated lid was used for applying the chemicals. After application, leaves of the sulfur-treated plants were gently shaken by hand so that the sulfur would be further spread over the foliage. Similar beds were not treated and served as controls. The crop was 5 months old and the disease symptoms (fungal growth) covered about 12 percent of the foliage at the time of application.

TABLE 1. Control of Sugar Beet Powdery Mildew, 1977-1978

Treatment	Disease Index/Days* 0	35	67
Bayleton 5G (1lb a.i./A) 1/26/78	1.2	0.06[c]	0.05[b]
Sulfur dust 98% (30 lbs/A) 1/26, 6/4/78	1.2	0.7[b]	5.2[a]
Nontreated (CK)	1.2	5.3[a]	5.7[a]

*1=10% foliage infected; 10=100% foliage infected. Significant at 1% level (Duncan's Multiple Range Test).

TABLE 2. Effect of Powdery Mildew on Sugar Beet Production in Imperial Valley, 1977-1978.

Treatment	Root Tons/A	Yield Sugar (%)	Return/A ($)
Bayleton 5G (1 lb a.i./A)	29.3[a]	16.7	610.3
Sulfur dust 98% (30 lbs/A)	28.6[a]	16.8	595.7
Nontreated (CK)	25.0[b*]	16.6	520.7

*1% level L.S.D. = 18.42 (Duncan's Multiple Range Test).

The plots were randomized and treatments were replicated eight times. The plots were harvested on May 4, 1978. Ten roots were taken at random from each plot and analyzed for sugar content by Holly Sugar Company at Brawley.

Sixty-seven days after application in the Bayleton treatment 0.67 percent of the foliage was infected; in the sulfur-treated plots 52 percent of the foliage was infected, and in the nontreated checks 57 percent of the foliage was infected (table 1). With Bayleton treatment 29.3 tons of roots were produced per acre and with sulfur treatment 28.6 tons were produced. The nontreated plots produced 25 tons per acre.

Root yields up

All data were statistically significant. Bayleton and sulfur treatments increased root yield by 17.2 percent and 14.4 percent respectively (tables 1 and 2), but did not increase sugar percentage (average 16.7 percent).

Bayleton gave excellent disease control even though it was used on older plants when the fungus was well established; the chemical was not phytotoxic and exhibited a long residual effect. Bayleton has not been registered for use on sugar beets, but with registration it will be convenient and effective in controlling sugar beet powdery mildew fungus.

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