

Effect of *Phytophthora* spear rot on asparagus yield

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The disease was found in 14 of 15 fields sampled in northern California in 1982

Slime, the term used by asparagus growers to describe a spear rot caused by *Phytophthora* species, was first reported on asparagus in California in 1938. The disease results in water-

soaked, slightly sunken, soft lesions on the spears at, slightly above, or below soil level, which rarely extend into the crown. Under wet conditions, the lesions become slimy because of secondary invasion by saprophytic bacteria. The tissue or bracts around the lesions often appear slightly wilted and sometimes have a light brown discoloration. Spears usually have a crooked appearance with lesions on the inside of the crook; under dry conditions, the whole lesion may become light brown and the spear may finally shrivel up.

Phytophthora often can be isolated from newly formed storage roots that appear white but slightly transparent and water-soaked. Fleshly storage roots of infected plants often appear brown to reddish brown and occasionally are hollow. During winter and spring *Phytophthora* can be isolated from crown tissue, where it is associated with a brown or slightly transparent rot.

No data existed on the effect of *Phytophthora* on asparagus production, and little was known of its distribution in the asparagus production areas of northern California. The results reported here are from work carried out in 1982 and are part of a continuing study on the effect of *Phytophthora* on asparagus production in California.

We established two field trials in the spring of 1982 to assess the effect of *Phytophthora* on yield. At Davis, plots of



R. Lamberts



J. Hall

Mature storage roots of infected plants (at left) often appear brown to reddish brown and sometimes are hollow.

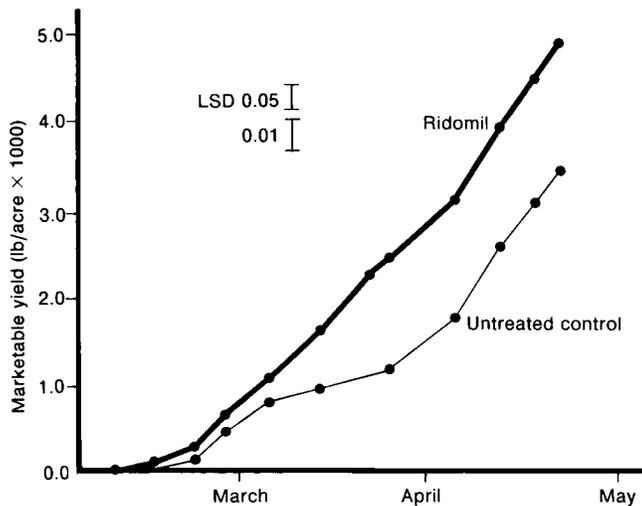


Fig. 1. Ridomil-treated plots had significantly higher cumulative marketable yield of asparagus.

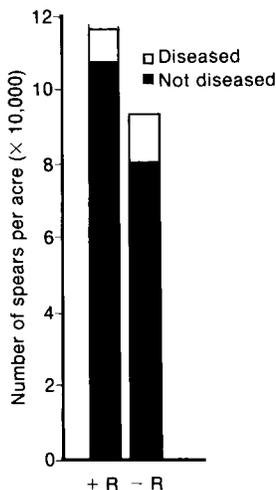


Fig. 2. Number of diseased and marketable spears harvested from plots treated (+R) and not treated (-R).

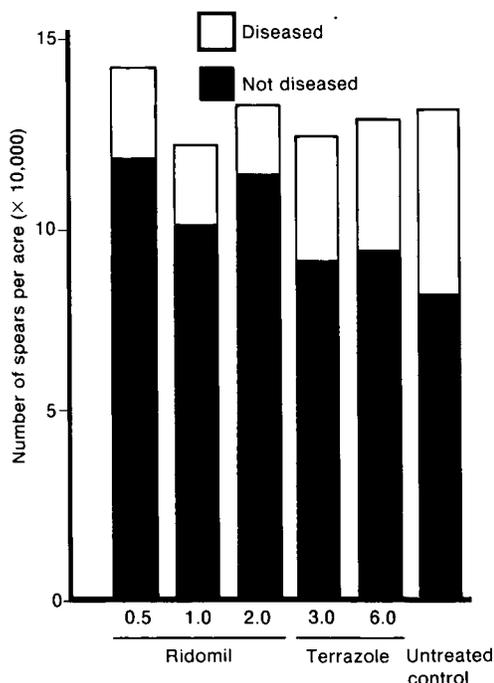


Fig. 3. Ridomil treatments increased marketable spear numbers 22 to 43 percent. Terrazole had no significant effect.

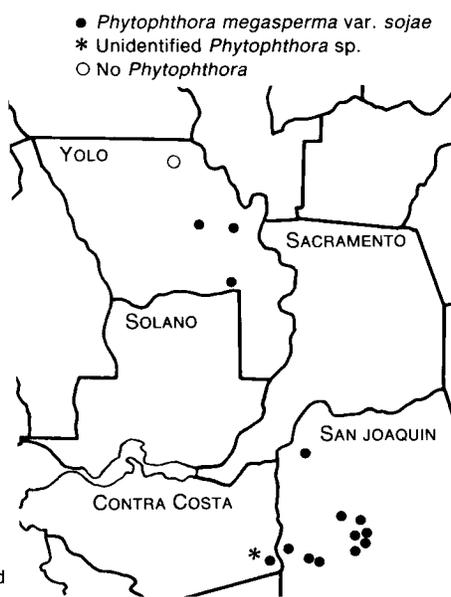


Fig. 4. Distribution of *Phytophthora* spear rot in 15 northern California asparagus fields sampled.

The second trial was in an asparagus field on Coney Island, San Joaquin County. The field had been established in Egbert muck soil from seedling transplants of U.C. 157 during the spring of 1981. *Phytophthora* was isolated from the soil in December 1981 and from asparagus crowns in January 1982. Plots were treated with either Ridomil applied at rates of 0.5, 1, or 2 pounds active ingredient per acre or Terrazole at 3 or 6 pounds active ingredient per acre on February 25, 1982. Rows were 3 feet apart and plants 1 foot in the row. Treatments were applied to each 25-foot-long plot in a band 6 feet wide. Spear numbers were recorded only from the middle row of each plot.

All three rates of Ridomil increased marketable spear numbers by between 22 and 43 percent (fig. 3). Neither Terrazole treatment significantly affected spear numbers.

Phytophthora also affected asparagus seed production during 1982. Seed yields from the 3 acre U.C. 157 foundation seed block at U.C. Davis were approximately 1430 pounds per acre in 1981, but were reduced to approximately 940 pounds per acre in 1982. *Phytophthora* spear rot reduced the number of spears able to develop into fern in 1982 and therefore contributed significantly to the reduced seed yields.

The distribution of *Phytophthora* in asparagus fields in Yolo, San Joaquin, and Contra Costa counties was determined by a field survey during winter and spring, 1982. *Phytophthora* species were isolated from soil or plant tissue in all but one of the 15 fields sampled (fig. 4). Of the 25 isolates collected, 24 were identified as *Phytophthora megasperma* var. *sojae*. One, however, appears to be a new species not previously found on asparagus.

Thus, we found that during the very wet months of March and April 1982, *Phytophthora* had a marked effect on asparagus yield, and it reduced seed production, resulting in a shortage of U.C. 157 seed. After isolating pathogenic species of *Phytophthora* from 14 of 15 fields sampled in northern California, we are continuing work to determine the distribution of this disease in other asparagus production areas. Further studies will evaluate the effect on yield and seek an effective control.

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the cultivar U.C. 157 were inoculated with *Phytophthora*-infested field soil on February 13, 1982, and Ridomil (metalaxyl) was applied a week later at the rate of 1 pound active ingredient per acre. The field had been established in Yolo loam as seedling transplants in the spring of 1978. Rows were about 6 feet apart, and plants were spaced 1 foot apart within the row. Each plot was 47 feet long, and Ridomil was applied in a band 12 feet wide. Yields were taken from the center row of each plot. Plots were harvested for 73 days, starting on March 10.

Ridomil effectively controlled *Phytophthora* spear rot until April 9, when

surface flooding contaminated sprayed plots with runoff from unsprayed plots (fig. 1). Treated plots had significantly higher yields than untreated plots from April 5, until the end of the harvest season. Based on 1982 fresh market prices, this 43 percent higher yield was worth approximately \$884 per acre.

Plots treated with Ridomil produced 33 percent more marketable spears and fewer diseased spears than did untreated plots (fig. 2). Treatment resulted in 24 percent more spears (diseased plus not diseased), which indicates that some spear rot occurred below the soil surface in the untreated plots and was not detected.