. . . and in tomato

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Powdery mildew of tomatoes yellows and sometimes kills mature leaves, usually starting at fruit set. It increases sunburn of fruit through defoliation, can cause softness of fruit, and may weaken plants if severe. It has been suggested that the disease becomes more severe with additional stress to the plant, such as soil compaction, poor water penetration, and heavy fruit load, but in San Diego County, apparently healthy, unstressed plants have become severely diseased.

In California, the fungus (*Leveillula taurica*) that causes the disease was first found in 1978 in Imperial County and then in a staked tomato field in Orange County. The disease was later found in all coastal counties that grow commercial tomatoes and in the San Joaquin and Sacramento valleys. Powdery mildew may be severe in one field and have little effect in adjacent fields. The reason for this variation is uncertain.

We conducted trials in 1982 through 1985 in several locations to evaluate several fungicides for control. Except in the 1982 trial, where single-row plots were 25 feet long, plots were 15 feet long; all were replicated four times. All fungicides were applied with a pressurized sprayer with 4 ounces of Rohm and Haas B-1956 spreader-sticker per 100 gallons of water.

TABLE 1. Effect of foliar fungicide sprays for powdery mildew control on tomato 'Casino Royale', San Diego County, 1982

Material, rate/acre in 100 gal. water	Disease rating Nov. 22*†
Bayleton 50W, 2 oz.	0.6 a
Tilt 3.6 lb./gal, 25 grams active	1.2 a
Wettable sulfur, 5 lb.	4.7 b
Benlate 50W, 8 oz. + Phaltan 50W, 2 lb.	6.7 c
No treatment	8.4 d

* Duncan's multiple range test (DMRT) used at the 1% level. Treatment means followed by the same letter are not significantly different.
† Rated on a scale of 0 to 10: 0 = no symptoms; 10 = severe disease symptoms.

TABLE 2. Effect of foliar fungicide sprays for powdery mildew control on tomato 'Royal Flush', Stanislaus County, 1983

Material, rate/acre in 50 gal. water	Disease rating Oct. 18*†
Tilt 3.6 lb./gal, 25 grams active	0.12 a
Bayleton 50W, 2 oz.	0.25 a
Elanco 228 0.75EC, 9 fl. oz.	0.50 ab
Fungaflor 20EC, 12.8 fl. oz.	1.00 b
Wettable sulfur	2.00 c
No treatment	2.00 c

* DMRT at 5% level.
† Scale of 0 to 10.

TABLE 3. Effect of foliar fungicide sprays for powdery mildew control on tomato 'Royal Flush', Merced County, 1984

Material, rate/acre in 100 gal. water	Disease rating Oct. 19*†
Bayleton 50W, 4 oz.	1.5 a
Bayleton 50W, 2 oz.	1.6 a
Topas 10W, 7 oz.	1.6 a
NuStar 40%, 2.5 fl. oz.	3.4 b
No treatment	4.5 c

* DMRT at 1% level.
† Scale of 0 to 10.

TABLE 4. Effect of foliar fungicide sprays for powdery mildew control on tomato 'Campbell CX8101', Orange County, 1984

Material, rate/acre in 100 gal. water	Disease rating Nov. 19*†
Spotless 25W, 4 oz.	1.8 a
NuStar 40%, 2.5 fl. oz.	1.8 a
Summit 25 W, 4 oz.	1.8 a
Systhane 40W, 2.5 oz.	1.8 a
Bayleton 50W, 2 oz.	2.0 a
Topas 10W, 7 oz.	2.0 a
No treatment	5.8 b

* DMRT at 1% level.
† Scale of 0 to 10.

TABLE 5. Effect of foliar fungicide sprays for powdery mildew control in tomato 'Royal Flush', Merced County, 1985

Material, rate/acre in 100 gal. water	Disease rating Oct. 14*†
Systhane 40W, 2.5 oz.	2.5 a
Summit 25 W, 4 oz.	2.5 a
Topas 10W, 10 oz.	2.7 a
NuStar 40%, 2.5 fl. oz.	3.7 ab
No treatment	5.5 b

* DMRT at 1% level.
† Scale of 0 to 10.

TABLE 6. Effect of foliar fungicide sprays for powdery mildew control in tomato 'Casino Royale', San Diego County, 1985

Material, rate/acre in 100 gal. water	Disease rating Nov. 8*†
Spotless 25W, 4 oz.	0.00 a
Summit 25 W, 4 oz.	0.25 a
Systhane 40W, 2.5 oz.	0.25 a
NuStar 40%, 2.5 fl. oz.	0.50 a
No treatment	5.50 b

* DMRT at 1% level.
† Scale of 0 to 10.

1982 trial

The fall 1982 fungicide trials were conducted in a staked tomato field of the cultivar Casino Royale in San Diego County. Plants were approximately 24 inches tall at the time of the first fungicide application. Treatments in 100 gallons of water per acre were applied on September 13 and 27, October 11 and 25, and November 11.

Bayleton (triadimefon) and Tilt (propiconazole), an unregistered material, gave excellent control throughout the growing season and were significantly better than the other treatments. Wettable sulfur was intermediate in control. The applications of Benlate (benomyl) plus Phaltan (folpet) resulted in significant control of mildew when compared with the untreated plot, but not at a level considered commercially satisfactory.

1983 trial

Cooperative trials in 1983 in Merced and Stanislaus counties tested several fungicides on the tomato cultivar Royal Flush. Fungicides were applied in the equivalent of 50 gallons of water per acre on September 13 and 27. The fungus was producing spores on a few leaves on September 6, and infection was very light at the time of the first fungicide applications.

Neither Merced County plot (one on the west side and one on the east side of the county) developed enough powdery mildew to permit evaluation of fungicide effectiveness. The Stanislaus County plot showed a trend toward control with Tilt, Elanco 228 (trimidal), and Bayleton, but disease incidence was so low that further trials would be necessary to substantiate these results (table 2). The use of Bayleton in the test fields could have resulted in

low fungus inoculum levels, or possibly environmental conditions were unfavorable for the development of the fungus during the test.

A tomato grower adjacent to the Stanislaus County research plot sprayed Bayleton 50W at a rate of 4 ounces on September 10 and 27 using 40 gallons of water per acre. Unsprayed rows were given a disease rating of 4 on October 18, while the Bayleton plots were rated 0.2 with excellent control (scale of 0 to 10).

1984 trials

In 1984, we began a trial on the west side of Merced County with the cultivar Royal Flush, applying fungicides on September 14 and 28 in 100 gallons of water. Powdery mildew lesions were present on the lower leaves at the time of the first fungicide application, when fruit in the plots were 1 to 1.5 inches in diameter.

Bayleton 50W at 2 or 4 ounces and Topas (penconazole) were equally effective for the control of powdery mildew of tomato (table 3). The level of control by NuStar (fusilazol) suggests the rate may have been too low. All fungicide treatments were significantly better than no treatment.

In the same year, we conducted a trial at the University of California South Coast Field Station in Orange County, using the susceptible cultivar Campbell CX8101. Fungicides were applied on October 5, 19, and November 2.

Spotless, NuStar, Summit (triadimenol), Systhane (myclobutanil), Bayleton, and Topas provided excellent control of powdery mildew, and all treatments were significantly better than no treatment (table 4).

1985 trials

One fungicide trial in the fall of 1985 was on the west side of Merced County with the cultivar Royal Flush. Materials were applied on September 10 and 24.

Powdery mildew was prevalent on the lower half of tomato plants but, in the plot area, did not develop to the plant tops by the end of the crop season. Systhane, Summit, and Topas provided significant control of powdery mildew. NuStar gave some control but was not significantly different from no treatment.

Another trial, in San Diego County, used the tomato cultivar Casino Royale in a staked tomato field. Plants were 2 feet high when the first fungicide application was made on September 13. Subsequent sprays were applied on September 27 and October 11 and 25.

Powdery mildew did not appear in the plot until after the second fungicide application. All four fungicides tested effectively controlled powdery mildew of tomato (table 6).

Conclusions

A number of the fungicides tested gave effective control of tomato powdery mildew. Current registration is limited to sulfur and Bayleton (the latter has temporary registration until January 1, 1987). The other fungicides tested are not registered at present for this use in California.

Cultivars differ in their susceptibility to tomato powdery mildew and growers should look for those that are tolerant of the disease.

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Managing powdery mildew and rust on sunflower

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Several farmers in northern California's Brentwood area grow sunflower, primarily for seed production. About 1,000 acres are cultivated each year.

Two fungal diseases are common on sunflower (*Helianthus annuus* L.): rust, caused by *Puccinia helianthi* Schw., and powdery mildew, caused by *Erysiphe cichoracearum* D.C. Rust and mildew, alone or in combination, occur on many crops and can reduce yield considerably.

Field test, 1982

In a field test to evaluate fungicides for rust and mildew control, plots 25 feet long and 36 inches wide, with one plant row per bed, were sprayed with either Bayleton (triadimefon) 50W, Tilt (propiconazole) 3.6E, or mancozeb 80WP on July 7 and 27. Similar, nontreated plots served as controls, and two beds between plots were left nontreated as a buffer. The plants were sprayed to runoff with a pressurized sprayer. The plot design was a randomized complete block with four replications.

At the time of the first application, the plants were free of rust or powdery mildew and were about 3 feet tall. On September 10, 46 days after the second application, 10 leaves taken at random from each plot were evaluated for the presence and severity of disease.

Results

Rust was present in all treated and nontreated plots but was significantly reduced by Tilt (table 1). Visually, but not statistically, Bayleton appeared to be somewhat more effective against powdery mildew than Tilt.

When the plots were reexamined on September 15 (51 days after the last application) the Bayleton-treated plants were still free of powdery mildew. None of the chemicals used caused any apparent damage to the plants.

TABLE 1. Effect of fungicides on powdery mildew and rust of sunflower

Fungicide, rate/100 gal water	Disease rating*	
	Powdery mildew†	Rust‡
Bayleton 50W, 10 oz.	0.0 b	88.7 a
Tilt 3.6E, 10.6 fl. oz.	1.2 b	34.7 b
mancozeb 80WP, 4 lb.	5.0 a	224.5 c
nontreated control	5.5 a	243.2 c

* Evaluated 46 days after last application. Treatments followed by the same letter are not significantly different at the 5% level, Duncan's multiple range test. The statistical analysis for rust was done using the log transformation of the number of pustules.
† Mildew ratings on a scale of 0 to 10, where 1 = 10% foliage infected; 10 = 100% foliage infected.
‡ Average number of rust pustules per leaf.

Powdery mildew on sunflower leaf.

Conclusions

In this field test, both Bayleton and Tilt controlled powdery mildew on sunflower. Tilt controlled rust, but Bayleton did not. Mancozeb 80WP, as used in this test, was not effective against either powdery mildew or rust. None of the fungicides tested is currently registered in California for use on sunflower.

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