

bloom after injection at high concentrations, but these mostly were trees that had suffered severe symptoms prior to treatment. Abnormal growth after injection has not been detrimental to the trees the following year.

### Tank mixing and water quality

Certain types of water have increased injection time considerably, presumably because of impurities. Usually, these waters have been from surface sources and changing to other sources corrected the problem.

Oxytetracycline in water will darken when exposed to air and light. This has not reduced the chemical effectiveness if it is

used within 24 hours, but sunlight will break down the oxytetracycline in a few days. Therefore, limiting the amount of light on the mixed tank solution will increase the solution's life. Material left in the tank for extended times should be disposed of, not used. If oxytetracycline is aerated, oxidation occurs and the material precipitates; therefore, agitation or return bypass flow machines should not be used. Some stirring or mixing is desirable for other materials.

### In re: equipment

No commercial company is manufacturing pressure injection equipment for appli-

cation of liquids at 200 psi. Equipment described in the December 1976 issue of *California Agriculture* can be made with a minimum amount of tools and parts available from hardware, plumbing, and industrial suppliers. The cost of the equipment will vary depending on quality and supply, but should cost approximately \$400 to \$500 (1979 prices). Additional plans, directions, or help may be obtained from the author, Wilbur O. Reil, Pomology, Cooperative Extension, c/o Wickson Hall, University of California, Davis, CA. 95616.

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# Reaction of cauliflower cultivars to downy mildew in Imperial Valley

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**C**auliflower, *Brassica oleracea* L. Var. *botrytis* L., is a minor crop in Imperial Valley; about 200 acres are grown there annually. It is extensively cultivated, however, in several coastal counties including Monterey, Santa Barbara, Ventura, and Alameda.

Cauliflower, like cabbage, broccoli, and other members of the cruciferae family, is susceptible to downy mildew caused by the fungus *Peronospora parasitica*. The disease is prevalent in coastal and cooler parts of California, but in an arid area like the Imperial Valley it is normally sporadic and of minor economic significance.

The first recorded downy mildew epiphytotic on crucifers in Imperial Valley occurred during November and December 1976. During that year it became epiphytotic and attacked all local broccoli, cabbage, and cauliflower fields. Since then it has become endemic, infecting local crucifers every year.

### Materials, Methods, Results

Several cauliflower cultivars were planted during August 1978 at the University of California Agricultural Experiment Station near Holtville. The objective of the test was to study the possible adaptation of some of these cultivars to the desert environment and to obtain yields, quality, maturity, and other information under the same climate.

The plots, 40 inch wide by 60 feet long, were randomized and replicated four times. There were two plant rows per plot (bed), and the plants were thinned to about 12 inches apart.

Downy mildew appeared on commercial crucifer fields during November 1978. The experimental cauliflower plots were also infected, thus presenting an excellent opportunity to assess their reaction to downy mildew.

Fifteen mature leaves were taken at random from each plot on January 15, 1979 and the incidence and severity of downy mildew were recorded (table 1). The severity of the disease on each leaf was based on the extent of necrotic tissue on a scale 0 to 10 (0 = no necrosis, 10 = 100 percent of the leaf necrotic).

Table 1 shows that there was some variability in the reaction of the cultivars to downy mildew infection. Visually, the cultivars Igloo (Keystone), Snowball Y (Ferry Morse), Dok Elgon, and RS-355 (Royal Sluis) appeared to be resistant to the disease (less leaf necrosis), whereas MSU 817 (Homna), White Contess #10 (Sakata), and T-3 (Dessert) were susceptible to downy mildew. The cultivars Igloo and Snowball Y are commonly grown in the Imperial Valley.

The information presented may guide growers in selecting for planting a cauliflower cultivar, particularly in areas with severe downy mildew history. The same in-

formation may also be of value to breeders of cauliflower.

**TABLE 1. Reaction of Cauliflower Cultivars to Downy Mildew in the Imperial Valley (1978-1979).**

Cultivar	Supplier	Disease Index*
MSU 817	Homna	5.70 U
White Contessa #10	Sakata	4.36 V
T-3	Dessert	3.76 VW
T-2	Dessert	2.95 WX
Self Blanche	Harris	2.49 WXY
Suprimax	Royal Sluis	1.91 XYZ
MSU 812	Homna	1.69 XYZ
Meru	Royal Sluis	1.64 XYZ
Snowball Opal	Sluis and Groot	1.59 XYZ
Imperial 10-6	Harris	1.53 XYZ
T-4	Dessert	1.52 XYZ
Snowball Masters	Sluis and Groot	1.45 YZ
Nevada-RZ	Rijk Zwaan	1.33 YZ
Exp. Hyb. 6353	Keystone	1.12 YZ
165-RZ	Rijk Zwaan	1.10 YZ
Snowball 42	Ferry Morse	1.05 YZ
Christmas White	Sakata	0.94 Z
Snowball 76	Ferry Morse	0.84 Z
Strong Osená	Keystone	0.83 Z
Alpha Hormadé	Rijk Zwaan	0.66 Z
RS-355	Royal Sluis	0.63 Z
Dok Elgon	Royal Sluis	0.62 Z
Snowball Y	Ferry Morse	0.51 Z
Igloo	Keystone	0.43 Z

\*Disease index (average of four replications) 1 = 10 percent of foliage necrotic due to downy mildew; 10 = 100 percent of foliage necrotic. Means with different letters are significantly different at the 1 percent level on Duncan's Multiple Range Test. Means with the same letter are not significantly different.

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