

largest number of cows per day (without enlarging the pipeline system) would be the most efficient use of the hot water.

In general, larger dairies use less hot water per cow because more cows are milked in a given size installation. The number of cows in the milking herd can, then, be used as a factor in hot water demand, at the average rate of about .8 gallon per day per cow for a dairy region. This range might be adjusted upward .2 gallon for dairies with considerably fewer than 500 cows, and downward .2 gallon for dairies with considerably more than 500 cows.

The number of milking units in use has no relationship to hours of operation per day or number of cows in herd, and is not a realistic criterion of hot water requirement.

The washed surface area proved to have the strongest correlation to the actual use of hot cleaning water, as common knowledge of cleaning principles would suggest. Unfortunately, determination of the surface area requires considerable on-site measuring and calculation, and is not a quick and convenient energy demand factor.

Hot water use vs.	r	Significance percent
No. of cows: All dairies	.6972	5
: excluding dairy H	.8346	1
No. of milk units: all dairies	.6414	10
Washed surface: all dairies	.6928	5
: excluding dairy H	.9358	.1
Hours milking per day	-.7168	5

Increasing the hours of milking time per day does not increase water use: milking more cows with a given system is therefore a means of water conservation.

### Summary

There are innumerable variations in milking parlor design, size, pipeline configuration, and management. This study was limited to locations where the owner/operator already wanted to know how much hot water was being used and could

be depended upon to assist in collecting reliable data, and where installation of water meters was relatively convenient.

Hot water use in modern milking parlors for cleaning and sanitation of pipeline milking systems with their ancillary equipment and including automatic teat cup detachers and CIP methods would appear to average about .8 gallon per day per cow in herd, on a regional basis.

Any specific milking machine installation appears to be using on a weekly average about .5 gallon of hot water per day per square foot of washed (milk contact) surface.

*William C. Fairbank is Agricultural Engineer, Cooperative Extension, statewide. Richard N. Eide is Farm Advisor, Fresno County; Herbert S. Etchegaray is Farm Advisor, Kings County; Gale G. Gurtle is Farm Advisor, Tulare County. Metering equipment and installation assistance for this energy use study was provided by Pacific Gas and Electric Company, Southern California Edison Company and the water departments of Fresno, Hanford and Visalia and is hereby gratefully acknowledged.*

# Control of Botrytis fruit rot in strawberry

Albert O. Paulus ■ Victor Voth ■ Jerry Nelson ■ Howard Bowen

**B**otrytis fruit rot, commonly known as gray mold rot, is the major fruit rot of southern California strawberries. It is caused by the fungus, *Botrytis cinerea*, which thrives in wet conditions and cool temperatures. Botrytis spores are produced in tremendous quantities and are carried by the wind. The fungus usually attacks through senescent dead petals, stamens, or other delicate plant tissue. Much of the infection of the fruit originates at the stem end, but the fungus is able to penetrate the unbroken skin of the berry. A trial to control botrytis fruit rot with fungicides was initiated in the spring of 1977.

### 1977 trial

The 1977 trial, using Tioga and Tufts strawberries, was conducted at the University of California South Coast Field Station near Santa Ana. Polyethylene mulch was used in all plots. Plots consisted of 12 strawberry plants and were replicated five times. Fungicide spray applications were made with a 2-

gallon Hudson CO<sub>2</sub> sprayer at 30 psi. The plot was mist irrigated 4 times daily to enhance development of Botrytis fruit rot.

Sprays were applied on March 7, 17, and 27 and April 6, 15, and 25. Yield and counts of rotted fruits were taken on March 30 and April 6, 13, 20, and 27. The

Treatment*	Yield† (tons per acre)	No. of rot-affected fruit†
BASF 352 50W, 16 oz	16.26 a	47 a
Captan 50W, 3 lb + benlate 50W, 8 oz	14.81 ab	76 b
Captan 50W, 3 lb	14.27 b	111 b
Thiram 65W, 2 lb	13.92 b	98 b
Boots 7544 25% EC, 20 oz	13.1 b	100 b
Control (No treatment)	11.74 c	156 c

\*Fungicide rates are per 100 gallons of water, and the fungicidal mixtures were applied at 200 gallons per acre.

†Significant at the 5% level. Treatments with the same letter are not significantly different.

Tioga variety results are given in the table.

BASF 352 and captan + Benlate gave the highest yield in the Tioga variety, but only BASF 352 produced the least number of rot-affected fruit. All fungicide treatments were significantly better than the control.

None of the fungicides used on the Tufts variety increased yield over the control, but BASF 352 gave significantly less Botrytis-affected fruit.

BASF 352 is commercially available in Europe for control of Botrytis fruit rot of strawberry and hopefully will become available in the United States. Captan, thiram, and Benlate are currently registered for Botrytis control.

*Albert O. Paulus is Extension Plant Pathologist, and Jerry Nelson is Staff Research Associate, UC Riverside. Victor Voth, Pomologist, and Howard Bowen, Staff Research Associate, Department of Pomology, UC, Davis, are located at the South Coast Field Station, Santa Ana.*