Control of Peach Diseases in Alabama

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FIG. 1 (upper left). Symptoms of brown rot on fruit and twig. FIG. 2 (upper right). Symptoms of scab on fruit and bacterial shot-holing on leaf. FIG. 3 (center). Symptoms of bacterial spot on fruit. FIG. 4 (lower left). Rhizopus rot on fruit. FIG. 5 (lower right). Symptoms of peach leaf curl.


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Control of
PEACH DISEASES
in Alabama

A. J. LATHAM and C. C. CARLTON*

PEACH PRODUCTION in Alabama ranged from 7 to 33 million pounds per year during 1968-74, the years of the study reported here. Value of the crop increased from $3.00 to $9.00 per bushel during the course of the study. Generally, Alabama growers earn about $2 million annually from the crop.

Environmental factors such as frost damage or insufficient chilling contributed to low production during 1973 and 1974 when only 7 and 9 million pounds, respectively, were produced. Otherwise, the crop yield averaged in excess of 20 million pounds. Additional orchard plantings are being made in several areas of the State.

Control of diseases and insects is essential for production and marketing of quality peaches. Availability of new, highly effective pesticides makes possible increased yield and high quality peaches. The investigations reported here were conducted to determine effective fungicides for controlling important peach diseases.

DESCRIPTION OF MAJOR DISEASES

Brown Rot

Brown rot is the most destructive disease of peaches in Alabama. The causal fungus, *Monilinia fructicola*, may invade ripe, non-fungicide protected fruit and cause it to rot in as little as 36 to 48 hours.

Symptoms of brown rot first appear as light brown, circular

* Assistant Professor, Department of Botany and Microbiology, and Superintendent, Chilton Area Horticulture Substation.

spots that enlarge slowly on immature fruit but rapidly on mature fruit. The fruit surface remains smooth and unsunken with rotted tissue becoming softer than uninfected tissue. The rotted area becomes more or less covered with ash colored tufts of *M. fructicola* conidia that break through the skin of the fruit, Figure 1. Damp, rainy weather during the ripening period increases conidial production and disease incidence. Subsequently, the unpicked rotting fruit shrivels and dries into a firm mummy, which may remain on the tree or fall to the ground. The fungus overwinters in mummified peaches and cankers in the tree. About blossom time, conidia produced on the mummies or cankers are carried by breezes to blossoms and twigs where new infections may occur. Conidia produced on the blighted blossoms and twig cankers provide inoculum to infect the fruit. Peaches become more susceptible to infection as they ripen. Injuries to fruit, particularly insect punctures, increase the possibilities for infection *(2,5,6,12,13)*.

Scab

Peach scab, caused by the fungus *Cladosporium carpophilum*, occurs widely in peach-growing areas of Alabama. The unsightly scab blotches on the fruit reduce fruit marketability and sale value. Cracked fruit may become infected and rotted by other fungi, such as *M. fructicola* and *Rhizopus* spp.

Cladosporium carpophilum overwinters in shallow twig lesions. Conidia produced on the lesions are dispersed to young fruit and twigs by windblown rain. Infection occurs after petal-fall, usually about shuck-fall. Scab symptoms appear on maturing fruit as small, greenish-black spots, Figure 2. Lesions may appear somewhat superficial, but on heavily infected fruit the lesions coalesce and the skin of the fruit becomes cracked *(1,2,5,6)*.

Bacterial Spot

Bacterial spot is caused by the bacterium *Xanthomonas pruni*. Losses resulting from this disease are spotted and frequently cracked, unsaleable fruit. Additionally, secondary invading fungi, such as *M. fructicola* and other fungi, may develop in *X. pruni* lesions to rot the fruit. The most important effect may be the devitalization of trees as a result of defoliation, causing reduced fruit quantity and quality.

The bacterium overwinters in twig cankers and bud scales near the twig ends of susceptible cultivars. Bacteria ooze from water-soaked blisters on the cankers about petal-fall, depending on weather conditions. *Xanthomonas pruni* is spread chiefly by windblown rain to infect foliage, fruit, and young twigs. On leaves, circular to angular spots develop that darken and fall out of the leaf giving a shot-hole appearance. Badly infected leaves soon turn yellow and drop from the tree. On the fruit, lesions first appear as small, circular brown spots. As disease develops, the spots become dark and depressed with a water-soaked margin. The most prominent symptoms are the pitting and cracking that occur in areas of coalesced lesions, Figure 3. On twigs, "spring cankers" develop from infections of the previous late summer or fall. These are the cankers responsible for overwintering and spread of *X. pruni*. "Summer cankers" develop on green shoots after foliage infection has become evident *(2,3,4,5,6)*.

Rhizopus Rot

Rhizopus rot, caused by *Rhizopus arrhizus* and *R. stolonifer*, may become a major problem during transportation and storage, depending on temperature and moisture conditions.

Fruit infection occurs during harvest or post-harvest handling of peaches. Injured fruit are most susceptible. *Rhizopus* spores germinate and infect fruit rapidly. In humid environments, watery fluids seep from infected fruit, causing a whisker-like growth of the fungus to cover the fruit, Figure 4 *(2,5,6)*.

Peach Leaf Curl

Leaf curl is caused by the fungus *Taphrina deformans*. Losses from leaf curl are caused by defoliation, which induces failure of the tree to hold and develop fruit.

Spores of *T. deformans* overwinter on twigs and bud scales. In spring, when moisture and temperatures are suitable, spores germinate on swelling buds to infect the young developing leaves and fruit. Diseased leaves are thick, curled, or puckered and appear light green or pink, Figure 5. Infected leaves and fruit drop from the tree early in the season *(2,5,6,10)*.

MATERIALS AND METHODS

The research reported here was conducted at the Chilton Area Horticulture Substation from 1968 through 1974. Fungicides listed by common and chemical names in Table 1 were applied either singly or in combination. Parathion was added to each

TABLE 1. FUNGICIDES EVALUATED FOR PEACH DISEASE CONTROL

Trade or proprietary name	Common name	Chemical name
Benlate 50W	benomyl	1-(butylcarbamyl)-benzimidazole-carbamate
Botran 75W	dicloran	2,6-dichloro-4-nitroaniline
Bravo 75W & 4F	chlorothalonil	tetrachloroisophthalonitrile
Captan 50W	captan	N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide
Cela W-524	---------------	Piperazin-1,4-diyl-bis [1-(2,2,2-trichloroethyl) formamide]
Cyprex 65W	dodine	n-dodecylguanidine acetate
Difolatan 80W	---------------	N-[1,1,2,2-tetrachloroethyl)-sulfenyl] *cis*-4-4-cyclohexene-1,2-dicarboximide
Dithane M-45 80W	---------------	Coordination product of zinc ion and manganese ethylene bisdithiocarbamate
EL-273 10W & 25W	triarimol	*a*(2,4-dichlorophenyl)*a*-phenyl-5-pyrimidinemethanol
Sclex 80W	---------------	3-(3,5-dichlorophenyl)-5,5-dimethyl-2,4-oxazolidine-dione
Sulfur 90W	sulfur	sulfur
Thynon 75W	dithianon	1,4-dithioanthroquinone-2,3-dicarbonitrile
Topsin-M 70W	thiophanatemethyl	1,2-bis(3-methoxycarbonyl-2-thioureido) benzene

application to control plum curculio and other insects unless otherwise stated.

Fungicide treatments were applied with an air-blast sprayer to 5-tree plots replicated four or five times in a randomized complete block design. Guard rows between treated plots were sprayed with captan and insecticide. An application of liquid lime-sulfur (5 gallons per 100 gallons water) was made between March 14 and 20 at bud swell to kill infective spores of *T. deformans*. Liquid lime-sulfur (1 gallon per 100 gallons water) was applied at 3-day intervals during bloom to prevent blossom blight infection by the brown rot fungus. Experimental fungicide applications were initiated at petal-fall during 1968 to 1972. During 1973 and 1974, the initial fungicide applications were made during the bloom period. Treatments were applied at intervals of 10-14 days, but additional applications were made every 4-6 days during rainy weather.

Evaluations were conducted on 'Red Cap' peaches in 1968, but an insufficient number of trees necessitated a change to the 'Red Globe' variety in 1969. In 1971, winter damage to Red Globe forced a change to the 'Elberta' variety. Both Red Globe and Elberta were used in 1972-74 evaluations.

Fruit disease counts were made from several boxes of peaches (400 to 1,200 fruit) harvested randomly from several trees in each replication. Subsequently, 50 visually unblemished peaches from each replication were selected and stored at 80° ± 5° F. After 4 to 7 days of storage, data were taken on the percentage of diseased peaches to evaluate protective qualities of the fungicides in preventing fungus decay in storage.

RESULTS AND DISCUSSION

In 1968, an experimental fungicide, du Pont 1991, demonstrated unusual activity for peach disease control. These results warranted further work with the fungicide, and subsequent tests provided data facilitating its registration and use in Alabama as Benlate 50W (benomyl), Table 2.

Brown Rot

Brown rot incidence at harvest was as high as 3.6 percent during 1969 in plots sprayed with sulfur as compared with 12.2 percent in unsprayed plots. In subsequent years, *M. fructicola* infection at harvest was less than 3 percent in all fungicide treatments; rot on unsprayed fruit was only 4 percent during this same time *(7,8,9)*.

When peaches were stored 4 to 7 days at 85° ± 5° F, brown rot incidence was high. Seasonal inoculum levels of *M. fructicola* and favorable infection conditions varied greatly as measured by the percentage of post-harvest rot on unsprayed Red Globe peaches: 66.5 in 1969, 30.4 in 1970, 11.0 in 1972, 74.4 in 1973, and 14.5 percent in 1974. Brown rot was 51.3 percent in 1968 on unsprayed Red Cap peaches and 27 percent in 1971 on unsprayed Elberta peaches. No significant differences were observed among fungicide treatments for post-harvest brown rot control in 1968, 1971, 1972, and 1974. Evaluations for brown rot on Elberta peaches were not made in 1973 and 1974 because of the high incidence of bacterial spot lesions.

During 1969 and 1973, two-thirds of the peaches from unsprayed plots placed in storage rotted within 5 days storage; peaches sprayed with Benlate 50W showed only 11.5 and 9.5 percent rot during storage for these years, respectively. Overall evaluation of fungicides from 1968 through 1974 showed post-

TABLE 2. POST-HARVEST FUNGICIDAL CONTROL OF BROWN AND RHIZOPUS ROTS

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year, cultivar, and days in storage						
			1968 Red Cap 6 days	1969 Red Globe 5 days	1970 Red Globe 5 days	1971 Elberta 5 days	1972 Red Globe 7 days	1973 Red Globe 4 days	1974 Red Globe 5 days
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Benlate 50W									
(du Pont 1991)	0.3	F[1]	14.3[2]						
Benlate 50W	0.3	F		11.5[3]					
Benlate 50W	0.375	F			8.0[4]				
Benlate 50W	0.5	F				14.7[2]	4.0[2]		
Benlate 50W plus	0.5+	F							
Sulfur 90W	6.0	F				15.3			
Benlate 50W	1.0	B							
Sulfur 90W	6.0	C							
Benlate 50W	0.5	P					4.7		
Benlate 50W plus	0.5+	F						9.6 a[3]	
Lannate W	0.5	F							
Benlate 50W plus	0.5+	F						37.6 abc	
Lannate L	½ pt.	F							
Benlate 50W plus	0.5+	F						48.4 bc	
Vydate L	½ pt.	F							
Benlate 50W plus	0.5+	F							1.8[2]
Lannate L	2 pt.	F							
Benlate 50W plus	0.5+	F							9.0
Nu-film (10 days)	4 oz.	F							
Benlate 50W plus	0.5+	F							9.8
Nu-film (20 days)	1 pt.	F							
Bravo 75W	1.0	F				19.3			
Bravo 75W	1.5	F				15.3			

Continued

TABLE 2 *Continued.* POST-HARVEST FUNGICIDAL CONTROL OF BROWN AND RHIZOPUS ROTS

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year, cultivar, and days in storage						
			1968 Red Cap 6 days	1969 Red Globe 5 days	1970 Red Globe 5 days	1971 Elberta 5 days	1972 Red Globe 7 days	1973 Red Globe 4 days	1974 Red Globe 5 days
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Bravo 4F	2.0 pt.	F				16.7			
Captan 50W	2.0	F	15.6	19.5	10.8				
Captan 50W plus	1.0+	F							
Cyprex 65W	0.5	F	50.3						
Captan 50W plus	2.0+	F							
Cyprex 65W	0.5	F		24.5			5.5	25.6 ab	4.8
Captan 50W plus	2.0+	F							
Cyprex 65W plus	0.5+	F							
Botran 75W	1.0	F				7.7			
Difolatan 80W	1.0	F	29.3						
Dithane M-45 80W	2.0	F					11.7		
EL-273 10W	30 p.p.m.	F			16.8				
EL-273 10W	40 p.p.m.	F			20.8				
EL-273 25W	40 p.p.m.	F				18.3			
EL-273 25W	80 p.p.m.	F				14.7			
Sclex 80W	0.5	F				15.0			
Sulfur 90W	6.0	F	43.0	28.0	39.2	34.3	7.0	58.4 bc	4.3
Sulfur 90W	6.0	B,C							
Benlate 50W	0.375	P		5.5	19.6				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P		17.5	27.2				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P		15.0					

Continued

TABLE 2 *Continued.* POST-HARVEST FUNGICIDAL CONTROL OF BROWN AND RHIZOPUS ROTS

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year, cultivar, and days in storage						
			1968 Red Cap 6 days	1969 Red Globe 5 days	1970 Red Globe 5 days	1971 Elberta 5 days	1972 Red Globe 7 days	1973 Red Globe 4 days	1974 Red Globe 5 days
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Sulfur 90W	6.0	B,C							
Cela W-524	1 pt.	P					6.2		9.3
Sulfur 90W	6.0	B,C							
Difolatan 80W	1.0	P							
Botran 75W	1.0	P	41.6						
Thynon 75W	1.0	F	44.6						
Thynon 75W	1.0	B,C							
Benlate 50W	0.375	P		23.5					
Thynon 75W	1.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P		31.5					
Topsin-M 70W	0.75	F				12.0	2.5	29.6 ab	2.5
Check (unsprayed)		F	51.3	66.5	30.4	27.0	11.0	74.4 c	14.5

[1] F = full season; B = blossom; C = cover; P = pre-harvest 3 times.
[2] Means not significantly different at 0.05 level.
[3] Means not followed by the same letter are significantly different at the 0.01 level.
[4] Means not followed by the same letter are significantly different at the 0.05 level.

harvest brown rot incidence was consistently lower with Benlate 50W than with other fungicides. Brown rot control was poor (1973) when the insecticides Lannate L and Vydate L were used at ½-pint application rates with Benlate 50W. In 1974, disease control with Benlate 50W was satisfactory when the insecticide Lannate L was used at 2 pints per 100 gallons. Since *M. fructicola* will invade wounds made in the fruit by insects, it is essential that insecticide and fungicide application rates are adequate to control insects and prevent brown rot. No significant effect on brown rot control was shown during 1974 with Nu-film (surfactant) at 10- or 20-day spray intervals.

Brown rot control with Captan 50W was as effective as with Benlate 50W from 1968 through 1974. During 1968, investigations showed that 2.0 pounds per 100 gallons water was the minimal rate of Captan 50W for brown rot control. With 1 pound Captan 50W, brown rot developed in stored peaches about the same as on peaches from unsprayed plots, 50.3 and 51.3 percent, respectively. Fruit finish appeared better and color was more pronounced on Captan 50W treated peaches than on Benlate 50W treated peaches. Fruit was firmer with Benlate 50W, but greener (maturity slightly delayed) as compared with Captan 50W and unsprayed peaches.

Other fungicides that showed promise for brown rot control were Bravo 75W and 4F, EL 273 10W and 25W, Sclex 80W, and Topsin-M 70W. Sulfur 90W was ineffective in preventing post-harvest brown rot development. In fact, during 1970 and 1971 post-harvest brown rot was worse on sulfur sprayed trees than on fruit of unsprayed trees.

Scab

Control of scab was near perfect with Benlate 50W throughout these tests, Table 3. Captan 50W, Difolatan 80W, Dithane M-45 80W, Thynon 75W, and Topsin-M 70W also gave excellent control of scab. Control of scab was inadequate with Bravo 75W and 4F, EL-273 10W and 25W, and Sclex 80W. Sulfur 90W gave excellent control of scab on Red Globe peaches throughout these tests but was not effective on Elberta in 1971. In that year scab incidence on Elberta peaches was 27.3 percent on sulfur sprayed plots and 26.9 percent on unsprayed peaches. Seasonal incidence of scab was low as evidenced by data on unsprayed peaches in 1970 and 1972; during the other years, scab incidence ranged from 20.6 percent in 1969 to 81.0 percent in 1974.

TABLE 3. FUNGICIDE CONTROL OF SCAB ON PEACHES

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Benlate 50W (du Pont 1991)	0.3	F[1]	0.3 a[2]						
Benlate 50W	0.3	F		0.4					
Benlate 50W	0.375	F			0.2 a[3]				
Benlate 50W	0.5	F				0.7 a[2]	0		
Benlate 50W plus	0.5+	F							
Sulfur 90W	6.0	F				3.0 a			
Benlate 50W	1.0	B							
Sulfur 90W	6.0	C							
Benlate 50W	0.5	P					0		
Benlate 50W plus	0.5+	F							
Lannate W	0.5	F						0.4 a[2]	
Benlate 50W plus	0.5+	F							
Lannate L	½ pt.	F						0.7 a	
Benlate 50W plus	0.5+	F							
Vydate L	½ pt.	F						1.4 a	
Benlate 50W plus	0.5+	F							
Lannate L	2 pt.	F							0 a[2]
Benlate 50W plus	0.5+	F							
Nu-film (10 days)	4 oz.	F							0.3 a
Benlate 50W plus	0.5+	F							
Nu-film (20 days)	1 pt.	F							0.5 a
Bravo 75W	1.0	F				33.7 abcd			
Bravo 75W	1.5	F				28.7 abcd			
Bravo 4F	2.0 pt.	F				18.0 abc			
Captan 50W	2.0	F	2.0 a	0.5	3.0 a				

Continued

Table 3 *Continued.* Fungicide Control of Scab on Peaches

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Captan 50W plus	1.0+	F							
Cyprex 65W	0.5	F	0 a						
Captan 50W plus	2.0+	F							
Cyprex 65W	0.5	F		0.3			0	1.9 a	6.0 a
Captan 50W plus	2.0+	F							
Cyprex 65W plus	0.5+	F							
Botran 75W	1.0	P				10.7 ab			
Difolatan 80W	1.0	F	0 a						
Dithane M-45 80W	2.0	F					0		
EL-273 10W	30 p.p.m.	F			21.4 b				
EL-273 10W	40 p.p.m.	F			11.6 a				
EL-273 25W	40 p.p.m.	F				43.0 bcd			
EL-273 25W	80 p.p.m.	F				49.3 cd			
Sclex 80W	0.5	F				62.3 d			
Sulfur 90W	6.0	F	0	1.3	0.2 a	27.3 abc	0	2.3 a	5.5 a
Sulfur 90W	6.0	B,C							
Benlate 50W	0.375	P		0	1.0 a				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P		0.4	1.6 a				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P	0 a	0.7					
Sulfur 90W	6.0	B,C							
Cela W-524	1 pt.	P					0		10.8 a

Continued

TABLE 3 *Continued.* FUNGICIDE CONTROL OF SCAB ON PEACHES

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Sulfur 90W	6.0	B,C							
Difolatan 80W	1.0	P							
Botran 75W	1.0	P	6.9 a						
Thynon 75W	1.0	F	0 a						
Thynon 75W	1.0	B,C							
Benlate 50W	0.375	P		0.1					
Thynon 75W	1.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P		0.6					
Topsin-M 70W	0.75	F				1.0 a	0	1.5 a	0.3 a
Check (unsprayed)		F	28.8 b	2.4	3.2 a	27.3 abc	1.2	74.4 b	81.0 b

[1] F = full season; B = blossom; C = cover; P = pre-harvest 3 times.
[2] Means not followed by the same letter are significantly different at the 0.01 level.
[3] Means not followed by the same letter are significantly different at the 0.05 level.

Bacterial Spot

Bacterial spot incidence was 11.8 percent on unsprayed Red Cap peaches in 1968 and 13.1 percent on unsprayed Elbertas in 1971, Table 4. During these years, bacterial spot appeared to be aggravated by sulfur. A 20 percent incidence of the disease was associated with sulfur applications. Bacterial spot increased slightly when sulfur was added to Benlate 50W in 1971. The disease was so widespread in Elberta plots in 1973 and 1974 that evaluations for brown rot and scab control were not feasible. On Red Globe, bacterial spot incidence was highest during 1969 and 1973. In 1973, effectiveness of fungicides in preventing spot development appeared to be related to insect control. Use of inadequate levels of Lannate L and Vydate L resulted in poor control of bacterial spot. Significant increases in bacterial spot occurred when intervals of Benlate 50W plus Nu-film (1 pint per 100 gallons) applications were increased to 20 days.

Rhizopus Rot

Use of Botran 75W in pre-harvest applications to control Rhizopus rot did not seem warranted, especially since Botran 75W controls only one of the two species of *Rhizopus* that attack peaches *(9)*. Rhizopus rot incidence was so low that it was combined with brown rot in Table 2.

Peach Leaf Curl

No peach leaf curl was observed in the orchards during the 7 years of research. Of course, inoculum levels of *T. deformans* may have been low. The dormant lime-sulfur applications were 100 percent effective in preventing leaf curl as suggested *(2,5,6)*.

Table 4. Incidence of Bacterial Spot After Fungicide Applications

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Benlate 50W									
(du Pont 1991)	0.3	F[1]	15.4						
Benlate 50W	0.3	F		5.5					
Benlate 50W	0.375	F			10.8				
Benlate 50W	0.5	F				10.0	0		
Benlate 50W plus	0.5+	F							
Sulfur 90W	6.0	F				17.4			
Benlate 50W	1.0	B							
Sulfur 90W	6.0	C							
Benlate 50W	0.5	P					0.3		
Benlate 50W plus	0.5+	F							
Lannate W	0.5	F						3.7 a[2]	
Benlate 50W plus	0.5+	F							
Lannate L	½ pt.	F						10.5 a	
Benlate 50W plus	0.5+	F							
Vydate L	½ pt.	F						30.2 b	
Benlate 50W plus	0.5+	F							
Lannate L	2 pt.	F							6.3 a[3]
Benlate 50W plus	0.5+	F							
Nu-film (10 days)	4 oz.	F							7.5 a
Benlate 50W plus	0.5+	F							
Nu-film (20 days)	1 pt.	F							28.0 b
Bravo 75W	1.0	F				6.3			
Bravo 75W	1.5	F				15.6			
Bravo 4F	2.0 pt.	F				22.0			

Continued

Table 4 *Continued.* Incidence of Bacterial Spot After Fungicide Applications

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Captan 50W	2.0	F	10.7	2.2	16.0				
Captan 50W plus	1.0+	F							
Cyprex 65W	0.5	F	5.9						
Captan 50W plus	2.0+	F							
Cyprex 65W	0.5	F		0.9			0.2	5.8 a	3.0 a
Captan 50W plus	2.0+	F							
Cyprex 65W plus	0.5+	F							
Botran 75W	1.0	P				11.2			
Difolatan 80W	1.0	F	4.4						
Dithane M-45 80W	2.0	F					0		
EL-273 10W	30 p.p.m	F			8.0				
EL-273 10W	40 p.p.m.	F			12.6				
EL-273 25W	40 p.p.m.	F				7.2			
EL-273 25W	80 p.p.m.	F				3.2			
Sclex 80W	0.5	F				9.7			
Sulfur 90W	6.0	F	20.7	4.8	17.0	20.5	0.2	6.0 a	13.5 a
Sulfur 90W	6.0	B,C							
Benlate 50W	0.375	P		2.5	11.8				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P		3.5	18.6				
Sulfur 90W	6.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P		5.5					
Sulfur 90W	6.0	B,C							
Cela W-524 20 EC	1 pt.	P					0.2		9.0 a

Continued

TABLE 4 *Continued.* INCIDENCE OF BACTERIAL SPOT AFTER FUNGICIDE APPLICATIONS

Fungicide concentration	Rate, lb. or pt./100 gal.	Time applied	Infected fruit, by year and cultivar						
			1968 Red Cap	1969 Red Globe	1970 Red Globe	1971 Elberta	1972 Red Globe	1973 Red Globe	1974 Red Globe
			Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Sulfur 90W	6.0	B,C							
Difolatan 80W	1.0	P							
Botran 75W	1.0	P	9.9						
Thynon 75W	1.0	F	3.5						
Thynon 75W	1.0	B,C							
Benlate 50W	0.375	P		4.0					
Thynon 75W	1.0	B,C							
Captan 50W	2.0	P							
Botran 75W	1.0	P		2.8					
Topsin-M 70W	0.75	F				11.3	0.2	8.4 a	3.5 a
Check (unsprayed)	----	F	11.8	5.2	18.4	13.1	0.6	4.6 a	4.0 a

[1] F = full season; B = blossom; C = cover; P = pre-harvest 3 times.
[2] Means not followed by the same letter are significantly different at the 0.01 level.
[3] Means not followed by the same letter are significantly different at the 0.05 level.

DISEASE CONTROL SUMMARY

1. Benlate 50W (du Pont 1991) was introduced, registered, and approved for use during the period of these investigations.

(a) Brown rot was effectively controlled with this fungicide.

(b) Control of scab was consistently better than with other fungicides.

(c) Fruit was firmer at harvest than with other fungicides.

2. Captan 50W controlled brown rot as effectively as Benlate 50W.

(a) The optimal rate for application was 2 pounds per 100 gallons water.

(b) Captan gave the best fruit finish and improved the color of most varieties of peaches.

3. Topsin-M 70W was usually as effective as Benlate 50W and captan for brown rot and scab control.

4. Sulfur was relatively ineffective in control of post-harvest brown rot.

5. No fungicide was consistently effective in preventing bacterial spot development on peaches.

6. Lime-sulfur applications were effective in preventing leaf curl.

7. Of the fungicides tested, only Benlate, captan, and sulfur are approved by the Environmental Protection Agency (EPA) for use on peaches.

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