

New research on pear and apple scab in the north coast counties of California indicates that Benlate and Cyprex are highly effective as back action materials and resulted in a supplemental label for Benlate on pears. With more accurate prediction of scab infection, more effective use of these materials can be made.

Pear and Apple Scab

TABLE 1. EFFECTIVENESS OF FUNGICIDES IN THE REDUCTION OF PEAR SCAB (*VENTURIA PIRINA* ADER.) POTTER VALLEY, MENDOCINO COUNTY, 1975.

Treatments*	Mean percent pear scab lesions				
	4/1†	4/15	4/31	5/20‡	6/4§
Benlate 50% WP at 100 gal./acre 2 lb./acre	0.0a	0.1b	0.21a	0.81a	1.17a
Benlate 50% WP at 400 gal./acre 2 lb./acre	0.0a	0.0a	0.0a	0.0a	0.0a
Benlate 50% WP 1 lb. plus Volck Supreme Oil 1 gal./acre at 100 gal./acre	0.02c	0.21c	0.30a	0.90a	1.17a
Benlate 50% WP 1 lb. plus Volck Supreme Oil 1 gal./acre at 400 gal./acre	0.0a	0.0a	0.05a	0.10a	0.17a
Benlate 50% WP 1 lb. plus Manzate 200 4 lb./acre at 100 gal./acre	0.01b	0.13b	0.29a	0.58a	0.67a
Benlate 50% WP 1 lb. plus Dithane M-45 4 lb./acre at 100 gal./acre	0.0a	0.01a	0.16a	0.49a	0.50a
Dithane M-45 8 lb./acre at 400 gal./acre	0.02c	0.11b	0.24a	0.64a	0.67a
Cyprex 65% WP 3 lb./acre at 100 gal./acre	0.01b	0.31d	1.01ab	2.05ab	2.83a
Cyprex 65% WP 3 lb./acre at 400 gal./acre	0.03d	0.12b	0.33a	0.38a	0.53a
Untreated check	0.01b	1.60e	7.61b	26.55c	29.33b

* Applications applied by speed sprayer on April 1-2, 8-9, 15-16, 24, 31, and May 6, 1975.
† Pretreatment count.
‡ Readings were made on 100 fruit per tree for 6 trees in each of 4 replications per treatment and untreated checks.
§ Readings made on the total fruit of 6 trees per replication. Both fruit on trees and on ground checked for pear scab lesions.

The above tests were made, based on spore emission periods, starting in early April and reaching a peak on April 22-24, 1975.

TABLE 2. REDUCTION OF APPLE SCAB (*VENTURIA INAEQUALIS*, CKE.) SEBASTOPOL, SONOMA COUNTY, 1974.

Material and application rate*	Mean percent apple scab lesions†				
	4/26‡	5/3	5/23	6/20	7/23
Benlate 50% WP 2 lb. per acre 60 gal./acre	10.9ab	4.3a	10.5c	19.3b	22.4d
Benlate 50% WP 2 lb. per acre 400 gal./acre	5.6a	1.3a	0.3a	0.0a	2.7a
Cyprex 65% WP 3 lb. per acre 60 gal./acre	7.7ab	1.7a	3.7b	7.3a	10.4c
Cyprex 65% WP 3 lb. per acre 400 gal./acre	14.5b	1.4a	2.3ab	4.6a	5.9b
Untreated check	10.1ab	29.5b	38.2d	56.1c	84.5e

* Applications applied by speed sprayer on 4/26, 5/21, and 6/17.
† 250 fruit per replication. Four replications per treatment or check.
‡ Pretreatment and count.

TABLE 3. EFFECT OF FUNGICIDES ON ACTIVE PEAR SCAB (*VENTURIA PIRINA* ADER.) BIG VALLEY, LAKE COUNTY, 1974.

Material and application rate*	Mean percent pear scab lesions†		
	4/4‡	4/24	5/1
Benlate 50% WP 2 lb. per acre plus X77 12 oz.	0.5a	1.0a	7.0b
Cyprex 65% 3 lb. per acre plus X77 12 oz.	0.6a	12.0b	48.6c
Benlate 50% WP 2 lb. per acre plus 2 gal. Superior Oil per acre	0.6a	0.8a	3.5a
Untreated check	0.7a	28.9c	87.5d

* Application applied by speed sprayer at 250 gallons per acre. Each treatment replicated 4 times.
† Readings were made on 25 clusters per replication.
‡ Pretreatment and count date.

Control



Pears severely affected by scab fungi.

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Pear and apple scab fungi *Venturia pirina* Ader. and *Venturia inaequalis* (Cke.) Wint. caused major losses to growers in the pear and apple regions of the north coast counties of California in the 1974 and 1975 seasons. These diseases have become more important in recent years, especially on pears in Mendocino and Lake counties and on apples in the Sebastopol, Sonoma County region.

Carefully timed applications of spring fungicides are necessary for effective scab control. Substantial research has shown that in pear and apple orchards, the two most important sprays are applied at early green tip and early bloom (pink bud). Under normal conditions this is usually sufficient. However, under wet

spring conditions which occur quite often in our north coastal counties, additional sprays are needed.

At green tip stage, liquid lime sulfur at 2 gallons, plus wettable sulfur at 4 pounds per 100 gallons of water gives effective protection. Benlate 50 percent W.P. at 1/2 pound, Cyprex 65 percent W.P. at 3/4 pound, or Captan at 2 pounds per 100 gallons of water will also give satisfactory control. CAUTION: Do not apply any form of sulfur within 10 days of oil and before, with, or following Captan applications, as injury may occur.

Research indicates that eradicants such as Benlate 50 percent W.P. at 1/2 pound or urea at 50 pounds per 100 gallons of water, as a fall application just

before leaf fall, help control scab for the following season. Benlate works directly against the scab fungus and urea will speed up leaf breakdown, thus destroying the source of food for scab fungus.

Because of the lack of recent information on effective spring scab control in California, trials were initiated in 1974. Before the trials, Cyprex was the only effective material under label and registration for pear scab. High rainfall and warm weather conditions indicated a high potential of scab for the growing season of 1974.

Information from past scab research with Benlate (tables 2, 3, and 4) had suggested that it was indeed a highly effective material on both primary and secondary infection. It was most important to obtain an immediate label variance for pears. This would give growers protection from a dangerous pear scab season. With the cooperation of the Lake County Agricultural Commissioner's Office, DuPont, and the California Department of Food and Agriculture, a variance to the label was obtained. Agricultural commissioners from the north coast counties agreed to help prepare data for a supplement to the label.

As anticipated, pear scab did become a major problem, and the limited supply of Cyprex was soon exhausted. Fortunately, Benlate was available as an alternate, highly effective fungicide on scab. Major losses to pear growers in the Russian River area and Lake County were averted.

It should be noted on the test run in 1974 that Benlate treatments were

TABLE 4. EFFECT OF FUNGICIDES ON ACTIVE PEAR SCAB (*VENTURIA PIRINA* ADER.) POPE VALLEY, NAPA COUNTY, 1974.

Material and application rate*	Mean percent pear scab lesions†		
	3/20‡	4/24	5/7
Benlate 50% WP 2 lb. per acre	0.1a	2.4a	3.9a
Benlate 50% WP 2 lb. per acre plus 2 gal. Superior Oil per acre	0.2a	1.1a	2.5a
Cyprex 65% WP 3 lb. per acre	0.1a	3.5b	12.0b
Untreated check	0.3a	19.9c	70.0c

* Application applied by speed sprayer at 300 gallons per acre. Each treatment replicated 4 times.

† Readings were on 25 clusters per replication.

‡ Pretreatment and count date.

more effective with the addition of supreme oil at 2 gallons per acre (table 3). X77 spreader did not prove as effective as oil, but was still more effective than Benlate used alone. A reduction in the rate of Benlate 50 percent W.P. to 1 pound per acre with oil was also effective in controlling scab. Our tests suggested that under normal California weather conditions, Benlate can be effective for 30 days. When rain and showers persist, this period should be shortened to 7 to 14 days. One disadvantage of Benlate not present in Cyprex is that Benlate loses some effectiveness with low volume concentrate applications (tables 1 and 2). Full dilute spray at 400 gallons per acre is needed for optimum control.

Whatever the choice of fungicides, whether it be liquid lime sulfur plus wettable sulfur, Captan, Cyprex, or Benlate, the key to success in an apple or pear scab program is exact timing and full coverage.

More effective monitoring of wet and dry periods, temperatures, and relative humidity (all important factors for infection) is needed in scab-prone districts. Much is known about these relationships, but more research is needed to make monitoring more practical and less time consuming to the growers and consultants.

Tests were also conducted to determine if combinations of Benlate plus Manzate or Benlate plus Dithane M-45 at lower rates would control scab (table 1). These tests were conducted to offset the possible resistance that might occur later and still keep material costs down. This combination gave excellent control. Other orchards in Mendocino, Lake, and Napa counties did show that Dithane M-45 or Manzate 200 has a suppressive effect on both pear psylla and pear rust mite populations.

In summary, with present instrumentation technology and available research, great improvements can be made in the accurate prediction of scab infection periods. With these methods, more effective use of materials for control of both pear scab and apple scab can be made.

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Influence of Variety and Cutting

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Demand for oat hay has been stimulated by an increasing number of pleasure horses in California. Production now involves more than 250,000 acres annually in the state, on irrigated as well as dry-farmed lands.

Over a ten-year period a number of oat varieties have been evaluated for hay production potential in the Sacramento Valley. Nine trials were conducted in dry-farmed areas near Dunnigan, and two under irrigated conditions at U.C. Davis.

Observations were made on yield per acre and on the factors that influence hay quality: grain yield, disease resistance, early maturity, leafiness, and stem diameter. The influence of cutting stage on yield was evaluated over a two-year period.

In the 10-year testing period four varieties were found most suitable for producing high quality hay—California Red, Montezuma, Sierra, and Curt. (Kanota, which was evaluated only early in the testing period, was found to produce acceptable quality and yield of hay; no data is included in this report.) Each of these varieties has a particular set of

qualities that may be of importance to a given farm operation.

Hay yields

California Red oats had the highest average yield, approximately 3.5 tons per acre, over nine years of testing under dry-farmed conditions, but the other varieties all averaged slightly over three tons per acre (table 1). The yield ranking of varieties changed from year to year according to rainfall patterns and the occurrence of the virus disease, barley yellow dwarf. Mild winters and late spring rains were beneficial to all varieties, especially the late-maturing California Red. Barley yellow dwarf virus can cause severe stunting with accompanying low forage and grain yields in susceptible plants. California Red, more than the others, is extremely susceptible to barley yellow dwarf, which caused it to have low production during 1974.

In the two irrigated trials Sierra oats produced the highest yields, and California Red was second, followed by Montezuma and Curt (table 2). Under irrigation all varieties yielded more dry

TABLE 1. HAY YIELD OF FOUR OAT VARIETIES, DRYLAND TRIALS.

Harvest year	Planting date	Yield — Tons dry matter per acre				LSD .05	CV*
		Calif. Red	Montezuma	Sierra	Curt		
1965	12/ 1/64	4.75	—	4.15	3.72	.40	6.9
1966	12/17/65	2.24	—	1.72	2.09	.14	4.4
1967	1/ 2/67	4.58	—	3.36	3.57	.54	11.0
1968	12/18/67	4.29	4.14	3.82	3.69	.44	9.6
1969	12/ 6/68	3.91	3.06	3.16	2.92	.49	9.4
1970	11/18/69	2.58	1.63	2.04	1.53	.42	13.5
1972	11/30/71	3.30	3.41	3.08	3.37	.18	3.6
1974	1/28/74	.99	1.82	1.59	1.43	.48	20.6
1975	11/26/74	4.81	5.18	4.68	4.84	.41	5.8
Avg. yield, all years		3.49	3.21	3.07	3.02	3.19	
Avg. yield, 1968-75		3.31	3.21	3.06	2.96	3.13	

* CV, (Coefficient of Variation) is a measure of amount of unexplained variation present in a particular trial.