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Evaluation of Grape Powdery Mildew Forecasting Programs

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Three forecasting programs for scheduling fungicide applications were selected for comparison with the standard Oregon phenology based program. The UCDavis (California) program used leaf wetness and temperature early in the year and only temperature during the summer. The New York program was based on rainfall and temperature. The German Oi Diag program incorporated relative humidity along with temperature and rainfall. Treatments were arranged in a randomized complete block design in a block of 11 yr 'Chardonnay' with a 7x10 ft spacing. Vines were trained to a bilateral cordon with spur pruning. Each treatment was replicated on 3 sets of 5 Vines. Treatments were applied using a handgun sprayer at 300 psi at a rate of 75-150 gal water/A for applications between 14 Apr (budbreak) and 3 Jul (full bloom). Treatments were applied using a hooded boom sprayer at 300 psi at a rate of 200 gal water/A for all applications after 3 Jul. Approximately 1.8 gal of a spray suspension was applied between 14 Apr and 25 Apr (75 gal water/A), 2.2 gal of a spray suspension was applied between 30 Apr and 28 May (90 gal water/A), 3 gal of a spray suspension was applied between 3 Jun and 19 Jun (120 gal water/A), 3.7 gal of a spray suspension was applied between 25 Jun and 3 Jul (150 gal water/A) and 5 gal of a spray suspension was applied (200 gal water/A) for the rest of the applications per 15 Vines. Treatments were applied as required by the guidelines for each program. The standard program and the water control were applied on 6 May (6 inch shoots), 16 May, 28 May (12 inch shoots), 4 Jun, 19 Jun (full bloom), 3 Jul (postbloom), 19 Jul, 26 Jul, 8 Aug, 16 Aug and 5 Sep. No Botrytis control measures, including leaf removal, were applied to test vines. All programs used one of two fungicides, Thiolux DF at 3 lb/ 100 gal water or Rally at 2 oz/ 100 gal water for each application. The field plots experienced several environmental extremes including a freeze (down to 17°F on 2 Feb 1996), a flood (several feet of flowing or standing water on 9-12 Feb), and frost (30°F on 4 May). The frost event impacted the plots the most, causing 50 to 70% of the shoot terminals to dieback. Undamaged secondary lateral buds on the shoots, or at the base of the shoots, continued to grow and produce acceptable vine growth. However, there was a reduction in the number of clusters that developed. Incidence of powdery mildew on leaves was evaluated on 10 Jul, 19 Jul, 30 Jul, 6 Aug, 16 Aug, 27 Aug and 11 Sep by randomly examining 50 leaves from the middle 3 vines of each replicate. Incidence of powdery mildew on clusters was evaluated on 6 Aug, 16 Aug, 27 Aug and 11 Sep by randomly examining 50 clusters from the middle 3 vines of each replicate. Comparisons among treatments for incidence of powdery mildew on leaves and clusters was evaluated by calculating the area under disease progress curves (AUDPQ. ALJDPC was calculated by multiplying the mean incidence from two observation dates by the number of days between observations. Values calculated between each pair of observations are added together to obtain a total AUDPC.

Treatment and Rate/ 100 gal	% Powdery Mildew on Leaves[1]			% Powdery Mildew on Clusters[1]		
	6 Aug	27 Aug	AUDPC	6 Aug	11 Sep	AUDPC
Water Control[3]	83.3 a	--[2]	--	91.2 a	--	--
Standard Program[3]						
Thiolux DF 3 lb (6 applications alone) and Rally 40WP 2 oz (5 applications alone)	0.0 b	0.0 b	0.1 b	7.3 b	17.3	4.9
California Program[4]						
Thiolux DF 3 lb (7 applications alone) and Rally 40WP 2 oz (5 applications alone)	1.3 b	2.0 b	0.5 b	4.7 b	20.8	5.6
German Program[5]						
Thiolux DF 3 lb (7 applications alone) and Rally 40WP 2 oz (5 applications alone)	0.7 b	0.7 b	0.3 b	2.0 b	14.0	3.7
New York Program[6]						
Rally 40WP 2 oz (4 applications alone) and Thiolux DF 3 lb (5 applications alone)	1.3 b	6.7 a	1.6 a	5.3 b	24.0	5.1

1 Means followed by the same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

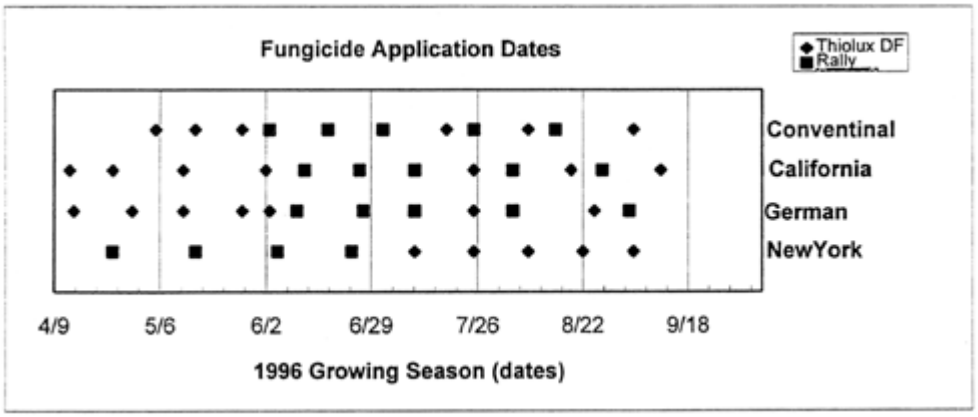
2 Evaluations for incidence of powdery mildew for leaves and clusters for the water control were not made after 6 Aug due to eradicative measures taken to control high levels of disease development.

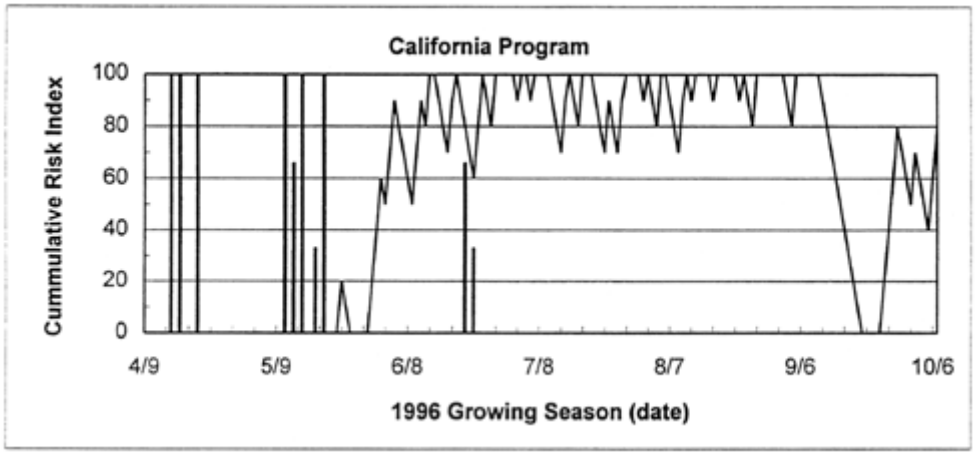
3 For the standard program, Thiolux DF was applied on 6 May, 16 May, 28 May, 19 Jul, 9 Aug and 5 Sep, and Rally was applied on 4 Jun, 19 Jun, 3 Jul, 26 Jul and 16 Aug. Water was also applied on each of these dates for the water control treatment.

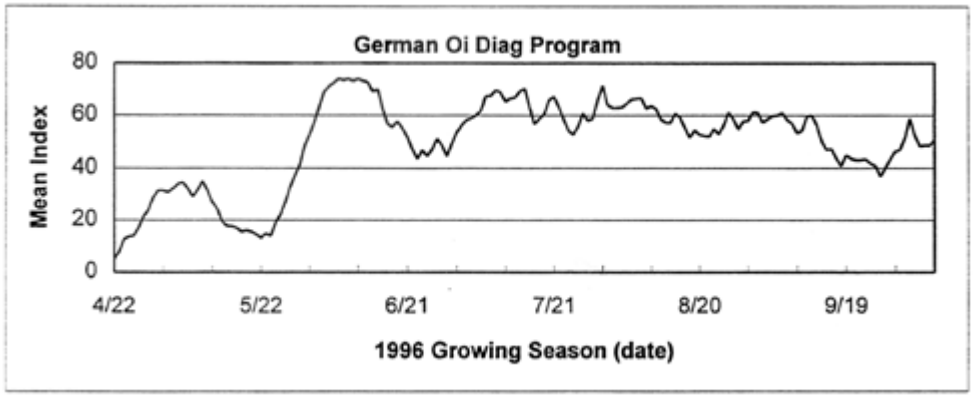
4 For the California program, Thiolux DF was applied on 14 Apr, 25 Apr, 16 May, 3 Jun, 26 Jul, 20 Aug and 12 Sep, and Rally was applied on 13 Jun, 27 Jun, 11 Jul, 5 Aug and 28 Aug.

5 For the German program, Thiolux DF was applied on 18 Apr, 30 Apr, 16 May, 28 May, 4 Jun, 26 Jul and 26 Aug, and Rally was applied on 11 Jun, 28 Jun, 11 Jul, 5 Aug and 4 Sep.

6 For the New York program, Thiolux DF was applied on 11 Jul, 26 Jul, 9 Aug, 23 Aug and 5 Sep, and Rally was applied on 25 Apr, 16 May, 6 Jun and 25 Jun.







The California program identified 9 rain events between budbreak and bloom that were favorable for ascospore release and infection. The cumulative risk index reached 60 (indicating the need for short spray intervals) on 3 Jun and generally remained above 60 until 16 Sep. The German Oi Diag program calculated the first fungicide application for 18 Apr. Mean Index values rose above 40 (indicating the need for short spray intervals) on I Jun. Long spray intervals were indicated in late Jun but went back to short intervals in early Jul until mid Aug when longer intervals were required. Conditions for the New York program to indicate fungicide applications were met throughout the spring season.

Powdery mildew symptoms were first observed in the water control on 12 Jun, with secondary sporulation observed on 19 Jun. Mean incidence of powdery mildew for water treated vines on 6 Aug was 83.3 % for leaves, and 91.2 % for clusters, while incidence of powdery mildew for all of the fungicide programs were below 2% for leaves, and below 8% for clusters. Total number of fungicide applications was 11, 12, 12 and 9 applications with the Standard, California, German and New York programs, respectively. The AUDPC for leaves was significantly lower for all treatment programs when compared to the New York program. There were no significant differences for evaluations of powdery mildew on clusters between the treatment programs.