Control of grape powdery mildew with spray oils

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Methods used to evaluate oils for control of powdery mildew

The trial was conducted at the Pacific Agri-Food Research Centre, Summerland (PARC) on 17 year old 'Pinot noir' (5 replicates) vines naturally infected with *Uncinula necator*, the causal agent of powdery mildew. The plot followed a randomized block design with five vines per replicate and five replicates per block. Treatments were started on 17 May and applied every two to three weeks until two weeks before harvest on 27 September. Powdery mildew was evaluated on 19 July, 11 August and the 23 September by examining 10 leaves on each of five shoots per three middle vines; and 10 berry clusters per three middle vines. On 6 August foliar chlorophyll measurements were taken at mid-canopy height (20 readings per panel , two readings per leaf), on all treatments using a Minolta Chlorophyll Meter (SPAD 502). Two clusters from each replicate were analyzed for sucrose (^{B}Brix) on 17 August, 7 September, and at harvest. A harvest sample of 100 berries from randomly selected clusters were collected and weighed for each treatment. Crush juice from these samples was evaluated for titratable acidity, soluble solids (EBrix), and pH.

Powdery mildew treatment regimes used in this trial

Conventional grower program consisted of Nova or Sovran at label rates alternated every two to three weeks until harvest.

Superior oil program consisted of 1% Superior oil applied repeatedly throughout the season.

Petro-Canada Spray Oil 13E program consisted of two spray regimes of 1% spray oil 13E applied consecutively, or in rotation with Kumulus DF (sulphur).

Petro-Canada Pure Spray Organic oil program consisted of two spray regimes of 1% pure spray organic oil applied consecutively, or in rotation with Sovran 50WG (kresoxim methyl).

Results and Discussion

Powdery mildew was first observed on grape berries on 1 June. All treatments significantly reduced foliar and cluster powdery mildew early, midway, and at the end of the season. Early season ratings indicate that 1% Petro-Canada Spray Oil 13E was most effective at controlling foliar mildew, while all oil treatments were as effective as Nova or Sovran at reducing cluster mildew. By mid-season, the Conventional grower program was the most effective treatment in the suppression of powdery mildew on both leaves and clusters. However, Petro-Canada Spray Oil 13E applied consecutively or in rotation was also effective at reducing both foliar and cluster powdery mildew. All other oil treatments provided moderate powdery mildew control (Table 1). At harvest, the Conventional grower program remained the most effective treatment for reducing foliar powdery mildew. All oil treatments (with exception of 1% Petro-Canada Spray Oil 13 and 1% Petro-Canada pure spray organic oil applied consecutively) were statistically similar at reducing cluster powdery mildew when compared to the Conventional grower program. Chlorophyll measurements taken on foliage mid-season indicated that the Conventional grower program had statistically higher levels of green chlorophyll than that of any of the oil treatments (Table 2). A low level of leaf burn and spotting was noticed on all oil treatments on 11 August during rating grapes for powdery mildew. At harvest average cluster weights were not

significantly different between treatments. Soluble solids (EBrix) increased throughout the growing season in all treatments as expected (Table 3). The Conventional grower program and unsprayed treatments had the highest EBrix ratings through out August and September. The maximum differences between treatments ranged from 1.3% to 3% sucrose, with the higher difference noted early in the growing season. There were no significant differences in pH values for any of the treatment programs (Table 4). The Petro-Canada pure spray organic oil applied consecutively had the highest titratable acidity when compared with other treatments. The Conventional grower and Superior Oil programs had lower titratable acidity levels than all other programs.

Overall summary

The Conventional grower program which depends on Nova and Sovran applications throughout the season controlled all phases of powdery mildew without reducing yield or any important grape quality factors. The oil treatments reduced the severity of foliar powdery mildew and likely would be adequate for most vineyards where powdery mildew had not been allowed to get out of control as it did in this experimental plot. The oils alternated with another fungicide or applied consecutively provided excellent control of cluster powdery mildew. The oil products slightly reduced photosynthesis and °Brix readings and increased titratable acidity when compared to the Conventional grower program. In general these adverse effects caused by oil sprays did not affect juice pH and likely would not be large enough to make major differences in wine quality.

Table 1. Percent incidence and severity of 'Pinot noir' grapes in mid August

Treatment	Leaf Powdery Mildew		Cluster Powdery Mildew	
	Incidence	Severity	Incidence	Severity
Unsprayed control	82 a*	21 a	88 a	20 a
1% Petro-Canada Spray Oil 13E	29 cd	2 b	28 c	2 b
1% Petro-Canada Spray Oil 13E (rotation program)	50 cd	3 b	28 c	2 b
1% Petro-Canada Pure Spray Organic Oil	54 b	4 b	54 b	4 b
1% Petro-Canada Pure Spray Organic Oil (rotation program)	64 ab	4 b	64 b	4 b
1% Superior Oil	49 bc	4 b	54 b	4 b
Conventional Grower program	12 d	1 b	10 c	1 b

*Numbers followed by the same letter are not significantly different at $p = 0.05$.

Table 2. Chlorophyll levels indicated by SPAD readings in 'Pinot noir' foliage in August

Treatment	Leaf SPAD units*

Unsprayed control	41 b**
1% Petro-Canada Spray Oil 13E	41 bc
1% Petro-Canada Spray Oil 13E (rotation program)	41 bc
1% Petro-Canada Pure Spray Organic Oil	40 bc
1% Petro-Canada Pure Spray Organic Oil (rotation program)	40 c
1% Superior Oil	41 b
Conventional Grower program	44 a

*All measurements were taken on a Minolta Chlorophyll Meter (SPAD 502).
**Numbers followed by the same letter are not significantly different at $p = 0.05$.

Table 3. Effect of spray oils on EBrix (percent sucrose) of 'Pinot noir' juice

Treatment	17 Aug	7 Sep	28 Sep
Unsprayed Control	13.01 b*	20.34 a	22.50 bc
1% Petro-Canada Spray Oil 13E	12.33 b	18.67 bc	21.20 g
1% Petro-Canada Spray Oil 13E (rotation program)	11.85 b	18.58 bc	22.40 cd
1% Petro-Canada Pure Spray Organic Oil	11.76 b	19.42 ab	21.55 f
1% Petro-Canada Pure Spray Organic Oil (rotation program)	13.23 ab	19.50 ab	22.35 d
1% Superior Oil	12.42 b	18.14 c	21.70 e
Conventional Grower program	14.73 a	20.21 a	22.85 a

*Numbers followed by the same letter are not significantly different $p = 0.05$.

Table 4. Effect of spray oils on two quality factors of 'Pinot noir' grape juice at harvest

Treatment	pH	Titratable acidity
Control	3.32	16.23 bc
1% Petro-Canada Spray Oil 13E	3.31	15.93 cd
1% Petro-Canada Spray Oil 13E (rotation program)	3.25	15.46 ef
1% Petro-Canada Pure Spray Organic Oil	3.32	17.16 a
1% Petro-Canada Pure Spray Organic oil (rotation program)	3.33	15.78 de
1% Superior Oil	3.32	14.21 g
Conventional Grower program	3.32	14.56 g

*Numbers followed by the same letter are not significantly different at $p = 0.05$.