

Control of grape powdery mildew with biorational products

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Methods used to evaluate products

The trial was conducted at the Pacific Agri-Food Research Centre, Summerland, B.C. (PARC) on 16 year old 'Pinot noir' vines. The plot followed a randomized block design with five vines per replicate and five replicates per block. The grape vines in the trial had been allowed to become naturally infected with *Uncinula necator*, the causal agent of powdery mildew. Treatments were applied two weeks before bloom and every two weeks thereafter until harvest on 23 September, 2003. Biorational products obtained from various manufacturers (Table 1) were applied until run-off with a handgun at set concentrations based on their use in 1000 L water/ha (Table 2). Percent incidence and severity of leaf and cluster powdery mildew were evaluated on 3 September by examining 10 leaves on each of five shoots per three middle vines; and 10 berry clusters per three middle vines. Fifty clusters were examined for powdery mildew at harvest on 23 September. A sample of 100 berries from randomly selected clusters in each replicate were collected and weighted at harvest. From this sample a 50 g sub sample was used to determine pH, soluble solids (°Brix), and titratable acidity.

A separate powdery mildew trial was conducted to test Chitosan for control of grape powdery mildew using similar methods as above but in a separate 'Pinot noir' plot.

Results and discussion

Visible colonies of powdery mildew was first observed on grape berries on the 26 June, 2003. The only treatments that significantly reduced foliar powdery mildew early in the season were those containing Nova. However, all the other products successfully reduced the severity of foliar powdery mildew. IBR liquid and Superior oil were as effective as NOVA in reducing disease severity. None of the materials including Nova prevented early development of powdery mildew on the grape berries but all the materials reduced its severity. Later in the season on 3 September only Nova reduced the incidence of foliar powdery mildew but all the biorational products except Soybean oil were effective in reducing its severity (Table 2). The IBR liquid, Fungineem, Stylet oil + Sodium bicarbonate, and Superior oil were the most effective. On grape clusters only Nova reduced incidence of powder mildew but several treatments reduced its severity with the most effective being Nova and IBR liquid. At harvest on 23 September, cluster numbers were not different between treatments but the average cluster weight was highest in treatments containing Nova, or Stylet oil plus sodium bicarbonate. Quality of grapes indicated by berry weight, pH, soluble solids, and titratable acidity did not differ between treatments (Table 3). However percent soluble solids in the Superior oil treatment was numerically the lowest of all treatments and could point to a problem with this material lowering sugar in grapes.

In the other trial, Chitosan at a rate of 2.5 L per 100 L water did not reduce incidence or severity of foliar powdery mildew but reduced disease severity of grape clusters by 29%. The Chitosan label presents a range of rates from 1 to 6.25 L for use on grapes recommending the lower rates early in the season and the higher rates towards the end of the season. Further research will be necessary to determine the correct rate of

Chitosan for this area. Another problem that occurred with Chitosan in this trial was product contamination by fungi which may have reduced its activity.

As expected, Nova was the most effective product that was tested. However some of the new and unregistered products showed promise especially for reducing the severity of powdery mildew. The IBR liquid, Stylet oil + sodium bicarbonate, and Fungineem provided adequate control of foliar and cluster powdery mildew. None of these products appeared to compromise grape quality as indicated by pH, soluble solids, and titratable acidity.

Table 1. Information on products used in this trial

Product	Type	Manufacturer	Registration status
Fung-aid	Chitosan (poly-D-glucosamine)	Agrowchem Inc.	Fertilizer
Fungineem	Neem product	Pronatex inc.	No
IBR Liquid	Vegetable waste	International Bio Recovery Corp.	No
NOVA 40 W	Systemic fungicide	Dow AgroSciences Canada Inc.	Yes
Sea buckthorn juice	Plant product	PARC, Summerland	No
Sodium bicarbonate	Common chemical	Church & Dwight	No
Soybean oil	Plant oil	Daminco Inc.	No
Stylet oil	Mineral oil	JMS Flower Farms Inc.	No
Superior oil	Mineral oil	United Agri-Products	Dormant use

Table 2. Powdery mildew severity one month before harvest

Treatment (rate)	%Leaf Powdery mildew	%Cluster Powdery mildew
Control	75 a*	91 a
Sea buckthorn juice (50%)	50 bcd	42 bc
Soybean oil (1%)	60 abc	40 bc
Stylet oil (1%) + Sodium bicarbonate (0.5 kg/100L)	35 def	32 bcd
Fungineem (2.5%)	35 def	38 bc
IBR liquid (2%)	32 def	26 cde
Superior oil (1%)	43 cde	33 bcd
NOVA Standard (13.3 g/100 L) 6 applications	20 efg	13 de
NOVA Model (13.3 g/100 L) 6 applications	18 gf	21 cde

*Means followed by the same letter are not significantly different.

Table 3. Effect of treatments on quality of Pinot noir grapes at harvest

Treatment	Mean Berry weight (g)	pH	%Soluble solids	Titrateable acidity
Soybean oil	85 a*	3.5 b	19.1 a	15.5 a
Stylet oil + Sodium Bicarbonate	84 a	3.6 ab	17.7 a	15.7 a
Fungineem	86 a	3.8 a	18.6 a	16.1 a
IBR Liquid	75 a	3.6 ab	17.5 a	15.3 a
Superior oil	87 a	3.6 ab	16.5 a	14.5 a
NOVA	90 a	3.6 ab	18.5 a	14.2 a

*Numbers followed by the same letter are not significantly different.