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Effectiveness of biofungicides to control several fungal diseases in vineyard.

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Introduction

Canadian growers are under constant pressure to reduce their use of pesticides. Winegrowers are threatened by several leaves and berry diseases, including bunch rot (*Botrytis cinerea*), downy mildew (*Plasmopara viticola*), powdery mildew (*Erysiphe necator*), and black rot (*Guignardia bidwellii*) (1). Therefore, preventing and delaying the development of these diseases with minimal use of fungicides is a daily challenge for winegrowers and advisers. The control of these diseases is based on the use of several control methods, including synthetic fungicides. However, the resistance to these products is high, which results in a loss of effectiveness (2-3). In this context, it becomes essential to encourage the use of biofungicides. However, we must first assess their effectiveness and determine the best way to use them so that winegrowers can integrate these products into their disease management programs.

Objective

The main objective of this project was to evaluate the effectiveness of biofungicides approved for the control of grapevine diseases and propose application strategies within an integrated pest management framework.

Methods

Several trials were done with eight biofungicides between 2018 to 2020 under greenhouse and field conditions. Grapevine varieties used were sensitives to diseases. In the greenhouse trial, disease inoculation was done 24 h, before treatment with the biofungicide. The percentage of disease on the leaf area was measure with ASSESS software 14 days after treatment. Disease occurrence was fallow all season long for trial in the vineyard, and diseases severity and occurrence were quantified at harvest.

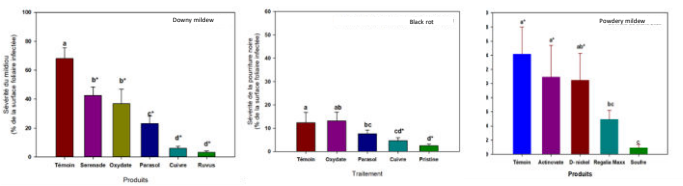
Treatment	Pathogens	Dose
Water (control)		
Pristine (control)	Black rot	0.732kg/600L
Revus (control)	Downy mildew	500 ml/600L
Copper 53W or Parasol (a.i copper)	Downy mildew, Black rot	3,0 kg/1 000 L
Sulfur	Powdery mildew	4,5kg/1000L
Double nickel 55 (a.i. *Bacillus amyloliquefaciens*)	Powdery mildew, Bunch rot	0,6 à 5,0 kg/ha
Serenade Max (a.i. *Bacillus subtilis*)	Powdery mildew, Bunch rot	3,0 à 6,0 kg/ha
Actinovate (a.i. *Streptomyces lydicus*)	Powdery mildew	425 à 840g/ha
Regalia Maxx (a.i. *Reynoutria sachalinensis*)	Powdery mildew	0,6 à 3,8 L/ha
Botector (a.i. *Aureobasidium pullulans*)	Bunch rot	1,0 kg/ha
Oxidate (a.i. peroxyde d'oxygène)	Downy mildew, Black rot	2,5L/600L

	Disease	Products	Varieties	Trial type	Year
1	Downy mildew	Serenade, cuivre, Revus	Vidal	Greenhouse	2018
2	Powdery mildew Bunch rot	Soufre, Regalia, Botector, Double nickel, Actinovate	Chancellor	Vineyard	2018
3	Downy mildew Black rot	Revus, Pristine, Cuivre, Serenade, Oxidate, Parasol	Vidal Seyval	Greenhouse	2019
4	Powdery mildew Bunch rot	Actinovate, Double nickel, Botector, Regalia, Serenade, Soufre/cuivre	Chancellor Geisemheim Seyval	Vineyard	2019
5	Downy mildew Black rot	Revus, Pristine, Cuivre, Serenade, Oxidate, Parasol	Vidal Seyval	Vineyard	2020
6	Powdery mildew Bunch rot	Soufre, Regalia, Botector, Double nickel, Actinovate	Chancellor	Vineyard	2020

Results and discussion

Within the framework of this project, some biological fungicides allowed good disease control, such as Botector, Oxydate (downy mildew), Actinovate, Serenade (bunch rot), and Double nickel (powdery mildew). Significant reductions in disease were observed compared to treatment with water, but disease levels remained high, demonstrating that the use of these products as unique method of control was not enough for acceptable disease control. These results support the importance of developing an integrated approach based on best cultural practices, scouting, and risk estimation.

Disease	Biofungicide	% effectiveness to reduce disease	
		Leave	Cluster
Downy mildew	Serenade	38%	
	Oxydate	59%	
	Parasol	78%	
	Copper	90%	
	Revus (control)	95%	
Black rot	Oxydate	10%	
	Parasol	45%	
	Copper	57%	
	Pristine (control)	89%	
Powdery mildew	Serenade	17%	0%
	Actinovate	50%	62%
	Double nickel	53%	62%
	Regalia Maxx	54%	37%
	Sulfur	95%	96%
Bunch rot	Regalia Maxx	22%	
	Double nickel	31%	
	Actinovate	56%	
	Serenade	59%	
	Botector	86%	



Severity of downy mildew (*P. viticola*) (cv Vidal) (A) and black rot (*G. bidwellii*) (cv Seyval)(B) on foliage; severity of powdery mildew (*E. necator*) (cv Chancellor)(C), and bunch rot (*B. cinerea*) (cv. Cahncellor (D) on cluster at harvest. Trials done in vineyard, 2020.

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Québec

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