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VIRTUAL CONFERENCE
JULY 5-9, 2021

Assessment of compatibility of biofungicides in the development of a strategy for the control of diseases in vineyards.

CRAM

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Introduction

Leaf and berry diseases are commonly found in vineyards and cause significant economic losses. In recent years, several biofungicides have been registered to control them. However, results in the field are sometimes inconsistent. Therefore, it is recommended to use an integrated pest management program that includes several biological control agents or products and, to a lesser extent, synthetic products (Abbey et al. 2019; Pertot et al. 2017). Then, the knowledge of the compatibility of biofungicides and synthetic products is essential to develop an effective disease management strategy (Abbey et al. 2019; Percival et al. 2017). In addition, a better knowledge of their mode of action and the possible effects on each other is necessary to prevent interference with a previous application and avoid unnecessary application.

This project aims to determine the compatibility of lower risk fungicides (including biofungicides) and understand their respective effects to propose an optimal use strategy to control grapevine diseases.

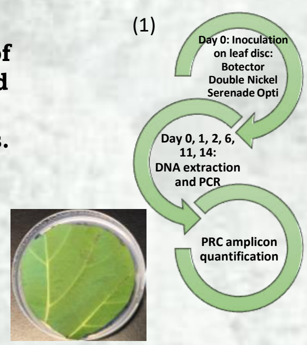
Methods

The first part of the study was carried out in the laboratory to understand the functioning of biofungicides and establish the compatibility of the products. Three microorganism-based biofungicides were evaluated to understand persistence on the leaf (1). Their colonization was monitored through quantification of PCR amplicons targeting species conferring biofungicide activity. After, compatibility between microorganisms-based and other biofungicides was evaluated using *in vitro* bioassays (2).

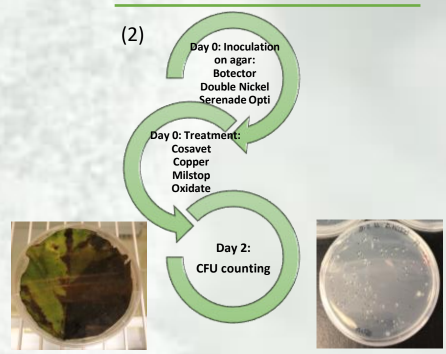
Microor.-based products	Active ingredient	Dose
Double nickel 55	*Bacillus amyloliquefaciens*	2.8 kg/ha
Serenade Opti	*Bacillus subtilis*	4.5 kg/ha
Botector	*Aureobasidium pullulans*	1.0 kg/ha

Biofungicides	Active ingredient	Dose
Copper 53W	Copper	3.0 kg/1 000 L
Oxidate	Hydrogen Peroxide	1,0% (v/v)
Milstop SP	Potassium bicarbonate	4.2 kg/ha
Cosavet DF	Sulfur	12.6kg/ha

(1)



(2)



Results and discussion

The population of the active ingredient of Double Nickel 55 and Serenade Opti decreases rapidly after the application based on PCR analyses. In contrast, Botector microbial population increases up to 6 days following application before decreasing (Fig.1). This result indicates that the more significant effect of microorganism-based biofungicide Double nickel and Serenade Opti is short after treatment. However, Botector requires more time (4-5 days) to colonize the leaf as this is a yeast.

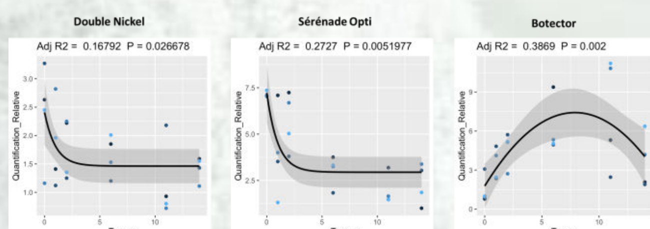


Figure 1: Relative quantification as a function of time for the three microorganism-based biofungicides

Oxidate 2.0 fungicide significantly affects all three microorganism-based biofungicides. It causes significant mortality of the active ingredient, unlike Cosavet DF, Copper 53W, and Milstop, which have little effect on microorganisms from biofungicides (Fig. 2). Then several biofungicides may be used together, but a delay is required when Oxidate is used with microorganisms-based products.

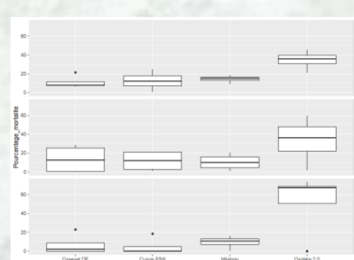


Figure 2: CFU death rate for each combination of biofungicides.

Field trials will be carried out during the 2021 and 2022 seasons to evaluate different application strategies based on the results observed in the laboratory.

Acknowledgement

This project was funded by the Prime-Vert program funded by the Ministry of Agriculture, Fisheries and Food of Quebec, through the Quebec Phytosanitary Strategy in Agriculture 2011- 2021.

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