Innovation Vineyard Project Report

Title: Bio-Start TripleX Trial V2019. Early verse Late Season Protection for Botrytis.

Author: Johnny McMillan and Jerome Demmer

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Abstract

The aim of this project was to measure the impact of two preventative TripleX applications (at flowering and PBC) and two late season TripleX applications on top of a chemical programme at our Marlborough Innovation site. If such a trial gave a significant result, confidence could be placed to invest in biological intervention to boost conventional protection against latent botrytis infections in grape bunches prior to pre-bunch closure.

Disease pressure was very low in Marlborough for V2019, so no significant results could be pulled from the data.

But two trials were conducted on Chardonnay in Gisborne, where there was a higher level of disease pressure. Both trials concluded if TripleX was included along with the conventional botrytis programme, that;

Trial 1. A TripleX preventative programme at 80% capfall and PBC reduced botrytis incidence and severity by 29% and 13% respectively at harvest.

Trial 2. A Foliacin and TripleX preventative programme at 80% capfall and PBC reduced the botrytis severity by 27% at harvest. There was no change in the level of incidence.

Such results would suggest that the addition of TripleX to traditional chemistry, and applied at intervals prior to bunch closure would reduce the botrytis level at harvest to a lower than the Control level.

Introduction

The V2017 and V2018 seasons in Marlborough experienced severe botrytis pressure. V2018 was particular in that from mid-January 2018, warm wet weather, with very little wind had a significant impact on creating a sheltered, warm and wet bunch zone. Green berries at peppercorn (E-L 29) to pea-size (E-L 31) were infected with botrytis. This gave an early indication of severe pressure for the season; botrytis is normally not of concern till after veraison when sugar levels begin to rise.

As the season progressed, so did botrytis. The frustrating feature being that the majority of the botrytis was initiated from latent infections within the bunch. Post pre-bunch closure (E-L 32), this was extremely problematic - botryticide spray penetration inside a tightly closed bunch of grapes in neigh impossible.

The key timings for managing latent infections of botrytis are with one to two flowering sprays (E-L 20 to E-L 25), followed by pre-bunch closure cover. A dye night in the previous spring confirmed how difficult it was to gain good spray coverage of the inflorescences over flowering.

MGG Coop decided to look at supporting measures to conventional chemistry in their member spray program. This was in the form of utilising BioStart Ltd.'s botrytis label claim; utilise TripleX (*Bacillus*

amyloliquefaciens BS 1b) over the period from flowering to pre-bunch closure. Young (2018). This would be used in conjunction with the conventional botrytis chemistry.

TripleX is a bio-fungicide registered for botrytis prevention and control. The living organism that it contains likes to live in the same environment that favours both botrytis and sooty mould. *B. amyloliquefaciens BS 1b's* metabolic respiration produces 6or more anti-fungal compounds. These compounds are contained in TripleX, and also produced when the organism establishes itself on the vine. These metabolic compounds actively compete with and kill botrytis (and sooty mould). Like all biocontrol agents, the best results for TripleX are obtained when the product is used as a preventative. It works by colonising the foliage, flowers and fruit (areas where the disease-causing fungi like to grow) to protect against Botrytis and sooty mould-causing fungi. The *B. amyloliquefaciens* produces antimicrobial compounds that destroy the disease and reduce re-infection. BioStart (n.d.).

To give local confirmation of TripleX efficacy over this early stage, BioStart were asked to conduct a trial to see if there was any significant benefit.

A trial was implemented in the Jarman Block of the Innovation Vineyard for V2019.

See appendix for the TripleX Trial protocol. The Marlborough season was very warm and dry, compounding on a poor fruit set that led to relatively open bunches at harvest. Consequently, botrytis pressure was very low.

Materials and Methods

Ben McLauchlan ran his conventional botryticide and canopy management program in the Jarman block.

In addition, a TripleX programme was applied as per the trial protocol in the appendix. In essence, to assess the impact of early and/or late season applications relative to a control.

Fruitfed Supplies Crop Monitoring Scouts were used to provide an independent assessment body for collecting the trial data.

Results

Disease incidence in Marlborough was very low for V2019. The trail results were as in Table 1.;

Botrytis	No TripleX	TripleX 2 x Late Season	TripleX 2 x Preventative	TripleX Preventative + Late Season
Incidence (%)	23.0	19.3	25.3	24.0
Severity (%)	0.57	0.60	0.90	0.85

TABLE 1. MARLBOROUGH TRIPLE X TRIAL RESULTS

No conclusion could be drawn from this season's outcome to show whether or not preventative TripleX applications applied early, or late season would reduce the level of botrytis at harvest.

Discussion and Conclusion

It was disappointing that there was no botrytis pressure in the local Marlborough trial. Local confirmation in a block known for high botrytis pressure would have given good confidence as to the potential benefits of early Triple X prevention of latent botrytis infections in young flower tissue, and young berries.

But the same trial protocol was conducted in a couple of chardonnay blocks in Gisborne. There was higher disease pressure, and the results showed a significant outcome. One of these trials included Foliacin, an elicit of plant defence mechanisms. BioStart Foliacin contains elicitor compounds and a combination of enzymes, signal molecules, bacteriocins and secondary metabolites from the fermentation of beneficial bacteria. These compounds mimic the presence of plant pathogens which in turn primes the plant's defence systems (systemic acquired resistance; SAR). A second activity is through restoring and repairing the leaf biofilm after fungicide or biocide applications. BioStart (n.d).

BioStart Chardonnay Trial 2 – TripleX plus standard programme. Figure 1.

- TripleX programme added to standard chemical programme
    - 80 % capfall and PBC
- Botrytis assessed 1 week before harvest
- Overall comment this was a low Botrytis pressure year, especially when compared to 2018 and 2017.
- Botrytis incidence reduced by 29 %
- BioStart programme gave a 13 % reduction in Botrytis severity
- This would have reduced crop loss in this crop

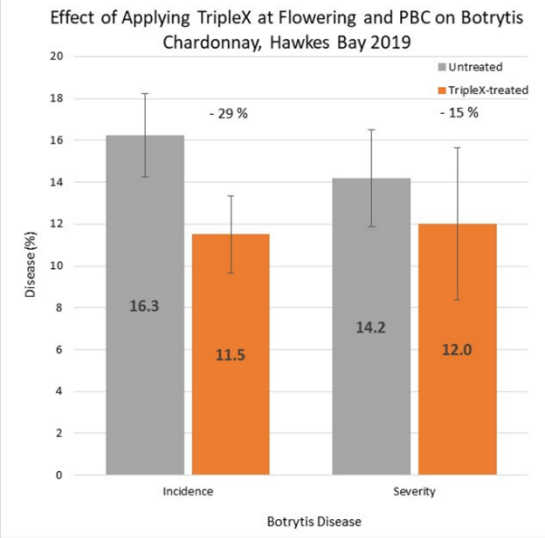

FIGURE 1. TRIPLEX PLUS STANDARD PROGRAMME

BioStart Chardonnay Trial 2 – TripleX and Foliacin with the standard programme. Figure 2.

- Foliacin and TripleX programme added to standard chemical programme
    - 80 % capfall and PBC
- Botrytis assessed 1 week before harvest
- This was a low Botrytis pressure year when compared to 2018 and 2017.
- Botrytis incidence the same which was low for Chardonnay
- BioStart programme reduced Botrytis severity by 27 %
- This would have reduced crop loss in this crop

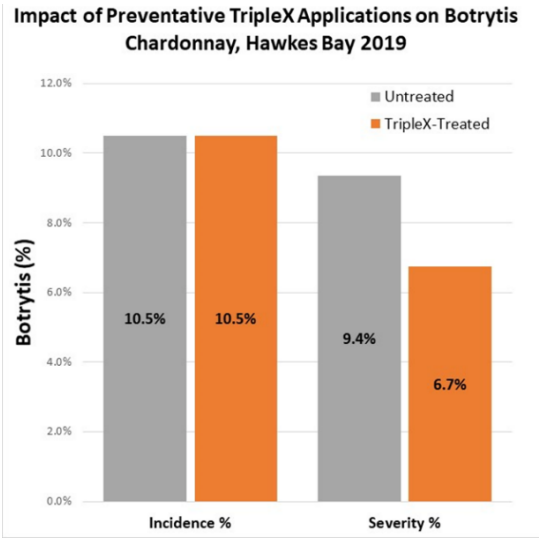

FIGURE 2. TRIPLEX AND FOLIACIN WITH THE STANDARD PROGRAMME

In both the above cases, potential crop loss to botrytis was significantly reduced.

In a commercial situation, reduced levels for botrytis has the potential to;

- Reduce the expense of lost crop and the labour cost to drop diseased fruit pre-harvest,
- Improve fruit quality at harvest,
- Reduce detrimental quality impacts on beneficial aromatics in the wine.

References

- BioStart (n.d.). *Foliacin; how it works*. http://biostart.co.nz/products/elicitors/foliacin/
- BioStart (n.d.). *TripleX; how it works*. http://biostart.co.nz/products/crop-protection/triplex/
- Young, S. (2018). New Zealand Novachem agrichemical manual 2018/2019. AgriMedia Ltd.

Appendix

BIO-START TRIPLEX TRIAL PROPOSAL 2018-19

Author: Jerome Demmer, CEO, Bio-Start Ltd

Date: 14 November 2018

Property: Marlborough

Crop: Sauvignon blanc

Key Contacts

Bio-Start:

- Jerome Demmer j.demmer@biostart.co.nz 021-593-609
- Geoff Warmouth g.warmouth@biostart.co.nz 021-794-276

Ben McLauchlan:

- Ben McLauchlan benmclauchlan@hotmail.com 027 486 6997

MGG:

- Johnny McMillan johnny@mgp.coop 027 486 6997

Crop Monitoring Services:

- Rena Mehrtens renamehrtens@pggwrightson.co.nz 027-244-9949
- Lynette Dick 027-473-2355

TripleX Trial

- **Aim**: measure impact of two preventative TripleX applications (at flowering and PBC) and two late season TripleX applications on top of a chemical programme.
- Spray programme
    - **Untreated** – use normal Botrytis chemical programme
    - **TripleX-treatments**; -
        1. TripleX @ 80 % capfall with Switch = preventative 1
        2. Pre-bunch closure = preventative 2
        3. At veraison but prior to Botrytis signs = late season 1
        4. Re-apply 3 weeks later = late season 2
        - All applications are at 1.5 L/ha in 300-600 L of water; water rate depending on canopy size
        - If disease pressure is high make a fifth, late-season TripleX application
- Trial design
    - Treat 4 rows per treatment with four treatments
    - 1 = rows 107-110 Control
    - 2 = rows 103 – 106 TripleX x 2 late season only
    - 3 = rows 99 – 102 TripleX x 2 preventative

    - 4 = rows 95 – 98 TripleX x 4 preventative and late season = standard full programme for vineyard
- **Disease Assessment CMS**: Assess 400 bunches from untreated, Digester-treated, TripleX-treated, and TripleX + Digester-treated areas and record
    - Powdery Mildew incidence and severity – late January
    - Botrytis and Slip Skin incidence and severity – immediately prior to harvest late March/early April