

BOTRY-Zen[®] RESEARCH SUMMARY FOR THE 2003/2004 SEASON

Botrytis control in vineyards world-wide is heavily dependant upon the use of synthetic fungicides to reduce crop losses. Fungicide resistance and the need to produce wines with zero chemical residue are both factors that have contributed to the search for alternative *Botrytis* control strategies. Biocontrol is an alternative to synthetic chemicals and is a strategy that is being actively pursued globally. In this article we review progress to date on the development of the biological control agent (BCA), BOTRY-Zen for suppression of *Botrytis* in grapes.

In the early days, (2002) the BCA consisted of a black, fermenting liquid that was shipped around the country in 20 litre buckets that had to be stored refrigerated until use. Formulation improvements meant that a concentrated frozen spore suspension was supplied to participating growers in 2003, but this was far from ideal. The development of the new BOTRY-Zen[®] water dispersible granule formulation towards the end of 2003 was an important leap forward in the commercialisation of the *Botrytis* antagonist, *Ulocladium oudemansii*, as a biocontrol agent for *Botrytis* control in grapes. The product, now in a dry form, has a shelf life of at least 6 months at room temperature, is easy to use and has proven to be effective in several vineyards and research sites.

Working closely with HortResearch scientists, we have evaluated BOTRY-Zen[®] in comparison with the usual botryticide programmes used by vineyard managers in regional grower trials in Gisborne, Hawke's Bay and Marlborough and in several experimental vineyards. Four applications are usually required (early flowering e.g. 1-5%; late flowering 80-90%; berry pea-size; and one at pre-bunch closure). It is vital to get BOTRY-Zen established within the bunch over flowering with the two applications at flowering and the addition of an advanced adjuvant will improve botrytis bunch rot control. Adjuvants trialled this season will be discussed later in this article. Both Gisborne and Hawke's Bay made a further two applications after flowering due to botrytis pressure. After veraison, synthetic botryticides should still be used to ensure control of *B. cinerea* infection on the ripening berries.

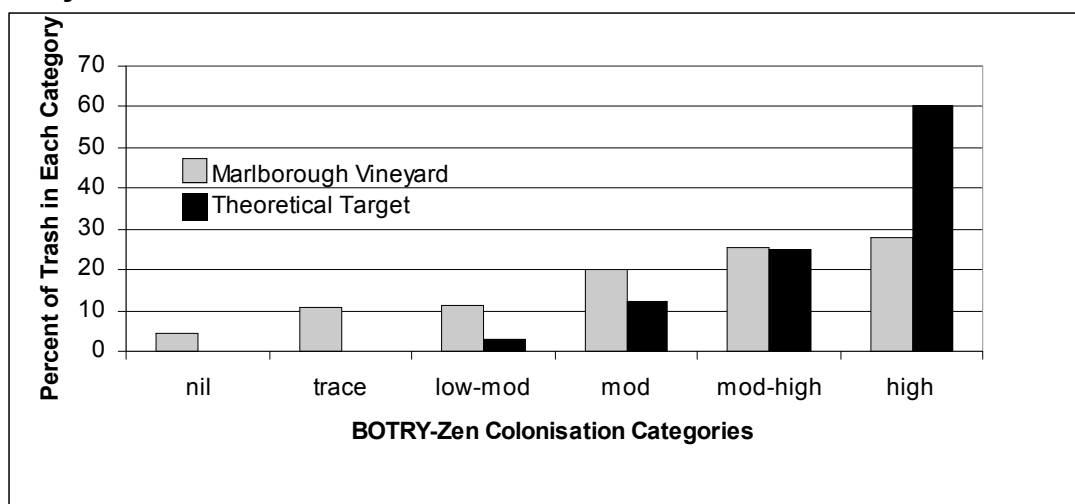
This season, Marlborough only required the two applications at flowering, and in samples taken at bunch closure, BOTRY-Zen was still active and colonising senescing bunch debris (caps, aborted fruitlets and other floral trash) within the grape bunch. Under some circumstances we still recommend that four applications be made in Marlborough, for example when;

1. there was a lot of *Botrytis* in the previous vintage (e.g. 2004 vintage)
2. *Botrytis* conducive conditions occur over flowering
3. extended forecasts predict a season of high disease pressure.

Delivery of a BCA to the sites where it is required to work is a critical factor that determines how well the BCA will perform in the field and in the next section we examine how well the product has been delivered to grape bunches. Where there was good delivery of the product, high levels of

colonisation of the bunch debris occurred (GRAPH 1) and good botrytis bunch rot control was achieved.

Graph 1: BOTRY-Zen[®] Colonisation of Bunch Trash at a Marlborough vineyard in 2004.



After two applications of BOTRY-Zen[®] over flowering, HortResearch scientists measured bunch trash colonisation by the fungal antagonist used in BOTRY-Zen[®]. This was then compared to a best case scenario called the “theoretical target” and this is the percent of bunch trash in each colonisation category that would be expected to optimise protection against *B. cinerea* by BOTRY-Zen[®]. At this Marlborough vineyard the grower achieved BOTRY-Zen[®] colonisation of bunch trash in the moderate and moderate – high categories close to the theoretical levels (GRAPH 1). Although the BOTRY-Zen[®] colonisation of bunch trash was not quite achieved in the high colonisation category, the grower still achieved good botrytis bunch rot control at vintage in his BOTRY-Zen[®] treated block that was as good as that in the standard botryticide sprayed block.

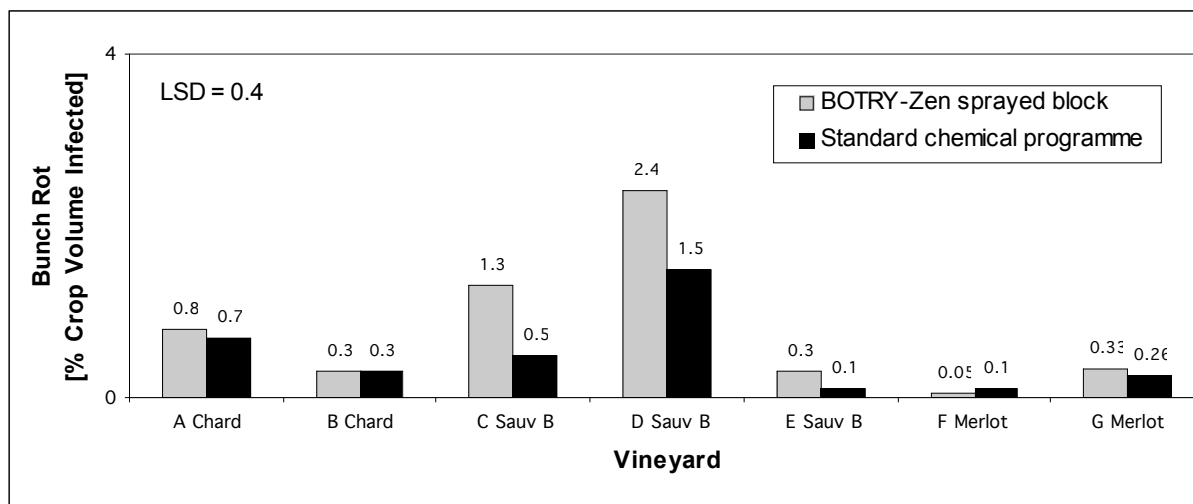
The other factors involved in protecting against *B. cinerea* infection include timing, as mentioned earlier the 2 applications at flowering are vital. BOTRY-Zen[®] must also be applied before *Botrytis* gets well established or within 12 hours of an infection period. New data suggests that tank mixing with some fungicides used for control of other important pathogens, such as powdery mildew and downy mildew is possible with some fungicides such as copper and sulphur but if these two fungicides are mixed they are likely have a detrimental effect on the establishment of BOTRY-Zen[®]. Therefore, the compatibility list supplied by the manufacturer should be adhered to. HortResearch is continually measuring the compatibility of BOTRY-Zen with pesticides, adjuvants and foliar nutrients used in viticulture in order to provide vineyard managers with the information they need to make the right decisions on mixes.

Regional Summaries

Gisborne and Hawke’s Bay had early *Botrytis* pressure with Hawke’s Bay experiencing 11 infection periods to mid-February 2004. This caused a lot of green berry infection which dried-up prior to harvest in both regions. Marlborough had low *Botrytis* infection pressure during December and January but severe infection periods at the beginning and end of February in this region gave rise to berry infections soon after veraison. As illustrated in

the graph below, there was comparable *Botrytis* bunch rot control in the BOTRY-Zen treated blocks compared to blocks that received the standard botryticide programme of Switch[®] over flowering and Scala[®]/Teldor[®] later in the season.

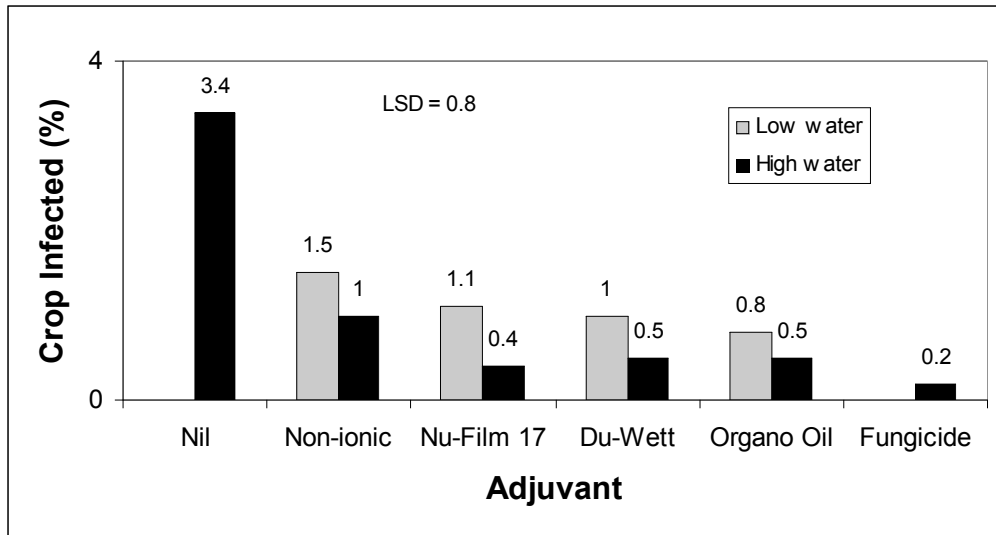
Graph 2: *Botrytis* Bunch Rot in Seven Hawke's Bay Vineyards, Vintage 2004



In Hawke's Bay there was no significant difference in the *Botrytis* bunch rot control achieved using BOTRY-Zen[®] and that achieved after a standard botryticide programme, except in some Sauvignon blanc vineyards (Sav blanc) where applications were poorly timed or BOTRY-Zen[®] was applied in a mixture of chemicals that may have had a detrimental affect on its germination .

As with most biological control agents, effective coverage continues to be the most important factor when applying a biological control product such as BOTRY-Zen[®]. Research trials carried out by HortResearch scientists showed that water rate applied per hectare and type of wetter can affect *Botrytis* disease control with BOTRY-Zen. For example, the advanced adjuvants (Nu-Film-17 and Du-Wett), applied at the higher water rate of 800 litres / ha outperformed a non-ionic wetter and compared to 200 litres / ha gave superior control of *B. cinerea* (Graph 3).

Graph 3: Botrytis bunch rot in Chardonnay, Hawke's Bay April 2004

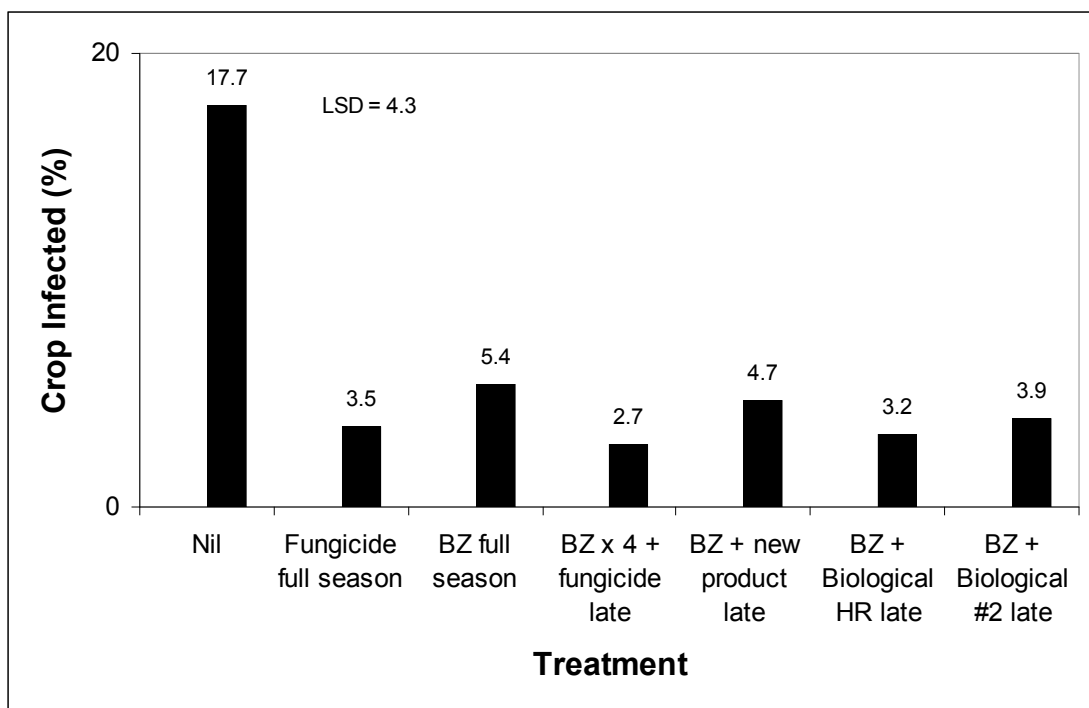


The graph shows that BOTRY-Zen[®] applied at a water rate of 800 litres / ha and with the addition of Nu-Film-17, Du-Wett or Organo oil, consistently reduced *Botrytis* infection compared to the low water rates (200 litres / ha) or a non-ionic surfactant.

New Developments

BOTRY-Zen Ltd and HortResearch have been evaluating new, late season biocontrol companions to compliment early season BOTRY-Zen applications. Results from an experimental vineyard in Hawke's Bay are very encouraging and will eventually provide wine growers with a full season biocontrol programme for *Botrytis* suppression.

Graph 4: Botrytis Infection at Harvest, Hawke's Bay Chardonnay 2004



In this high disease pressure block in Hawke's Bay, the recommended BOTRY-Zen[®] programme of 4 BOTRY-Zen[®] applications were made (early flowering, late flowering, pea size and bunch closure). A range of post-veraison ("late") treatments were then applied including a new product under evaluation by BOTRY-Zen ("new product"), a new BCA under development by HortResearch ("Biological HR"), and another BCA (Biological#2) soon to be registered for *Botrytis* control. All treatments were compared to a full season botryticide programme, consisting of; Shirlan[®] and Switch[®] at flowering, Captan[®] at pea size, Teldor[®] at PBC, Scala[®] at veraison, Captan[®] 4wks preharvest and Rovral[®] two weeks preharvest.

All the potential BOTRY-Zen companions under development significantly ($P < 0.05$, LSD Test) reduced *Botrytis* at vintage and disease control was comparable to a full season of botryticide applications, demonstrating that season long biocontrol of *Botrytis* is achievable.

Key Findings:

- (i) The production of a stable water dispersible granule successfully completes the development of a commercial BOTRY-Zen product suitable for use in New Zealand and international markets.
- (ii) The 2003/2004 trials with the new formulation confirmed that when the biocontrol product, BOTRY-Zen is applied correctly, it becomes well established within the bunches and reduces *Botrytis* infection of bunch trash.
- (iii) In the majority of BOTRY-Zen treated blocks in Hawkes Bay and Marlborough, *Botrytis* bunch rot control was as good as full-season botryticide programmes. In the high pressure area of Gisborne 3 blocks still achieved control as good as the botryticide programme, a number of blocks did not receive the recommended 4 applications of BOTRY-Zen or post-veraison botryticides.
- (iv) The integration of BOTRY-Zen into a conventional spray programme, reduces the number of chemical botryticides applied thereby improving the sustainability of New Zealand wine production and extending the effective life of synthetic botryticides.
- (v) Finally, promising results were achieved with full-season biological control programmes thereby offering both organic and conventional winegrowers a new *Botrytis* bunch rot control solution.

Acknowledgements

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