BOTRYZEN
proven natural science

Invented by:

Plant & Food RESEARCH
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Proud Members of:

MIDI-Zen®

BIOLOGICAL SOLUTION FOR *BOTRYTIS* AND POWDERY MILDEW

HISTORY

In 2003, two Plant and Food Research (PFR) scientists, Dr Kirstin Wurms and Dr Annette Ah Chee, developed a formulation based on a plant oil (coded NP2) that demonstrated anti-fungal activity, particularly against powdery mildew, in a number of crops including cucurbits, pipfruit, wheat and ornamentals. A small scale field trial in a Hawke's Bay research orchard on Chardonnay grapes also showed the potential of NP2 to control botrytis, as there was no significant difference in disease incidence between the spray programmes incorporating NP2 and the commercial fungicide programme.

A research team was formed in 2005 to carry out a Technology for Business Growth (TBG) project in collaboration with New Zealand Winegrowers (NZW) and Botry-Zen Limited (BZL). This involved a series of laboratory studies and vineyard trials over three years to evaluate a number of promising biologically-based products for use in integrated programmes against botrytis bunch rot. NP2 featured prominently in these trials and the focus was on developing its commercial potential with regards to efficacy against botrytis, whilst maintaining fruit quality, yield and canopy health.

The main NP2-based programme (coded BZ/NP2/BCA-L1) consisted of three components which covered the full growing season: BZ early-season (5% bloom to berries pea-size), NP2 mid-season (pre-bunch closure to veráison) and BCA-L1 late-season (veráison to harvest). BCA-L1, a biological control agent for late-season botrytis control, being developed by Plant and Food Research for NZW, is described in the other part of this article. Our experience over the last decade has demonstrated that multi component programmes consistently perform better than single or two component programmes under high disease pressure conditions.

In some trials, NP2 was also evaluated as part of another biologically-based programme with ARMOUR-Zen® (AZ) as the late season component (coded BZ/NP2/AZ). ARMOUR-Zen® is a chitosan-based product with anti-fungal activity, and has no withholding period so can be used up to harvest. Both BZ and AZ were commercialised by Botry-Zen Ltd in 2004 and 2007, respectively.

In the TBG project, these two biologically-based programmes were evaluated in vineyard trials and their performance was compared against a full season commercial fungicide programme (generally up to seven applications) recommended for high value, botrytis-susceptible grape varieties. Note that the products used in the 'standard' fungicide programmes can differ from year to year and between regions but the research team always used the fungicide programme that was being recommended by wineries for high value, high botrytis risk varieties for the specific region.

RESEARCH

MIDI-Zen has been registered with the ACVM for control of Botrytis cinerea and powdery mildew in grapes.

Field trials conducted in Hawke's Bay over two seasons and on three varieties showed that MIDI-Zen® reduced powdery mildew infection. Because these trials were focused on Botrytis control the actual treatments varied between blocks.
Sites: Havelock North, Hawke's Bay.
Varieties:
1. Chardonnay (clone UCD15), 7 year old plants grafted onto 3309 rootstock.
2. Riesling (clone Montana), 15 year old plants grafted onto S04 rootstock.

2.2 Field Trial Summary 2006 – 07

Sites: Hawke's Bay. Lawn Road, near Clive.

Varieties:
1. Chardonnay (clone UCD5), 10 year old plants grafted onto S04 rootstock.
2. Sauvignon blanc (mass selected), 17 year old plants grafted onto S04 rootstock.

Treatments:
Chardonnay

Programme	Early season				Mid season			Late season			
Nil botryticide	Nil	Nil	Topas	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
BOTRY-Zen-MIDI-Zen	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen
BOTRY-Zen-MIDI-Zen-BCAL1 + Topas	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	BCA-L1*	BCA-L1	BCA-L1	BCA-L1
BOTRY-Zen-MIDI-Zen-BCAL1	BOTRY-Zen	BOTRY-Zen	MIDI-Zen	BOTRY-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	BCA-L1	BCA-L1	BCA-L1	BCA-L1
Full season fungicide	Euparen multi	Switch	Topas	Captan	Switch	Captan	Captan	Captan	Captan	Captan	Rovral

*BCA-L1 – a biocontrol agent being tested by Plant and Food Research

Sauvignon blanc

Programme	Early season				Mid season			Late season			
Nil botryticide	Nil	Nil	Topas	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
BOTRY-Zen-MIDI-Zen	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen (10g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)
BOTRY-Zen-MIDI-Zen-BCAL1 + Topas	BOTRY-Zen	BOTRY-Zen	MIDI-Zen	BOTRY-Zen	MIDI-Zen (5g/L)	MIDI-Zen (5g/L)	MIDI-Zen (5g/L)	BCA-L1*	BCA-L1	BCA-L1	BCA-L1
BOTRY-Zen-MIDI-Zen-ARMOUR-Zen	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen (10g/L)	MIDI-Zen (2.5g/L)	MIDI-Zen (2.5g/L)	ARMOUR-Zen	ARMOUR-Zen	ARMOUR-Zen	ARMOUR-Zen
Full season fungicide	Euparen multi	Switch	Topas	Captan	Switch	Captan	Captan	Captan	Captan	Captan	Rovral

*BCA-L1 – a biocontrol agent being tested by Plant and Food Research

Assessments: Canopy assessments were carried out at vintage. Where present, fifty bunches per plot in the chardonnay and 30 bunches per plot in the sauvignon blanc (a small plot trial) were selected at random and inspected for powdery mildew incidence and severity. Percentage of the total crop infected was calculated as a product of disease incidence and mean severity.

Treatments:
1. Chardonnay

Programme	Early season				Mid season		Late season		
	5-15% capfall	80-90% capfall	Post bloom	Berries pea size	Pre-bunch closure	Post-bunch closure	Veraison	4-5 weeks pre-vintage	2-3 weeks pre-vintage
Nil botryticide	Nil	Nil	Topas	Nil	Thiovit Jet	Thiovit Jet	Nil	Nil	Nil
Full season Bio-2	BOTRY-Zen	BOTRY-Zen	MIDI-Zen	BOTRY-Zen	MIDI-Zen	MIDI-Zen	BCA-L1*	BCA-L1	BCA-L1
Full season fungicide	Euparen multi	Switch	Topas	Captan	Switch	Captan/Thiovit Jet	Captan	Captan	Captan

*BCA-L1 – a biocontrol agent being tested by Plant and Food Research

2. Riesling

Programme	Early season				Mid season		Late season		
	5-15% capfall	80-90% capfall	Post bloom	Berries pea size	Pre-bunch closure	Post-bunch closure	Veraison	4-5 weeks pre-vintage	2-3 weeks pre-vintage
Nil botryticide	Nil	Nil	Topas	Nil	Nil	Nil	Nil	Nil	Nil
BOTRY-Zen – MIDI-Zen	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen
BOTRY-Zen – MIDI-Zen (b)	BOTRY-Zen	BOTRY-Zen	Topas	BOTRY-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen	MIDI-Zen
Full season fungicide	Euparen multi	Switch	Topas	Captan	Switch/Thiovit Jet	Captan/Thiovit Jet	Captan	Captan	Captan

Assessments: Canopy assessments were carried out approximately 10 days after vintage, on 14 2006 (Riesling) and 22 April 2006 (Chardonnay). Fifty leaves per plot were selected at random and inspected for powdery mildew incidence and severity.

Results:

1. Chardonnay
There was no significant difference between the Full season Bio-2 treatment and the full season fungicide programme.

Treatment	Total Canopy Infected with Powdery Mildew (% area)
Nil botryticide	0.4
Full season Bio-2	5.1
Full season fungicide	0.2

2. Riesling
The two BOTRY-Zen – MIDI-Zen® treatments significantly reduced powdery mildew infection and were not significantly different from the Full season fungicide treatment.

Treatment	Total Canopy Infected with Powdery Mildew (% area)
Nil botryticide	25 *
BOTRY-Zen – MIDI-Zen	9
BOTRY-Zen – MIDI-Zen (b)	6
Full season fungicide	2

* significantly different from the full-season fungicide programme (P<0.05)

Summary: Powdery mildew infection in both chardonnay and riesling canopies following treatments with MIDI-Zen® through the mid-season were not significantly different from the Full season fungicide programme.

Results:
In both the chardonnay and sauvignon blanc, applications of MIDI-Zen® through the mid-season significantly reduced crop loss due to powdery mildew.
In the chardonnay trial the addition of the mildewcide, Topas, in the BZ-NP2-BCAL1 + Topas did not significantly reduce the amount of crop loss compared to the biological/natural equivalent treatment (BOTRY-Zen-MIDI-Zen®-BCAL1).

Treatment	Crop Loss from Powdery Mildew Infection (%)	
	Chardonnay	Sauvignon blanc
Nil botryticide	13.31	9.76
BOTRY-Zen-MIDI-Zen	0.12	0.14
BOTRY-Zen-MIDI-Zen-BCAL1 + Topas	0.02	0.03
BOTRY-Zen-MIDI-Zen-BCAL1	0.05	-
BOTRY-Zen-MIDI-Zen-ARMOUR-Zen	-	0.35
Full season fungicide	0.01	0.02
SED	0.058	0.192

Summary: Crop loss caused by powdery mildew infection in both chardonnay and sauvignon blanc bunches was significantly reduced following treatments with MIDI-Zen® through the mid-season.

In Conclusion:
Two seasons of replicated trials in three varieties of winegrapes prone to powdery mildew showed that MIDI-Zen®, applied through the mid-season, significantly reduced disease in the canopy and crop loss compared to an untreated control.

MIDI-Zen® is a natural product providing mid-season control by killing Botrytis spores within the canopy and with activity against latent infections.

It also has activity against Powdery Mildew and replaces applications of chemical fungicides through the mid-season.

MIDI-Zen® is registered for grapes. It is a natural product based on a soya lipid fraction. The product is presented as a emulsifiable concentrate (liquid) and is applied at 15L / ha. The mode of action is ant-fungal, also stopping latent infection.

MIDI-Zen® fits well with our current products in an IPM programme; however it can also be used by itself as a dual control application, or as an application against powdery mildew. Besides grapes there have been recent trials on roses and tomatoes.

Active Ingredient	Soya Oil
Formulation Type	Emulsion,
Product Type	Protectant/contact product
Toxicity	Non-toxic
Controls Diseases	Botrytis cinerea, Powdery Mildew
Mode of Action	Botrytis - stops spores from germinating and dries out establish mycelium Powdery Mildew - has anti-microbial action that desiccates mycelium and dehydrates the cell wall of the fungal conidiophores
Post Harvest Interval	Pre-bunch closer to veraison
ACVM Registration	P008636
Registered For	Grapes
BioGro Certification	In process
Shelf Life	24 Months
Developed by	Plant & Food Research, NZ
Manufactured by	Botry-Zen (2010) Ltd, Dunedin
Packaging Sizes	5L, 20L