

# Protective Management with Biologicals Offers Alternatives for Disease Control in the Vineyard

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## Introduction

As consumer markets continue to place pressure on food producers to reduce their use of chemical pesticides growers find encouragement to seek soft chemicals or biological alternatives to manage many of the more common plant diseases. Integrated pest management (IPM), once solely the realm of horticultural research institutes to combat insect pests, has now become a regular practice in many aspects of commercial horticulture. Management of common fungal diseases in the vineyard by using biologicals in conjunction with chemical fungicides has always offered certain advantages. Foremost amongst these is the opportunity to reduce exposure of both producer and consumer to chemical residues; most biologicals have a low or minimal toxicity or hazard rating and are generally considered as safe.

Unfortunately, often in the past the biological products available commercially have not conveyed sufficient levels of disease control to satisfy winegrowers who rely on the consistent production of a commercial crop for their livelihood. Fortunately to the benefit of growers, consumers and the environment, this is changing. One of the key reasons for this change is that we are learning more about how certain biologicals work. Unlike chemical fungicides that usually have a discrete and well understood mechanism of activity to control a certain disease, biologicals have potential for a number of different mechanisms of control. While this can be an advantage as it is more difficult for resistance to develop, these mechanisms have usually been poorly understood.

A better understanding of the mechanisms by which biologicals control disease has developed over the last few years after more than two decades of research conducted around the world. Now commercial formulations have been designed to exploit these mechanisms more effectively. Furthermore, with better knowledge about the protective properties these have against disease growers have been able to manage biological product application more effectively, thereby obtaining more consistent field results.

## Biological Fungicides

Biological fungicides work far more effectively as protectants. Unlike chemical fungicides they very rarely have much "knock down" effect once the disease has become well established. Product formulation and an appropriate specificity of the active ingredient are crucial in order to obtain consistent efficacy of disease protection against defined fungal pathogens. Crop management incorporating a suitable product re-application schedule to maintain sufficient activity above the lowest protective threshold level in the target area is also essential for efficacy.

How do biological products compare with traditional chemical pesticides? In many instances they are equally as effective. Take the example of the Bt insecticides derived from *Bacillus thuringiensis*, which have been adopted into main stream horticultural production. Biological fungicides have, however, yet to be embraced by the winegrowing industry with the same degree of enthusiasm, although in certain situations excellent results have been achieved with specific products. In New Zealand commercial biological fungicides registered for use in viticulture include formulations based on both bacteria and fungi as active ingredients. Biologicals registered for botrytis include Serenade® containing *Bacillus subtilis*, Sentinel® *Trichoderma atroviride* and Botryzen® *Ulocladium oudemansii* as active ingredients. Although Botryzen is not yet readily available from horticultural merchants it has undergone a number of seasons of commercial evaluation. Sentinel was launched in early 2005 and a significant amount has been applied to grapes during the latter part of this season, especially in Marlborough, which experienced botrytis conditions after consistent rain during March.

## Dieback

Dieback diseases are caused by wood invading fungi infecting vines through pruning wounds or other damage to the vine. The most common pathogens in New Zealand are *Eutypa lata* and *Botryosphaeria* species which produce infective spores that are released during rainfall. These can be carried for many kilometers by wind borne droplets and can infect pruning wounds to cause a progressive and degenerative die back condition which is generally fatal. After the infection occurs symptoms may not become apparent for several seasons but infection leads to shoot



Figure 1: Typical vine death from *Eutypa* dieback; Clare Valley, South Australia.