



Plant Health  
Products (Pty) Ltd

# Working with nature

Volume 3 No.1, 2010

## Biological balance

One of the many challenges that farmers face is the danger of practising intensive farming to the detriment of biological balance.

In the foreword to the recently published book *Biological Approaches to Sustainable Soil Systems*, MS Swaminathan, who coined the term 'Evergreen Revolution' warns that exploitative agriculture carries 'great dangers if carried out with only an immediate profit or production motive'. Among these dangers are that the 'indiscriminate use of pesticides, fungicides and herbicides could cause adverse changes in biological balance' and that 'intensive cultivation of land without conservation of soil fertility and soil structure could lead, ultimately, to the springing up of deserts.'

In contrast, his so-called Evergreen Revolution involves 'the enhancement of farm productivity in perpetuity without associated ecological or social harm.' For an Evergreen Revolution, we need, 'first and foremost, to have sustainable soil systems.'

A recent WWF report entitled *Agriculture: Facts and Trends; South Africa* has a similar outlook: "Poorly managed intensive farming has many negative impacts on the natural environment, on people's wellbeing and on a farmer's ability to adapt to change. A dependence and overuse of synthetic fertilizers, pesticides and herbicides reduces long-term soil fertility, causes soil erosion, pollutes water supplies, poisons fragile ecosystems, exposes farmers and farm workers to toxins, and contributes to climate change through greenhouse gas emissions.

"The cumulative impact of these factors degrades farmlands and their vital catchment areas. As a result, the long-term productivity declines and these areas become more vulnerable to climate change."

*Continued on page 2*

### The Law of the Land

Now this is the law of the land, son,  
As old and as true as the hills,  
And the farmer who keeps it may prosper,  
But the farmer who breaks it, it kills.

Unlike the laws of man, son,  
This law it never runs slack,  
What you take from the soil  
For your own, son,  
You've damn well got to put back.

(First verses of poem by Edgar Matthews from the Tukulu Collection, published in the 1950s, reprinted in *Farmer's Weekly*, 18 June 2010)

# Biological balance

*Continued from the front page*

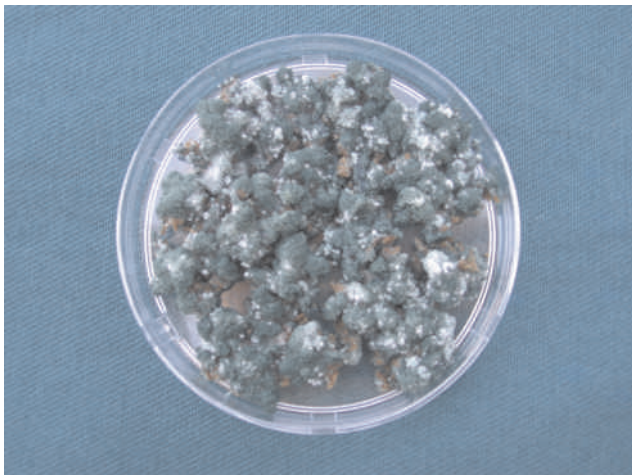
There is a growing conflict between the proponents of organic farming and chemical farming. However, the book *Biological Approaches to Sustainable Soil Systems* brings out clearly that there is no need to abandon all external inputs and that there can be synergy between organic and inorganic inputs.

Plant Health Products advocates the use of natural biocontrol agents or resistance-enhancing products such as potassium silicate where possible. For example, a biocontrol agent such as Eco-Bb has no withholding period and so can be used for whitefly or spider mite control during the harvest period. The product AgriSil K50, which contains potassium silicate, has been used very successfully in alternation with chemicals to help reduce chemical sprays (see article on page 3).

Bill Kerr wrote in the *Farmer's Weekly* of 9 April 2010: "Savvy consumers worldwide are motivating a radical shift towards organic produce. Whether or not their perceptions are misguided, farmers will have to adapt to survive."

He continued: "Because they are being policed, vegetable producers have become much more careful about what they use for pest control. Many companies specializing in organic products are coming to the fore, and pest-control reps are now selling both chemical and organic products."

"When I recall the products that I used when I started vegetable farming, I shudder," writes Bill Kerr. "One registered for cabbage pests was called Plantsol MP and was a mixture of DDT, toxaphene and parathion!"



*The beneficial Trichoderma fungus. Soil organisms such as Trichoderma can boost root growth and help control soilborne diseases.*



Perhaps the most worthwhile lesson to be drawn from organic farmers is that they focus their efforts on building a healthy soil, which plays a major role in promoting plant health.

As is written in the WWF report: "The small and microscopic soil animals and fungi hold the soil together (preventing erosion), aerate the soil, provide sustained breakdown and release of plant nutrients from organic matter, and - importantly - control soilborne diseases."

*Trichoderma* is possibly the most well-known of these beneficial soil organisms. The *Trichoderma harzianum* fungus in the product Eco-T is able to inhibit and attack the fungi that cause root diseases, as well as boosting root growth. When applied to seed, the fungus grows alongside the roots and acts as a protective layer against root pathogens, not temporarily as with a chemical application, but for the life of the plant. It is a common, naturally-occurring soil fungus and so is part of the biological system. Once a crop is removed, the levels of *Trichoderma* in the soil decrease to their natural levels.

This altered focus on soil sustainability and maintaining biological balance has steadily been leading to an increase in bio-pesticide use worldwide. Sales of bio-pesticides, biochemical pesticides and beneficial insects in North America and western Europe are forecast to grow by more than 70% over the next six years, according to UK market research firm Frost & Sullivan.

According to their report, the major growth factor in the market is the "escalating demand for chemical-free crops from end users and supermarkets." (From *Agrow No. 581, December 4th 2009.*) Woolworth's *Farming for the Future* initiative is a case in point. To quote from their latest brochure in the *SA Sunday Times*: "Together with our farmers we're pioneering a new approach to growing food sustainably and in harmony with nature, so that South Africa's farms will be able to provide enough food for future generations."

# A useful tool in reducing pesticide use

Recent trial results confirm that fungicide use can sometimes be reduced by alternating non-toxic potassium silicate with fungicides. Potassium silicate enhances plant resistance to pests, diseases and other stresses.

It is a fairly recent discovery that silica plays a significant role in plant defence, not only by physical means through improving plant tissue strength, but also biochemically, by switching on certain genes.

There is a growing trend to try alternating pesticides or fungicides and potassium silicate to achieve pest and disease control. This has the following advantages: 1) Reduces the amount of pesticide or fungicide applied; 2) Extends the life of an effective chemical treatment by preventing resistance build-up to that chemical; 3) Saves on costs; and 4) Potassium silicate is non-toxic with no withholding period and so can be applied when fruit or vegetables are being picked. However, caution is advised as it may have an adverse effect on the taste of fruit if sprayed directly onto fruit before harvest.

In a recent contract trial conducted by the ARC at Nietvoorbij at Stellenbosch in the Cape (South Africa), AgriSil K50 applied to grapes as a spray increased plant resistance to powdery mildew on leaves and fruit, leading to mildew levels equivalent to those on plants sprayed with the standard fungicide used for powdery mildew control (see graphs below). Interestingly, the treatment

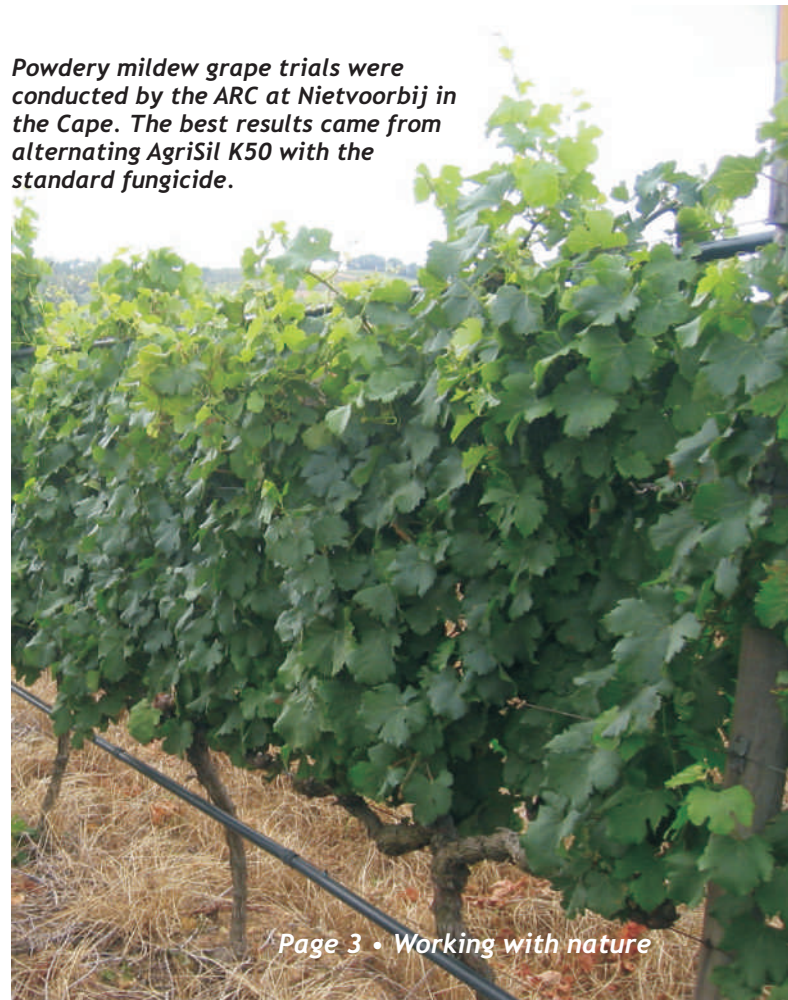
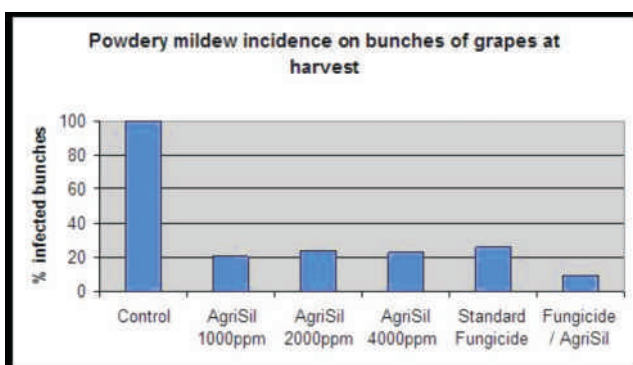
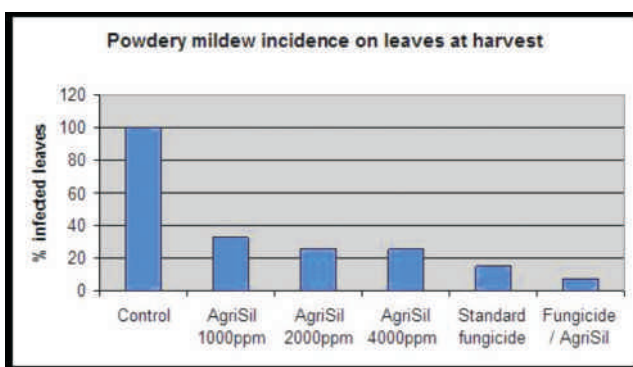
where AgriSil K50 and the standard fungicide were sprayed in alternation every 14 days gave the best result.

In a previous contract trial conducted by the same ARC researcher at Nietvoorbij, AgriSil K50 also reduced disease dramatically but was not as effective as the fungicide spray. Recommendations from other parts of the world where potassium silicate is being used and tested led to the idea of alternating the fungicide with potassium silicate.

Potassium silicate has also been shown to work synergistically with biological control agents. For example, AgriSil K50 and Eco-Bb gave better control of spider mite than either treatment applied on its own.

It is important to note that, although the Nietvoorbij grape trial does illustrate the concept of alternating fungicides with potassium silicate, the relevant research must be conducted for each crop-pest or crop-disease combination since not all soils and plants are deficient in silicon and not all crops have the same requirement for silicon.

*Powdery mildew grape trials were conducted by the ARC at Nietvoorbij in the Cape. The best results came from alternating AgriSil K50 with the standard fungicide.*



# Biological control product for whitefly and red spider mite

The newly-registered product Eco-Bb contains a fungus which attacks and kills certain insect pests, including the destructive and ubiquitous agricultural pests, whitefly and spider mite. There is more good news: A significant drop in the price of Eco-Bb.

A major advantage of this product is that it can be applied during the picking season as it is non-toxic and has no withholding period. It is suitable for organic and conventional agriculture.

The 'Bb' in the product name stands for *Beauveria bassiana*, the name of the insect-attacking fungus. Several strains of this fungus have been developed and registered for use as bio-insecticides in various parts of the world.

The particular strain of the fungus (strain R444) in Eco-Bb is a local strain isolated from soil in Clanwilliam and so is adapted to hot, dry, semi-desert conditions. In addition, Eco-Bb's unique formulation prevents the fungal spores from drying out and becoming deactivated under field conditions and enhances penetration and infection of the insect or mite pest.

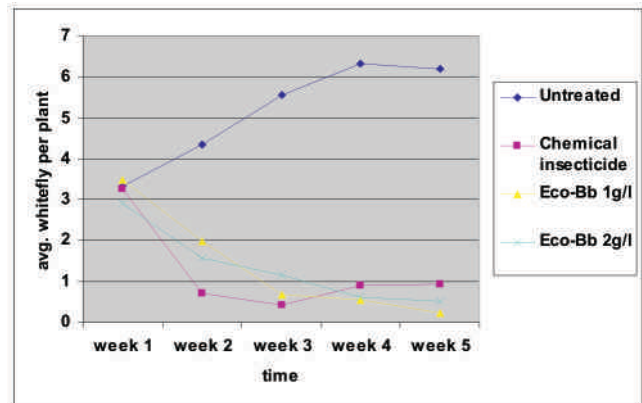
The registration in terms of Act 36 of 1947 is for the control of whitefly and red spider mite on beans, tomatoes, cucumbers and brinjals (Registration no. L8469). Plant Health Products plans to extend the registration in time to other crops and other insect pests.

In numerous greenhouse, shadehouse and field trials conducted at the University of KwaZulu-Natal from 2005-2007, the product proved to be effective against whitefly and red spider mite on a variety of crops. The trial results can be viewed at [www.plant-health.co.za](http://www.plant-health.co.za) Exceptional results have also been achieved in the control of red spider mite on field-grown strawberries.

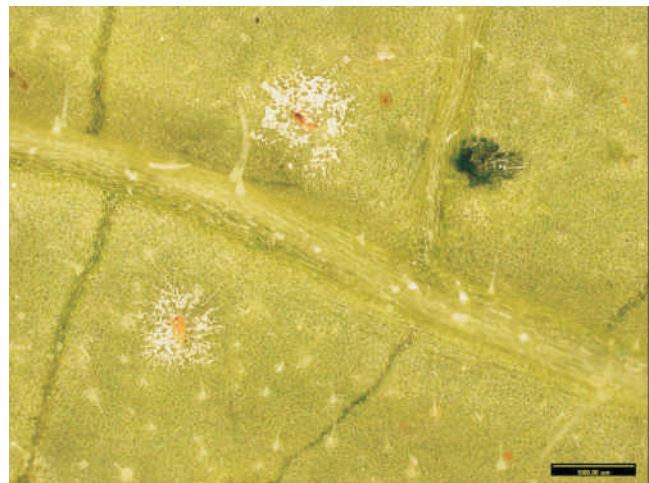
*Beauveria bassiana* is a common soil-inhabiting fungus and is non-toxic to people, the environment and to natural enemies of pests thus making it an environmentally-friendly way of keeping spider mite and whitefly under control. Under the correct environmental conditions Eco-Bb has been shown to achieve control levels comparable to existing chemical insecticides and miticides. The product also provides a good resistance management tool for the preservation of existing chemicals if the two measures are used in combination.

It has also been successfully used in combination with potassium silicate (see product information on page 3) to control red spider mite on strawberries and brinjals.

Eco-Bb and other biocontrol products from Plant Health Products are distributed through a network of agents in southern Africa. The price of Eco-Bb has recently been reduced due to an increase in the volumes being moved and an improvement in production methods.



Results of a trial to determine the efficacy of Eco-Bb for the control of whitefly on tunnel tomatoes.



Red spider mites infected with the *Beauveria bassiana* fungus

Bruce and Michelle Paterson have made up the marketing team of Plant Health Products for the past three years. Bruce Paterson has taken up a new position back in the seed industry as SA Country Manager for Seedco, and PHP wishes him well in this new venture. Michelle Paterson will continue on the marketing side at Plant Health Products. She holds an MSc degree in Plant Pathology from the University of Natal and has years of experience in agricultural marketing, PR and journalism. Please find her contact details below.