REPORT UPDATE AUGUST 2004

This is the final update of the report.

All contact details and websites have been checked and revised in:

> The List of Useful Sites at the end of Chapter 6 (pp. 111 – 113)
> Chapters 9 and 10 (pp.143 – 173)

Development of Producer oriented Site-specific research.

Several overseas research institutions that undertake organic farming research have been developing new research methodologies, working with producers to improve farming practices. Institutes such as the Louis Bolk Institute (LBI) and the Swiss Organic Research Institute (FIBL) are a driving force behind the adoption of organic and biodynamic technology by producers. They consider that good organic biodynamic research involves the producers.

The specific knowledge and skill base available for organic and biodynamic production has increased significantly so that there is less risk for newcomers. Methodology includes the development of observational and intuitive skills; skills, which farmers have been using for a long time but which tend to be neglected by modern science. These methods could readily be transferred to New Zealand.

Basic organic farming starts with the soil (healthy soil provides for healthy plants and healthy animals). Nevertheless, the first question many producers ask is what they can do about specific pest and diseases. Conventional science generally responds with research into the specific pest or diseases. But there may be a better way.

Black spot in apple orchards and botrytis in vineyards are examples of specific problems. Research usually concentrates on the lifecycle of the pest to determine where it can be interrupted. This has resulted in more environmentally friendly treatments such as fewer and less-disrupting sprays (for example, sulphur and copper based spays) or the use of antagonistic micro-organisms. It gives us more useable knowledge, but it is not the complete answer to our question, “What are all the factors involved with the occurrence of black spot or botrytis?” The occurrence of both diseases is varietal and site specific, which means that factors falling under those two headings need to be addressed.

A factor generally overlooked outside the organic research centres is soil/nutrient dynamics. Unbalanced nutrition is generally the main contributing factor to plant pest and diseases; one obvious factor is excessive nitrogen in spring and summer. It encourages both black spot in orchards and botrytis in vineyards. Most newcomers would say, “We do not use fertiliser so how do we have excessive nitrogen?” This is a suitable research question for on-farm research, because it is very site-specific.

Nitrogen comes from soil organic matter mineralised by soil micro-organisms. Thus the amount of soil organic matter determines the potential amount of nitrogen that could be released. It also means that the right conditions in the soil to maintain suitable micro-organisms are needed, and this is where the problem often lies. The

micro-organism requires moisture, air, warmth, food, a certain pH etc, to be functionally active, and a change in the weather can cause a drop or an increase in activity within a few hours. Micro-organisms are also very susceptible to daily and seasonal rhythms. The use of external inputs can cause a temporary population shift and the use of harsh agro-chemical creates nearly lifeless soils. This means that every different management method has different effects on microbial activity. If we include the factors such as different soil type, different (micro) climates, and different crop requirements (for example, nitrogen demand in apples is higher than in grapes) you will easily see that nitrogen management is a site-specific challenge.

Let's go further into the detail. Let's say our soil has an organic matter content of 3% which would mean about 6000 kg of nitrogen per hectare. We know that in a healthy soil in temperate regions we will probably have 2-4% mineralisation per year. This means 120 to 220 kg of nitrogen per year can be available for crop growth. For the needs of olives or grapes, 220 kg would be on the high side and a warm, moist spring could result in higher peacock spot (in olives) and higher botrytis (in grapes). Apples would still be outside the risk zone since their demand for nitrogen is higher. In a situation with 5% soil organic matter however, which would lead to 200 - 400 kg/ha available nitrogen, there would also be a risk of increased black spot. This is a theoretical example but it shows the importance of holistic organic / biodynamic research, which is aimed at site-specific prevention rather than cure.

Research stations like LBI and others mentioned in the report investigate nutrient dynamics (mineralisation, immobilisation, etc) on the farm and how they can be influenced to the grower's benefit. We cannot just work with a rough estimate of 2-4 % mineralisation / year in a temperate climate. To make nutrient studies really useful we need clearer rates of mineralisation, not yet available for many regions in NZ.

This illustrates how to focus formal research on questions of practical importance and make more effective use of the scarce time and expertise of producers and scientists Benefits of such on-farm research for the producer and the trained researcher include[1]:

- The scientist can acquire deeper insights into problems (and potential solutions) from the producer's point of view and discover possibilities not previously contemplated. These can be investigated in jointly designed and managed trials.
- Producers often have intuitive methods of problem solving, that the researcher can work with to develop into more transparent and scientifically acceptable methods.
- Criteria for content, design and evaluation of scientific trials can be adjusted to ensure that the producers' priorities are met while still satisfying accepted research criteria.
- Both parties can increase their understanding of local agro-ecological and socio-economic conditions and how introduced technologies can be adapted to them.
- All participants may be able to identify details to be studied more rigorously.

[1]Adopted from Farmers' Research in Practice; lessons from the field, 1997, edited by Laurens van Veldhuizen,Ann Waters-Bayer, Ricardo Ramirez, Debra A. Johnson and John Thompson)