

BIOFUMIGATION

What is it, and what benefit can it add to existing farming systems?

What is biofumigation?

Biofumigation is an agronomic technique that makes use of some plants' defensive systems. The main plant species in which this is found are the *Brassicaceae* (cabbage, cauliflower, kale, mustard) *Capparidaceae* (cleome) and *Moringaceae* (horseradish) species. In suitable conditions the biofumigation technique is able to efficiently produce a number of important substances. In the above plant families, one of the most important enzymatic defensive systems is the myrosinase-glucosinolate system. With this system, tissues of these plants can be used as a soft, eco-compatible alternative to chemical fumigants and sterilants. In a number of countries over the past few years, several experiments have been carried out to evaluate the effectiveness of the myrosinase-glucosinolate system, in particular using the glucosinolate-containing plants as a biologically-active rotation and green manure crop for controlling several soil-borne pathogens and diseases.

The use of this technique is growing, and it is studied in several countries at a full-field scale (USA, Australia, Italy, The Netherlands and South



Africa), thus triggering the interest of some seed companies, with a positive effect on the "biofumigation" seed market, which is significantly growing year after year. New potential has also been found for the dehydrated plant tissues and/or for defatted meal pellets production and use. An intense discussion amongst researchers of this topic in the various countries seems to be of fundamen-

tal importance particularly to define and develop future common strategies.

The First International Biofumigation Symposium was held in Florence, Italy in April this year. The objectives of the symposium were the following:

- To stimulate discussion and collaboration between researchers doing this work.
- To increase awareness of current research and extension projects .

- To share knowledge.
- To create an informal, international network of people working in this area.
- To establish a place to share information in the future.

One hundred and seven delegates from twelve countries (Italy, UK, France, Denmark, USA, Lebanon, Australia,

continued on p 44

Reinette Gouws is a Plant Pathologist at ARC-Roodeplaat, Pretoria. Her responsibilities include research on bacterial diseases of potatoes, diagnostic services of bacterial diseases on all vegetables and training in vegetable production in fields as well as hydroponic systems.

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Germany, The Netherlands, Belgium, Switzerland and South Africa) worldwide attended this meeting. During the course of the symposium the discussions on this subject ranged from very technical organic chemistry to on-farm applied research and development. The research done in South Africa was highlighted in a paper presented by Reinette Gouws on: "Biofumigation as alternative control measure for common scab on potatoes in South Africa". Full funding for attendance was supplied by the ARC as it was considered to be an opportunity that would have far-reaching application in SA's agro-economical industry and build on existing knowledge and international networks regarding biofumigation research.

Where does SA stand with this research?

Studies at ARC Roodeplaat were viewed as novel by other countries, as no other research has been conducted on the control of common scab by biofumigation. A few highlights from the paper were:

- establishing whether the disease can be controlled by soil incorporation of residues of *brassicaceous* crops;
- which brassica species/variety or type of tissue provides the best results and;
- the potential of biofumigation as an affordable and environmentally-acceptable alternative to agrochemicals for the control of common scab.

In the current biofumigation project running at

ARC Roodeplaat (funded by Potatoes South Africa), the following aspects are being investigated:

- on-farm field trials (Dendron) to evaluate efficacy against common scab;
- rotation regimes to optimise biofumigation potential; and
- application methods to ensure optimum effectiveness.

Areas that will need attention in the future include:

- chemical analysis of glycosinolates;
- irrigation scheduling coupled with brassica amendments; and
- ecological studies on the potato plant and pathogen interaction.

Why is research on biofumigation being done in South Africa?

It is important to research and apply alternative control measures as mentioned above and to integrate several cultural practices, as they are usually not as successful on their own as their chemical counterparts. These alternative control measures are of the utmost importance to the commercial and emerging agricultural sector in South Africa seeing that the cost of chemicals is very high and input costs are accumulating each year. The extensive use of the limited soil available also predisposes the farmers' crop and yield losses. The most important benefit from this research is the use of the technique as a control measure against a series of pathogens and pests in an integrated cropping system, perfectly suited to each individual farmer.



Die nuutste verslag oor wêreld inisiatiewe oor laat-roes(GiLB)

Dr Harold W. (Bud) Platt, Voorsitter GiLB Stuurkomitee, Landbou en Voedsel, Charlottetown, Prince Edward Island, Kanada

Laatroes word wêreldwyd as meer aggressief ervaar deurdat daar:

- Meer letsels voorkom.
- Die patogeen meer spore produseer.
- Halms en knolle word meer gereedelik geïnfecteer, nie meer hoofsaaklik die blare nie.
- Die patogeen beskik oor beter oorlewingsmeganismes.

Jaarlikse verliese as gevolg van laat-roes word op 15% beraam (\$ 3

biljoen per jaar).

GiLB navorsingsprioriteite:

- Bestandheidstelling.
- Studies van die patogeenpopulasie (Epidemiologie).
- Geïntegreerde beheerstrategie (IPM).
- Opleiding van navorsers en produsente.
- Inligting - die insameling en die disseminasie daarvan.