

Biological farming of sweetpotato on the Cudgen plateau

Sweetpotato farmers on the Cudgen plateau face a number of challenges to remain economically viable, while satisfying retailer and community expectations for product quality and environmental management.

Council worked with farmers on a recently-completed project to test and demonstrate biological farming practices in commercial sweetpotato production, trialling biological methods alongside conventional chemical treatments.

It measured their effects on pest control, soil quality and crop yields and delivered a number of recommendations for producers.

Recommendations for producers

- Utilise cover crops during the fallow to:
 - build soil organic matter
 - encourage biological control of root-knot nematode
 - increase populations of beneficial free-living nematodes and other soil biota
- Apply compost during the cover cropping phase to:
 - improve soil structure
 - enhance soil microbial activity to increase the availability of stored nutrients and suppress disease
- · Conduct soil testing to:
 - monitor changes in soil minerals
 - inform decisions about nutrient applications
- Applying biological farming practices over consecutive growing seasons is expected to bring continual improvements in crop yield, soil health and the wider environment, further sustaining agriculture on the Cudgen plateau.

Background

Root-knot nematode, a soil-borne plant pathogen, is a major cause of crop yield losses. Relying on pesticides containing the active ingredient fenamiphos to control nematodes provides variable results and can adversely impact on other soil biota responsible for productive soil health. The Australian Pesticides and Veterinary Medicines Authority has restricted the use of fenamiphos to just a few crops because of undue risks to the environment and human health, so sweetpotato growers now have to look for alternatives.

The Cudgen plateau is a highly productive agricultural landscape. However, past farming practices have significantly reduced the organic matter and soil carbon levels in its soils. Soil carbon has dropped to between one and three per cent, the lowest of any soils in the Tweed Local Government Area. Farming practices have also depleted biological activity and essential plant nutrients including potassium, calcium, nitrates and other highly mobile elements.

Biological farming methods enable appropriate interaction between the chemical (nutrients), physical (air and water) and biological (soil life) properties of the soil. It is a method of farming that has shown potential to regenerate soil, improve productivity and suppress disease.



Cover crops build soil organic matter, cycle nutrients and protect the soil from erosion.



Producers assessing storage root yield and quality.

Project trials

The project demonstrated biological farming practices in commercial sweetpotato production, investigating the effects on nematodes, soil health and productivity.

From January 2015 to August 2016, 0.5-hectare trial areas were established on two farms to investigate three treatment options.

Table 1. Soil amendments and products used in each treatment area

The Treatment 1 area was farmed biologically, with no conventional chemical inputs. Treatment 2 was farmed biologically but also included conventional chemical inputs including nematicides. The Control used conventional cropping practices, including inorganic fertilisers and chemical pest controls.

Product	Control	Treatment 1	Treatment 2
Cover crops (Lablab, veen, sorghum)	\checkmark	\checkmark	\checkmark
Compost & chicken litter	×	\checkmark	\checkmark
Kelp, molasses	×	\checkmark	\checkmark
P, N, S, Ca, Si, B	×	\checkmark	\checkmark
Neem cake and oil	×	\checkmark	\checkmark
Mycoforce [™] Rootguard [™]	×	\checkmark	\checkmark
Solubor™	×	\checkmark	\checkmark
Telstar™	\checkmark	×	\checkmark
Lorsban™	\checkmark	×	\checkmark
Nemacur™	\checkmark	×	\checkmark
Thimet™	\checkmark	×	\checkmark

The trial investigated the effects the different treatments had on:

- numbers of free-living nematodes and plant parasitic nematodes
- soil mineral and chemical properties
- storage root yield



Sweetpotato farmed biologically.

Results

After just one cropping cycle the demonstration found:

- Biological farming practices were just as effective at controlling nematode and producing quality yields as conventional chemical-based controls.
- Farming biologically was as cost-effective as conventional practices.
- Beneficial or free-living nematodes, including varieties that feed on rootknot nematode, increased in the presence of cover crops and high levels of organic matter.
- Populations of parasitic nematode were high across all treatment areas but sometimes higher in the biologically-treated areas. However, these did not affect crop yield or quality.

For further information or to participate in future projects, contact Council's Program Leader – Sustainable Agriculture on (02) 6670 2400.

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