Organic Knowledge Update

Soil fertility

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Dutch soil management and soil fertility

The organic sector depends heavily on its soils. In the Netherlands, relatively little acreage is available per farm compared to other countries. This means that the soil has to be kept in optimal shape for production, be it vegetables, cereals, potatoes or animal feed and grassland. To facilitate organic farmers, Wageningen UR and Louis Bolk Institute carry out a variety of research aimed specifically at soil management and soil fertility.

Compost can increase the organic matter content of the soil

Current affairs

A healthy and resilient soil is extremely important to the organic sector. Fertilizers and chemical control measures are not allowed. The right combination of crop rotation, soil tillage and the use of manure has to ensure long-term soil fertility. Soil management needs to support a self-healing soil system.

The carbon content and ability of organic soils to sequester CO_2 from the air is important to the mitigation of climate change. N_2O emissions from soils play an important role in global warming. Moreover, soil resilience against physical and biotic stress is a hot issue. Not only agronomic issues but also other ecosystem services play an important role as biodiversity and water storage are essential in organic soil management. Much research is carried out on these topics.

Aspirations

The ultimate goal of organic soil management is to achieve healthy soils; a firm basis for quality produce and products.

To achieve this goal the Thematic Working Group (TWG) Soil Fertility has been created. The TWG consists of representatives of organic farmers, trade organisations, agricultural consultants and the public sector. It has developed a number of knowledge and research projects. Additionally, the TWG helps to develop rules and regulations regarding organic production.

The ambitions of the TWG are: Reduction of greenhouse gas emissions by increasing the organic matter content of soils; Efficient management of minerals from manure and feed; Good soil fertility, the use of alternative mineral resources and compliance with the European 'Water Framework Directive'.

Goals:

- By 2020 all organic farms will focus their efforts on maintaining and increasing soil fertility by controlling organic matter.
- By 2020 organic farms produce so-called 'soil services' through sequestration of CO_2 and other greenhouse gases and water storage. This will mitigate climate change.
- By 2020 organic soils will be as sustainable as possible. Nutrient use (dosage and leeching) will be optimised.
- Production and yield of reduced tillage fields will be on par with or higher than fields that have been subject to intensive and deep ploughing.

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Reduced and minimal tillage have received a lot of attention in recent years. At times these techniques have been controversial in conventional agriculture. For organic farms minimal tillage seems to be a promising solution, doing little damage to the soil structure and causing only minimal disruption to soil organisms. Efficient weed control in organic cultivation is a major challenge in relation to reduced soil tillage. Modern techniques combining ICT, sensors and GPS are combined in weed control machinery and optimised to improve weed control. GPS techniques and other controlled traffic systems are also used to minimise damage to the soil. Minimising soil compaction and optimising soil structure is one of the key factors studied in relation to tillage and controlled traffic systems.

Organic management as a key factor for agronomic performance, climate effects, soil resilience and biodiversity is another focus point of research. Related to this, nitrogen dynamics are studied and results are implemented in famer's management tools such as NDICEA.

Fixed lanes prevent soil compaction

GPS techniques are important to both weed control and minimal tillage

Research projects

- **BASIS** Combining controlled traffic systems with minimal tillage has a large potential to improve soil quality, minimise greenhouse gas emissions, carbon sequestration and enhance biodiversity. This project tests and improves these strategies.
  Contact: Derk van Balen, Derk.vanBalen@wur.nl
- **Optimising nutrient management at farm-level** This project looks at the possibilities of a 100% self-supporting farming system for nitrogen. Aspects included in the project: Minimising the supply of minerals from outside whilst maintaining soil fertility; Optimising soil structure, internal flows of minerals and organic matter and soil health; Minimising direct energy use with minimal tillage and reduced need for transport.
  Contact: Gert van der Burgt MSc, G.vanderBurgt@louisbolk.nl
- **Controlled Traffic Farming Flevoland** This project aims to measure the potential merits of a true controlled traffic system combined with minimum soil tillage on organic farms in Flevoland province.
  Contact: Dr. Bert Vermeulen, Bert.Vermeulen@wur.nl
- **Quality of sandy soils** Developing and improving management of sandy soils. These systems should have a positive effect on energy-use, carbon footprint, biodiversity, environment and product quality, without compromising profitability.
  Contact: Janjo de Haan MSc, Janjo.deHaan@wur.nl
- **Truly Overijssel!** This project aims to develop sustainable organic farming systems with regional nutrient cycles and enhanced nature and landscape values in the province of Overijssel.
  Contact: Dr Ina Pinxterhuis, Ina.Pinxterhuis@wur.nl

Yellow mustard is a well-known cover crop

Literature

- Zanen, M., Koopmans, C., Bokhorst J. and C. ter Berg. 2008. Special Fertilisation: Successful strategies for sustainable soil management (Dutch with summary in English).
- Zanen, M., Bokhorst, G.J., Ter Berg, C. and C.J. Koopmans. 2008. Investing down to the soil (Dutch with summary in English).
- Sukkel, W. 2008. Organic and conservation agriculture, the best of both worlds? In: ECOMIT: Proceedings of the 5th International Scientific Conference on Sustainable Farming Systems, Piestany, Slovakia, 5-7 November 2008. - Piestany : Slovak Association for Sustainable agriculture, 5th International Scientific Conference on Sustainable Farming Systems, 2008-11-05/2008-11-07.
- Vermeulen, G.D., and W. Sukkel. 2008. Potential of low ground pressure for harvesting machinery in a controlled traffic farming system in organic agriculture. In: Ecomit. Proceedings of the 5th Int. Sci.Conf on Sustainable Farming Systems, 5-7 November, 2008, Piestany, Slovakia. - Slovakia : Slovak Association for Sustainable Agriculture, Ecomit. 5th Int. Sci. Conf. on Sustainable Farming Systems, 2008-11-05/2008-11-07.
- Sukkel, W., Geel, W.C.A. van. and J.J. de Haan. 2008. Carbon sequestration in organic and conventional managed soil in the Netherlands. In: Proceedings of the 16th IFOAM Organic world congress, Modena, Italy 16-06 to 20-06 2008.
- Haan, J.J. de. 2002. Integrated and ecological nutrient management. Wageningen: Applied Plant Research, (VEGINECO project report 3).
- Vermeulen, G.D. and J. Mosquera Losada. 2009. Soil, crop and emission responses to seasonal-controlled traffic in organic vegetable farming on loam soil. Soil & Tillage Research 102 (1). - p. 126 - 134.

Bioconnect aims to further develop and strengthen the Dutch organic sector by initiating and implementing research projects. Within Bioconnect organic entrepreneurs (from farmers to shop-keepers) work together with research institutes, colleges and universities and consultancy organisations. This leads to demand-driven research that is unique to the Netherlands.

Bioconnect
The innovation network of organic agricultural chains

The Ministry of Economic Affairs, Agriculture and Innovation sponsors these research projects.

Ministry of Economic Affairs, Agriculture and Innovation

Wageningen UR (University & Research centre) and the Louis Bolk Institute together carry out these research projects. About 140 projects dedicated to organic agriculture are currently under way.

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