

Healthy Soils for Sustainable Farms



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Take home messages

- *Healthy Soils workshops are delivering knowledge, skills, and tools to better manage soils for improved soil health*
- *Care must be taken with soil sampling, transport and laboratory procedures for accurate test results*
- *Management significantly influences soil biology through various practices such as controlling what quality and quantity of organic matter is incorporated into the soil through crop and rotation choice, the utilisation of additives such as pesticides and herbicides, and the intensity and type of tillage employed.*

The 'Healthy Soils' project recognises that soil is a key regional asset and is the basis for agricultural production in Victoria. Soil health is critically important to sustainable agricultural productivity and environmental wellbeing. Healthy soils provide a range of environmental services including water infiltration, habitat provision and profitable and sustainable agriculture.

The Healthy Soils project is helping farmers manage their soil for productivity and for environmental protection. The project aims to improve farmer's capacity to manage soil health issues by providing information and access to soil management strategies and techniques. It will leave a legacy of enhanced local knowledge and capacity around soil health for the future that will provide a resource for farmers, advisers and other educational providers.

Throughout 2008 BCG, in partnership with DPI's Healthy Soils team, ran eleven Healthy Soils workshops and four demonstration sites within the Wimmera Mallee for farmers and advisers. The Healthy Soils project focuses on providing workshop participants with the knowledge, skills, and tools to better manage their soils for improved soil health. The nine modules provide an overview of what the specific subject is, what it does and how farmers can improve it by management of soils. The modules developed are:

- Understanding soil tests – chemical
- Managing subsoil constraints
- Understanding soil types
- Understanding soil structure
- Understanding soil biology
- Managing soil organic matter
- Understanding soil health
- Managing soil erosion
- Understanding soil water use efficiency.

The following sections give a brief overview of the information extended to farmers and advisers through the BCG Healthy Soils workshops in 2008.

Understanding soil tests – chemical

Testing for soil chemical attributes such as phosphorus, nitrogen, pH, and organic carbon is an important step in successful and profitable farming. The chemistry of the soil is important, not only for plant nutrition, but it also has a role in soil structure, water retention and soil biological activity. However, there are many risks in soil testing, and unless care is taken with sampling, transport and laboratory procedures, test results can be misleading. Not only is it up to the farmer to ensure that the samples sent off to the lab are representative of their paddock/farm, but credible interpretation and effective communication of the results are key.

This module informed participants of the important points of sampling and transporting samples to the lab, laboratory methods and whether they are what you need and want, and how to assess whether your laboratory is the best choice for the participant.

Four workshops were held between February and May, one for advisers in Birchip and three for farmers in Sea Lake, Nhill and Birchip. Participants gained a greater understanding and confidence in soil testing for soil chemical attributes.

Managing subsoil constraints

Physical and chemical subsoil constraints are known to reduce crop growth and yield as they limit root growth, water use, and nutrient uptake. These constraints are found below the cultivated layer and they limit the ability of the crop to draw on water and nutrients from the soil. Key chemical subsoil constraints that have the greatest negative impact on crop growth are salinity, sodicity, boron toxicity, pH aluminium toxicity, and nutrient deficiencies. The key physical subsoil constraints on root growth are high soil strength and low aeration in the subsoil.

The impact of subsoil constraints varies with crop type/variety and seasonal conditions. Management of these soil issues is dependent on the severity and extent of the individual constraints on the property, understanding how subsoil constraints affect plant growth and how they interact with seasonal conditions.

Two workshops were held in Brim and Rupanyup in March for farmers. Use of a soil pit facilitated discussion on subsoil constraints relevant to cracking clay soil typical of the Rupanyup and Brim regions. Participants developed knowledge to:

- recognise subsoil constraint problems
- understand the inter-relationships between constraints and the management options available.

Understanding soil types

To understand how soil functions as a medium for plant growth, you need to understand what it is you want the soil to do. Soils are highly variable across landscapes and within paddocks. Soils differ due to factors such as parent material, texture, colour, physical properties (eg. strength), chemical properties (eg. pH) and biological activity. Dealing with soil variability across paddocks and properties can be tricky, and it is important that differences in key soil properties at the surface and to depth are recognised and considered in relation to soil management.

A workshop was held in Birchip in June. Participants gained a better understanding of the soil types in the region and an increased confidence to consider these in relation to management.

Understanding soil structure

Soil structure is influenced by many factors including texture, moisture content, organic matter, sodicity, compaction, and tillage, to name just a few. Some of the factors determining soil structure are inherent, such as the texture of the soil. However, soil structure is mostly controlled by how the soil is managed.

Good soil structure is vital for a productive and profitable farm. An ideal soil structure for growing plants is one that is friable at the surface but resists erosion and compaction, is resilient, and is able

to store large amounts of water. Not only does good soil structure control water supply, root growth, erosion, waterlogging, drainage and trafficability on the farm, but good soil structure has flow-on effects to the surrounding environment and the farming neighbours.

A workshop was held in Birchip in June. This workshop included field activities in the soil pit near Curyo that was also used as part of the BCG Main Field Day. Participants developed knowledge to:

- recognise soil structural problems and management constraints on the farm
- protect, maintain and improve soil structure.

Understanding soil biology

Soil biology is important for a healthy soil. The biota of a soil has an invaluable role in decomposing plant residue, improving soil structure, degrading pesticides and herbicides and regulating water quality. Soil biology is regulated primarily by soil water, temperature and soil type.

Management significantly influences soil biology through various practices such as controlling what quality and quantity of organic matter is incorporated into the soil through crop and rotation choice, the utilisation of additives such as pesticides and herbicides, and the intensity and type of tillage employed.

Two workshops were held in Birchip in August, one for farmers and one for advisers. Participants developed knowledge to:

- assess the soil biology resource
- protect, maintain and increase the various forms of soil biology.

Managing soil organic matter

Soil organic matter is important for a healthy soil. It has an invaluable secondary role in supporting and stabilising soil structure, increasing water retention, storing nutrients, building diversity, resilience and resistance to disease and buffering chemical behaviour.

Management significantly influences what ends up incorporated into the soil through the choice of vegetation and crop, rates of harvest and removal, soil surface management, utilisation of additives and the intensity and type of tillage practices.

A workshop was held in Murtoa in June for farmers and advisers. Participants developed knowledge to:

- assess the soil organic matter resource
- protect, maintain and increase the various forms of soil organic matter.

Other Healthy Soils activities

At the BCG Grains Research Expo in July, the DPI Healthy Soils Team had a stand with practical hands-on demonstrations that generated strong interest, especially from the regional schools and TAFE.

At the BCG Main Field Day in September, healthy soil issues such as soil types, constraints and management were the focus of the soil pit presentation.

BCG will continue to work with DPI in 2009 delivering further Healthy Soils workshops and other activities.

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