

Combating climate change and its effects on agriculture:

The importance of healthy soils under drought conditions

By Greg Paynter

The drought conditions of recent years that have swept Australia have meant farmers are now very interested in understanding more about soil health. In particular, producers are interested in maximising soil moisture, infiltration and are looking at alternative cropping and nutrition options outside high cost external input systems.

A workshop recently held at Tracy and Dean Rockemer's property at Boobyjan, in Queensland, attracted 84 producers. The field day was facilitated by the SE Burnett Landcare Group and run by Greg Paynter from the BFA through Land & Water's Healthy Soils for Sustainable Farms programme.

Major highlights

There were a number of highlights to the practical day but the most important included the following:

As a result of the hard work done by SE Burnett Landcare Group 84 producers and people interested in land management were able to gain insight on how farming management practices can provide soil health outcomes and its resultant ecosystem functions/services so that profitable outcomes can be realized.

Many soils have restricted root growth (compaction at 10cms) as soil beds are commonly rock hard (roots grow around them), this limits capacity for roots and soil biota to access nutrients, water and oxygen and hence limits productivity.

Complete soil nutrition is critical to help plants cope with



Healthy soil containing high soil matter and soil carbon.

Photo supplied by Lyn Abbott, University of Western Australia.

moisture stress, soil diseases and insect attack (includes trace elements for plant enzymes), therefore building stable humus is the key (holds 20 times its weight in water and reduces water use & soil temperature fluctuations) to optimizing productive capacity. Consequently there is a need for farmers to expand their understanding beyond just NPK nutrition.

Benefits can be obtained from using local resources like manures, composts, mined minerals (gypsum, lime and crusher dust-fines), and green manures. Pasture maximises root diversity for nutrient extraction through creating more diverse food sources and environments for soil organisms (root sloughing/carbon dumping) to increase soil organic matter and humus to realize their related ecosystem services of: nutrient recycling, soil regeneration, water retention and use efficiencies, ground water recharge, contaminant amelioration and carbon sequestration.

Participants from previous Soil Health workshops who have implemented the change from current practice to the use of locally obtained inputs have been more than pleased by the results obtained.

The use of grazing management (GLM, HRM), pasture cropping and advanced sowing, organic zero-till and Polyculture-integrated enterprise management assisted to obtain soil health outcomes and increased profitability.

Farm design is critical for maximizing production and reducing cost:

- Through wind breaks decreasing wind speed over grazing land increased production up to 15%.
- Providing habitat for predators to be maintained-IPM/ecological engineering.
- Landscape design for the creation of micro climates, water catchment and utilisation, biodiversity enhancement above and below ground.
- There are no disadvantages to improving soil health only multiple benefits.



Soil Health workshop run by SE Burnett Landcare Group in conjunction with BFA at a lucerne farm at Goobyjan, Qld May 07. 84 attendees provided good feedback on information presented on the day.

Big issues facing growers

Many growers identified a number of issues that they are now facing. Some of these included:

- Declining soil moisture levels and poor yields.
- Soil carbon levels are dropping leading to poor soil structure, water infiltration, nutrient availability and hence lower capacity for production under current climatic conditions.
- Rising costs of inputs and static income stretching cash flow
- Little feed on farm.
- Environmental issues of drought. (Hard to be green when you're in the red).

Costs can be controlled

The costs of production can be reduced by adopting soil health principles. Some of the major costs currently faced by producers include:

- Feed/fodder – grow your own quality feed with healthy soils.
- Chemicals – disease & insects are increased by plant stress (soil health mitigates plant stress).
- Fertilisers (use cheap local fertilisers like manures, compost and other nutrient resources.)
- Fuel – increasing humus softens soil reducing machinery draft and the expense of the capital required to pull machinery.

Follow up activities discussed

A number of follow up activities were recommended by the producers. These included:

- More practical knowledge
- Specialised workshops-composting and farm design for water conservation

There is funding available for a further 12 workshops to be run on soil health. For more information contact: Greg Paynter, phone mobile: 0424 092 064; email <greg.paynter@bfa.com.au>

CarbonSMART – launch of the first Australian carbon pool

Landcare's CarbonSMART program was launched this year in March. It is Australia's first carbon pool management and brokering service for supporting biodiversity.

The aim of CarbonSMART is to offset emissions of carbon dioxide by providing an income to farmers for the growing and maintenance of native vegetation on their land.

It is estimated that a 10 hectare area of trees with mixed species could yield about \$20,000 over a 30-year period. For more information including on eligibility, ph 1800 151 105 or visit www.carbonsmart.com.au.



Jack Thompson, actor and Landcare ambassador, helping at the launch of CarbonSMART in March.

Biodiversity for combating the effects of climate change

The importance of biodiversity is gaining ground in discussions on how to best combat and reduce the effects of climate change. While climate change will bring with it warmer temperatures and better productivity to some areas of Australia, most regions it is said will have tougher, drier growing conditions and will benefit from implementing management systems for increased resilience.

The June issue of the *Australian Landcare* magazine was dedicated in major part to climate change where biodiversity was continually raised as a key component in building the resilience of our farmland as well as entire landscapes. Editor Patrick Francis writes "In terms of how future landcare is practiced for conservation and farming, it seems there is a key strategy, that is, increase biodiversity – the more the better." He notes that "Revegetation, cropping and pasture programs are likely to be more successful over time if based on species complexity rather than species simplicity."

An example from South America is the work being carried out by Peruvian agronomist Zenon Gomel Apaza..

When conventional agriculture as we know it today was introduced into Peru in the 1960s, synthetic inputs, machinery and new high yielding hybrid varieties made the Andean communities vulnerable with the reduction of the genetic base of plants farmed.

Mr Apaza is encouraging families to diversify the genetic varieties of seeds and tubers in addition to using traditional

methods of soil preparation with the result of recovering eroded hillsides and improving crop yields.

Mr Apaza comments "A diversity of plants has more possibilities of surviving adverse environmental conditions." About 5000 potato varieties have been identified by the Peru based International Potato Centre. With thousands of years of mountain farming knowledge, the Andean farmers are able to plant potatoes suitable for different soil types, temperatures, location and exposure.

Meanwhile a global initiative will for the first time fund the rescue of crop biodiversity worldwide in two ways. Firstly, it will secure under-funded seedbanks in developing countries housing 95% of endangered crop diversity. Secondly it will develop a comprehensive global information system allowing plant breeders to search genebanks worldwide for seed varieties with traits for better resilience.

The joint initiative is being led by Global Crop Diversity Trust and its partner the United Nations Foundation with the injection of an enormous donation of US\$37.5 million from the Bill and Melinda Gates Foundation.

President of the United Nations Foundation, Timothy Wirth said "The genetic diversity found within each crop is the raw material that enables plant breeders and farmers to develop higher yielding, more nutritious, and stress-resistant varieties."

Source: *Australian LANDCARE Magazine*, June 2007