wheatbelt natural resource management

Djilba - Kambarang

Wheatbelt NRM quarterly newsletter Issue 18 Spring 2013

The Greatest Gnammas on Earth!

Downloadable Farm Tools

Soil Carbon Change in Farming Systems

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This publication is produced by Wheatbelt NRM through funding from the Australin Government's Caring for our Country

CARING FOR OUR COUNTRY

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75 York Road
Northam Western Australia
PO Box 311 Northam WA 6401
Phone: (08) 9670 3100
Fax: (08) 9670 3140
Email: info@wheatbeltnrm.org.au

www.wheatbeltnrm.org.au

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AM FERTILISERS

What is NRM?

Natural Resource Management (NRM) is the sustainable management of Australia's natural resources (our land, water, marine and biological systems). NRM is vital to ensure our ongoing social, economic and environmental wellbeing.

More than just planting trees...

Our natural resources are everywhere. They are in our bush, around our coast, along our rivers, on our farms and in our cities and towns. In essence our natural resources are our water, soil, plants and animals. Importantly, people are a resource too- our farmers, our landowners and our rural and urban communities.

Natural resource management is about taking care of these natural resources, with a particular focus on how the management affects the quality of life for both present and future generations.

Building strong, vibrant and resilient communities is one of the aims encompassed by Natural Resource Management and recognises that we need sustainable and profitable farms for these communities to continue, especially in rural areas such as the Wheatbelt.

Who is Wheatbelt NRM?

Working with the community to manage our natural resources.

Wheatbelt NRM is an independent, community-based group providing community leadership for natural resource management. We focus on promoting and coordinating improvements in environmental, social and industry practices relating to natural resources outcomes in the Avon River Basin.

It actively engages with the community to undertake key projects and other initiatives that bring benefit and improvement to natural resources within the Avon River Basin. The staff at Wheatbelt NRM bring together their experience from a wide variety of backgrounds to work in key project areas of Sustainable Agriculture, Sustainable Communities, Biodiversity and Water.

The talents of the wider community are also acknowledged by showcasing innovation in sustainable farming practises as well as traditional knowledge in land management.

Becoming an associate member of Wheatbelt NRM is free, easy and keeps you up to date on current events, funding opportunities and who's doing what and where in the region. Associate members are provided with ENews, issued fortnightly by email and the Wheatbelt NRM Newsletter, issued quarterly.

Andrew Shanks

Community Support Officer

Andrew is Wheatbelt NRM's Community Support Officer in the Shire of Wongan-Ballidu. If you would like to contact Andrew please ring on 0438265028 or email: ashanks@wheatbeltnrm.org.au

Bush Stone-curlews

By Mike Griffiths (WWF)

What can you do?

- Be aware of stone-curlews while driving vehicles
- Control dogs and cats
- Support fox control in your area
- Fence livestock out of remnant bushland where practical
- Refrain from removing fallen timber from bushland areas
- If you see a Bush Stone-curlew contact the Department of Parks and Wildlife

Bush Stone-curlews *(Burhinus grallarius),* also known as Bush Thick-knees or just "curlews", are large ground-dwelling birds that are approaching extinction across the Wheatbelt. In these areas they are under constant threat from foxes, cats, dogs, disturbances by grazing stock and even from the collection of fire wood in bushland. They were once common across southern Australia but numbers have declined and they are now recognised as a threatened species across much of this area.

Many Wheatbelt old-timers talk about hearing the eerie "weer-lo" calls of the Stone-curlews after dark in years gone by but today few local people see or hear them.

Bush Stone-curlews feed mostly on insects, spiders and other small animals including skinks and frogs. They forage over large areas of bushland and mate for life. Curlews are mainly active at night when their distinctive wailing calls may be heard. They depend on their well-camouflaged plumage for safety while they roost on the ground during the daytime, and will often allow people to approach within metres, usually crouching or freezing in odd poses before running or flying away. The nest is a simple scrape on the ground, making the eggs and chicks very vulnerable to foxes, dogs and cats. If undisturbed, pairs will return to the same area to nest year after year. Branches and sticks on the ground are essential for the birds' camouflage to be effective and to hide their nests - they rarely attempt nesting on bare ground.

While stone-curlews are normally very wary of people, in some areas they seem to happily cohabit and tolerate day-to-day human activity.

Wheatbelt NRM Bush Foods Workshop

By Anika Dent

Janet and Yvonne Kickett learning about the bush potato trial at Gabbin

As the climate across the Wheatbelt changes, many farmers are seeking crop species that could provide greater sustainability than traditional crops. The bush foods industry may offer a viable alternative with many species being successfully cultivated across Australia.

The Noongar people have cultural and custodial responsibilities for the bush foods of the South West Region of Western Australia, and Wheatbelt NRM are looking to work with Aboriginal land managers in the Wheatbelt to trial dryland and locally occurring native bush food species on their properties.

After Aboriginal land managers expressed interest in expanding their businesses into the bush foods industry Wheatbelt NRM held a bush foods workshop on May the 14th and 15th. Representatives from Woolah-Wah Land Aboriginal Corporation, Nguna Morrt Aboriginal Corporation and Yaraguia Enterprises Incorporated as well as the Wheatbelt NRM Noongar Elders Advisory Group attended the workshop.

The workshop included farm visits, presentations and practical demonstrations. Noongar Elder Vivienne Hansen demonstrated how to make medicinal products from native plants. Peter Wells from Cooperatives WA presented on developing a business model and how a cooperative could work in the bush foods industry. Don Woodcock and Georgie Troup from Wheatbelt NRM presented on farm planning. The group also visited Connie and Marty Winch-Buist's Sandalwood plantation in Greenhills, Geoff Woodall's bush potato trial at Ros and Bob Huxley's place in Gabbin, and Rob and Beth Boase's nursery in Dowerin.

Through this workshop the Aboriginal land managers gained important knowledge and networks that they can use to develop their own bush food businesses. The workshop also provided a space for the group to exchange cultural ideas and knowledge of bushfoods with each other and others already working in the bush foods industry.

The Greatest Gnammas on Earth!

Excerpt from the Derdibin Gnamma booklet

By Christie Kingston quoting Kevan Davis

This information is taken from a recent publication by Wheatbelt NRM called The Derdibin Gnamma Storybook available for download on the qr code right or contact the office for a hard copy - but numbers are limited!

Although other countries have rock holes, Western Australia's ancient landscapes have the biggest and best pit gnammas in the world.

Kevan Davis at the Derdibin Gnamma

Precious water

'Water kept our people alive, so gnammas were sacred to them. They were guarded and regularly cleaned. Slabs of rocks were placed over some smaller pit gnammas to reduce evaporation and prevent wildlife from falling in and drowning. Large gnammas like the Derdibin gnamma were rare and highly valued.'

'When a group of people first arrived at a gnamma only the eldest – the decision maker – would drink the water at first. This elder would ensure that the water was safe. The others would wait, and then take turns to drink one by one. '

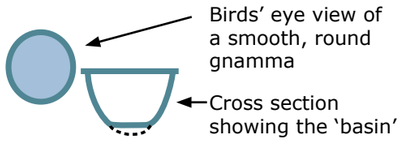
Food

'Gnamma attracted animals and birds that we hunted and ate including yonga (kangaroo), djurrang (lizards), djert (birds) and yerderap (ducks).'

'There are mangart (jam trees) near the Derdibin gnamma. Aboriginal people would have dug carefully around the mangart roots to gather bardi (witchetty grubs). The mangart had 73 uses, including being burnt in smoking ceremonies for healing and protection. We never cut mangart or kwel (she-oaks) down; we just used what had fallen.'

How gnammas form

The three-stage process below forms a smooth, roundish, hemispherical basin.



1

A depression in the rock starts.

Possible ways it starts include:

- sun exposure causing flaking,
- breakdown of crystalline irregularities,
- lichen attachment,
- attack of acid groundwater on bedrock.

2

The rock breaks up.

Alternate wetting and drying weathering bedrock granite is the most accepted explanation of how rock breaks up. Other possibilities include:

- continued sun exposure,
- xenolith (bits of foreign rock) attack, and
- the direct action of wind and running water.

3

The debris is evacuated.

The broken rocks:

- get taken away by wind,
- get dissolved in solution, or
- are removed by people.

Canoe

If there are weaknesses in certain places in the rock, more weathering happens there, changing the neat round shape into other shapes. For example, weakening in rock joints helps form canoe-shaped gnammas.

Soil Science Monitoring

By Professor Lyn Abbott

The On-Farm Soil Monitoring Handbook was developed because of the increasing interest in Soil Biology within the Wheatbelt community.

The On-Farm Soil Monitoring Handbook is based on the 'Monitoring Soil Science' resource developed by SPICE, a collaborative program between the Western Australian Department of Education and the University of Western Australia. The SPICE 'Monitoring Soil Science' resource helps teachers introduce scientific methodologies, including soil sampling strategies, to students and provides a platform for ongoing soil-based scientific research. The On-Farm Soil Monitoring Handbook has adapted this resource for use by farmers as a tool for monitoring aspects of soil health.

The On-Farm Soil Monitoring Handbook is used in conjunction with practical hands-on workshops that demonstrate the procedures for assessing soil fauna and *mycorrhizal fungi*.

Click on the QR code left to download the Soil Science Monitoring handbook.

Examining soil fauna extracted from soil at the Leibe Group Workshop (Photo: L Abbott).

Soil

It is a complex and fragile medium in which there are interactions between water, air, minerals, organic matter and roots. Soils contain pore spaces with varying proportions of air and water. Soil is made up of weathered parent bedrock and deposited minerals.

Organic matter is a relatively small part of the soil, encompassing plant and animal material both living and dead, but its influence is vast. Organic matter is crucial to soil's chemical fertility, resilience and structure, and it is the source of energy and carbon for many soil organisms.

Diversity of soil organisms

Soil organisms include bacteria, fungi, microarthropods, nematodes, earthworms and insects. Most soil organisms are largely dependent on soil organic matter or living plants and perform a number of vital processes in soil. Some of them are involved in the transformation of inorganic molecules in soil and are not directly involved in the soil carbon cycle, but they are indirectly influenced by organisms that cycle soil carbon. While certain soil organisms (such as plant pathogenic nematodes) may have detrimental effects when they are present in high numbers, in a healthy soil, they rarely become pests.

Soil organisms individually or in combination have roles including:

- **helping soil to form from original parent rock material,**
- **contributing to the aggregation of soil particles,**
- **enhancing cycling of nutrients,**
- **transforming nutrients from one form to another,**
- **assisting plants to obtain nutrients from soil,**
- **degrading toxic substances in soil,**
- **causing disease in plants,**
- **minimizing disease in plants, and**
- **assisting or hindering water penetration into soil.**

Seedling Selector

Know where to plant forage shrubs and trees on your property

Instant decision making advice, right at your fingertips

And its FREE

Downloadable on an iPhone or Android smartphone, the Seedling Selector App allows farmers to tap in information from their own property and generate a list of species suitable for their site, helping to take the guess work out of what to plant where.

- Advice offered for more than 45 different forage shrubs and agro-forestry options.
- Includes how best to establish the species including planting design, grazing and harvest management.
- Includes the risk of possible pest and disease problems.
- Advises how to optimize returns through improved management.
- Including information specifically for timber production, forage shrubs, Sandalwood, Brushwood, Oil Mallee, biodiversity and biomass.

Discover which plant suits your on-farm revegetation project. Using your paddock information you can generate a species list of plants which will suit your site. Recommended species include forage shrubs, timber, biomass, Sandalwood, Brushwood and Oil Mallees.

Click on the QR code above for more information and links to downloads on iOS and Android.

Farming Landscapes for the Future Tool (FLFT)

Farm forestry has been increasing in recent years and provides commercial and environmental benefits, such as biodiversity conservation, salinity control and protection from soil erosion.

In the South of Western Australia, there has been a recent trend of decreasing rainfall, and this is predicted to continue into the future. Trees may perform better with decreased rainfall in comparison to shallow-rooted annual crops, due to their ability to obtain water from a greater soil volume. Perennials may also benefit from the predicted increased frequency of summer rainfall events.

Despite the benefits of incorporating trees into farming landscapes, landowners may find this a difficult option to implement given the establishment cost and the prospect of delayed or reduced farm income. Therefore, the potential costs and benefits of changes in farm production need to be well considered. The Farming Landscapes for the Future software (FLFT) was developed to assist landowners in assessing the risks and benefits associated with land-use decisions.

This software uses a database of predicted tree, crop and pasture production in the Avon River Basin under current and future predicted climates, and forecasts the economic implications of different scenarios. Options include: tree crops sandalwood, Oil Mallee, Brushwood and mixed biodiversity plantings and annual crops Wheat, Barley, Canola, Oats and annual pasture for livestock.

The industries around these tree crops are still developing and the potential viability of farm forestry industries is unknown, therefore economic predictions are uncertain. Profitability will depend on future developments to tree crop industries, but this software uses the best information currently available to give an indication of potential income from trees, and gives the means to rapidly compare this to the financial performance of annual crops and pasture.

Due to the difficulty in quantifying the potential financial gain from the environmental benefits of tree plantings, (e.g. soil conservation), this is not accounted for in this software.

Click on the QR code right to download the FLFT program

Farming Landscapes For The Future

CARING FOR OUR COUNTRY · wheatbelt natural resource management · CSIRO · AVONGRO

Soil Carbon Change in Farming Systems of the Avon River Basin

Andrew Wherrett (Living Farm Pty Ltd).

Key Points

- **Topsoil (0-10 cm) carbon has largely declined over the last five years in the Avon River Basin.**
- **High soil temperature and soil moisture during summer promotes increased microbial activity and organic matter breakdown.**
- **Summer active cover provides an important source of carbon during wetter conditions, with current weed control practices limiting the soil of a future carbon source**
- **Detailed knowledge of preceding climatic factors are an important consideration for temporal measurement of soil carbon.**

Background

For carbon sequestration, soil makes sense. It is the largest store of carbon on earth – larger than the atmosphere, biosphere and hydrosphere. A small increase in soil carbon across large areas has the potential to make a massive difference to atmospheric carbon. That is why there is so much interest in soil carbon sequestration, and encouraging farmers to change management strategies to improve soil carbon is one method of doing that.

But why is it so difficult to increase soil carbon in the Avon River Basin? Not only are soil type and climate major limitations to increased soil carbon storage (see How Much Carbon can Soil Store Factsheet), but management practices like traditional summer weed control strategies may also be having a negative influence.

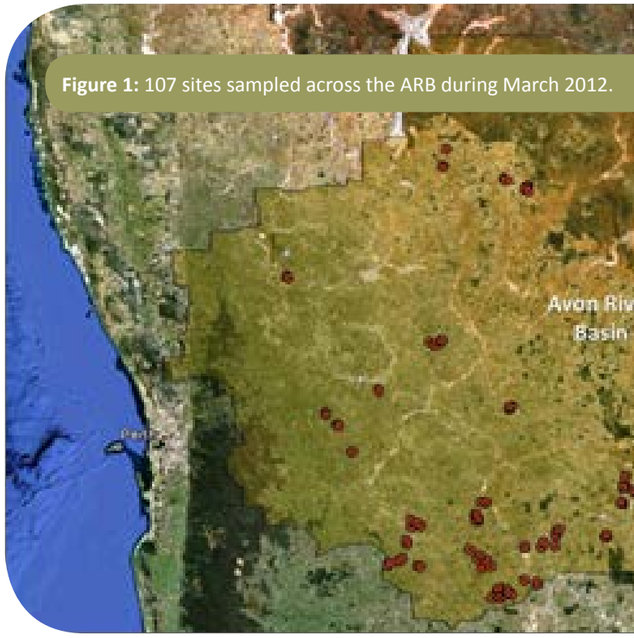


Figure 1: 107 sites sampled across the ARB during March 2012.

The Project

Soil was collected from 107 sites on farms throughout the Avon River Basin as part of a project to assess the capacity for change in soil carbon storage. Each of these sites was sampled previously between 2006 and 2008 as part of the W.A. "Soil Health Programme" providing a unique dataset for the region. Along with a range of other soil quality indicators, soil carbon stock was measured using a combination of bulk density and total carbon measurements.

Soil carbon loss?

The data collected in this project suggests a significant decline in topsoil carbon has occurred since the previous sampling times between 2006 and 2008 (Figure 1). While some sites indicated an increase in soil carbon, the major declines were particularly evident for soils that initially had relatively high carbon content. This change in carbon could be attributed to a combination of climatic factors and management changes over this period. Detectable changes in soil carbon generally occur over longer time periods (e.g. > 10 years), so this result is surprising – and has potential implications for measurement protocols for ongoing audits.

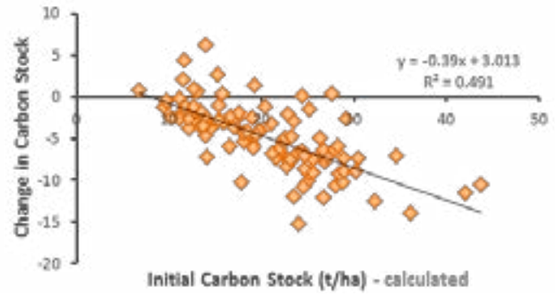


Figure 2: Topsoil (0-10cm) total carbon (t/ha) change between the first sampling time (2006-08) and sampling carried out during this project.

Are current management strategies affecting carbon storage?

Overall, the shifts in management over recent years are likely to favour conditions that result in a reduction in carbon storage. The drop in livestock profitability and therefore subsequent shift away from pasture systems is likely to have contributed to an overall decline in soil carbon, however other factors appear to be influencing this change.

Summer weed control

The push towards increasing cropping production benefits by preserving soil moisture from summer rainfall events particularly in the eastern wheat-belt, means summer weed control has become a large part of many farms annual management cycling. This leads to paddocks having very little active cover during these months and removes this as a potential carbon input source.

Winter fallowing

Decreased reliability of winter rainfall has seen many farmers adopt winter chemical fallowing for moisture conservation, and as a means of reducing investment risk over multiple seasons. While volunteer crops and weeds are allowed to grow during the winter season, herbicides are used to prevent seed set and reduce moisture loss. Anecdotal evidence suggests some farms have up to 20 % of paddocks under chemical fallowing at any one time. Figure 3 shows the increase in chemical fallowing over the last ten years across the sites sampled in this project.

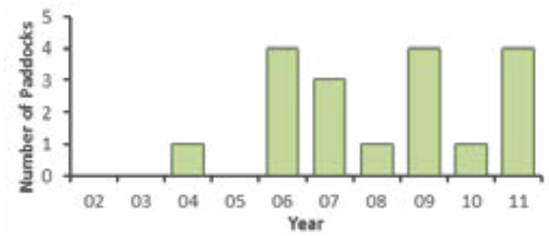


Figure 3: Incidence of chemical fallowing in the ten year previous to sampling in 2012.

Rainfall prior to sampling

The summer of 2011/12 was particularly wet in comparison to previous years. For most sites sampled between 2006 and 2008 the closest weather station recorded between 50 and 100 mm of rain between October and February – prior to soil sampling. In contrast, rainfall during the 2011/12 summer was over 150 mm for most of the same weather stations.

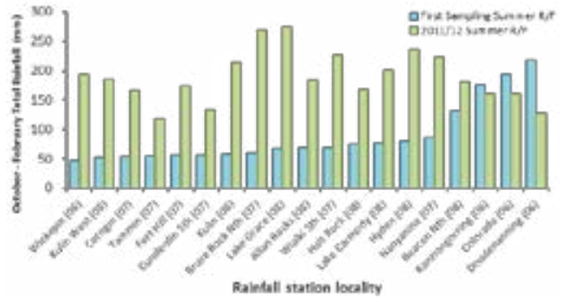


Figure 4: October to February rainfall from the closest weather station in the summer preceding soil sampling between 2006 and 2008, and again in 2012.

What does this mean?

The control of summer weeds and high 2011/12 summer rainfall are likely to have contributed to the decline in topsoil carbon levels, as the resulting soil conditions may favour carbon losses due to:

1. Microbial activity increases significantly at higher soil temperatures. Organic nitrogen mineralisation has been found to be favoured over immobilisation, increasing the chance of leaching or gaseous loss. The same may be the case for carbon.

2. If allowed to grow, weeds will decrease topsoil moisture much quicker than evaporation. This will decrease the time period that soil microbes are active for, and therefore decrease total CO_2 production.

3. The roots of weeds not only exude simple carbon compounds for soil microbes while growing, but will also leave behind a plant full of carbon for breakdown once it has died.

4. While microbes are not as active during winter, chemical fallowing during the growing season will still contribute to organic matter breakdown through retained topsoil moisture.

The research behind this factsheet is only the beginning of understanding how current management practices in the Avon River Basin might influence soil carbon storage. There is, however, a strong indication that high summer rainfall followed by weed control practices may increase the chance of carbon loss from cropping soils. This is particularly important given the observed increase in summer rainfall across the region. This suggests further work is needed to identify innovative management practices that maintain summer cover, while optimising yields in the subsequent crop.

Author: Andrew Wherrett (Living Farm Pty Ltd).

For further information see **www.soilquality.org.au** or **www.wheatbeltnrm.org.au**

Alternative farming inputs gaining momentum

By Kate Raston

For more information use the QR code left

Don Clarke (AMF Field Advisor) with the Butlers

The growing number of farmers wanting to step outside the square when it comes to traditional farming inputs has triggered interest from the country's peak grains research and development body.

The GRDC has budgeted $650,000 for the Understanding Biological Farming Inputs project, although this is very much still in its infancy.

If the project goes ahead it will use grower groups to trial the effectiveness of live and dead microbial solutions, humic acids, manures, earthworm casts and compost teas.

The project would need to meet a rigorous tender process, but potentially could run for three years from 2014.

This is welcome news for Bruce Rock farmers Chris Butler and his son Callan, who have already begun their own investment in alternative farming inputs.

"I've always been interested in finding out more about biological farming, but there hasn't been enough information on it," Chris Butler said.

The Butler family crops roughly 2000 hectares of Wheat, Canola, Lupins and Barley, in conjunction with 1900 Merino sheep.

"We've always grown above average crops for the district, but questioned the need to continuously lime to address acidity in the soil," Chris Butler said.

"Instead of looking at the plant on top and adding synthetic fertilisers to fix deficiencies, I've always felt by getting the soil balanced we could do a better job."

The focus is now on improving the microbial activity in their soils, in an attempt to build soil organic carbon levels, which helps improve moisture storage.

To do this, they've adopted the Australian Mineral Fertilisers (AMF) Grow Safe farming system.

At the heart of it is the introduction of soil microbes in the form of a seed dressing and the application of alkaline mineral-rich fertilisers, rather than commonly used acid chemical processed fertilisers.

"We've used this system on 40 per cent of our wheat crop, and on top of the soil it's hard to tell the difference between our crops grown using synthetic fertilisers," Chris Butler said.

"But below the surface it is a very different story.

"We're seeing much deeper root systems going into the sub soil which is really important as it helps the plant to cope with acidic soils, high aluminum levels and moisture stress."

When Chris and Callan Butler compared the root zones, the crops grown on the Grow Safe system were more than 50 centimetres deep, rather than the traditional crops of 20 to 30 centimetres.

"You can notice straight away how robust the roots are, especially when you have a dry season, it is really important because it helps the plant become more resilient," Chris Butler said.

The work being done on Chris and Callan Butler's property has grabbed the attention of natural resource management group Wheatbelt NRM.

Wheatbelt NRM, with funding through the Australian government's Caring for our Country program, has been working with the family on projects managing saline soils and understanding soil biology.

Wheatbelt NRM has also formed a partnership with AMF, to work more closely with farmers in helping them improve soil health.

Wheatbelt NRM's program manager for sustainable agriculture Dr Guy Boggs said drought and frost were taking their toll on farming businesses.

"One of the ways to improve the sustainability of farms is through improving the health of our soils," Dr Boggs said.

"Acidification has become one of the biggest threats to WA agriculture and has been estimated to cost the sector between $300 and $400 million each year.

"We need to build healthier soils so crops can better cope with our variable climate."

Soil scientist Dr Fran Hoyle from the Department of Agriculture and Food WA said while it was fantastic that farmers were taking a closer look at how to improve soil health, changes wouldn't happen overnight.

Dr Hoyle said growers should always compare new products.

"Strip tests within a paddock are a great idea and allow the grower to test multiple solutions," Dr Hoyle said.

She said farming practices like liming were still crucial.

"Liming is still necessary for soils below their target pH (pHCaCl 5.5 in the surface), as acidification cannot solely be addressed through improving soil biology or a change away from traditional fertilisers," Dr Hoyle said.

"Processes including nitrogen leaching as a result of either inefficient fertiliser use or the turnover of organic matter contribute to acidification."

To help Chris and Callan Butler improve the knowledge of soils on their farm, they've also sent samples to the UWA's School of Earth and the Environment to measure just how much life exists in the soil.

Keen to hear the answer will be AMF's senior microbiologist Paul Storer.

He said the Grow Safe farming system incorporating beneficial soil biology and non-leaching, highly efficient nutritional bio-mineral fertilisers was the culmination of 15 years of research and development.

"People are starting to question management practices and if the commonly used 'basic' pH soil and plant testing is really giving them a 'complete' picture; and if this in turn is only providing them with band aid solutions," Paul Storer said.

"With the recent advent of modern soil microbial testing and comprehensive soil nutrient analysis, our understanding and appreciation of the 'living soil' system and what drives it has markedly increased".

"Exhausted soils and changing climate conditions are driving farmers in the Wheatbelt to seek better ways to sustain crop production and maintain viability and profitability of the farm," Paul Storer said.

"Farmers are having to deal with adverse conditions like mid-season drought - perceived to be controlled by the amount of rainfall. However, the quality and health of the soil can have an enormous effect on how the landscape responds during dry periods. Healthy soils with increased organic matter act like sponges - absorbing moisture better and holding the water in the root zone longer, for plants to use during periods of drought".

Biology at work

- Grow Safe system showing typical
- significant early root development

"We find that farmers are really interested in encouraging beneficial soil biology. They are now realizing the importance of improving soil health and soil nutrition, increasing root and microbial biomass, organic matter, organic carbon and water holding capacity, and strengthening the plant to better cope".

"This is where the high performance Grow Safe system steps in. It improves production, protects natural resources, replenishes depleted mineral nutrition and more efficiently utilises water."

For Bruce Rock farmer Chris Butler, the decision to expand the new system won't be made until harvest.

"We're going to wait until the header is in the crop and find out what the yield and quality of the grain will be," he said.

"But at this stage it looks promising, because the strength of the root system is so impressive.

"We're hoping this system will provide an alternative to the traditional broadacre farming practices, which have focused solely on yield, using fertilisers that don't encourage soil health."

Example of Grow Safe on Bruce Rock paddock

CROP: Magenta wheat sown on May 14th at 70kg/ha using a seed dressing containing soil microbes

FERTILISER: Urea replaced with 15kg/ha sulphate of ammonia and 10kg/ha sulphate of potash instead of muriate potash.

An AMF NP bio-mineral fertiliser product was also used at 60kg/ha.

10 weeks after sowing, 35kg/ha of calcium ammonium nitrate and sulphate of ammonia was added using a super spreader.

SPRAYING: Knockdown using glyphosate and trifluralin during seeding for ryegrass control. Follow up spray to control turnip and capeweed.

Protecting Roadverge Vegetation in the Shire of Dowerin

By Julia Murphy (Greening Australia)

Along a length of road verge in the Dowerin Shire, approximately 150km northeast of Perth, is a road that looks like any other wheatbelt back road, however the Old Koorda Road has a plant so rare there are only two known plants in the world.

It was randomly spotted by previous Department of Environment and Conservation Officer, Joel Collins. Joel had the plant identified as *Acacia leptoneura* which was thought to have disappeared from the area 160 years ago. The only known specimen was collected between 1837 and 1848 by botanist James Drummond. Joel did a further search in the area and found one other plant on a nearby farm.

Old Koorda Road is a heavily cleared road reserve north of Dowerin. Currently in the Shire there remains less than 4% of it's remnant native vegetation, making remaining vegetation invaluable.

The *Acacia* has a unique spreading nature and grows to about 60cm high and spreads to 2.2m. Given its scarcity it is ranked as threatened which includes taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.

Knowing the *Acacia leptoneura's* importance, staff at Greening Australia approached the Shire of Dowerin to inform them of the value of the *Acacia* and bring to their attention funding available through Wheatbelt NRM's Healthy Bushlands project.

Greening Australia put forward ideas about revegetating around the *Acacia* to create a buffer from disturbance. As well as re-introducing biodiversity and controlling weeds by replacing the disturbed, weed-prone system with one that is native vegetation. By negotiating with the Shire, they agreed to support the action plan.

The proposed plan included:

- Weed control along the section to be planted.
- Handplanting of selected species creating a buffer along 100m of roadverge either side of the *Acacia*.
- Provision of signage.
- Communication of the projects purpose.

The vegetation for the area was identified as medium woodland; Wandoo, York gum, Salmon gum, Morrel & Gimlet. Species selected to revegetate were grown by local experts and owners of Arinya Plants nursery, Rob and Beth Boase.

WORKS UNDERTAKEN AND THEIR IMPACT

Methods for the revegetation included:

- Sprayed weeds using Glyphosate in July however the weed burden in this section was light.
- On the 26th July this year Greening Australia staff Julia Murphy and Amelia Glass planted seedlings with the invaluable help of Misty Richards (Dowerin Shire) and community volunteers Diane Hatwell and Rex Adams. The seedlings were planted at a distance of about 1.5m from the fence-line and 1.5m from the road to ensure safe road conditions. Potti-putki's and a pick were used to dig to plant by hand.
- Local shrub and groundcover species were used to alter the road verge vegetation to a native plant system, so trees don't become a safety issue and fall on the landholders fences.
- A heavy shower during and after planting meant the seedlings were well watered in, giving them an excellent start.
- A close eye will be kept on any potential recruitment of the *Acacia leptoneura* nearby.

Species Planted on Old Koorda Road

- ***Acacia brumalis***
- ***Acacia ligustrina***
- ***Calothamnus gilesii***
- ***Calothamnus quadrifidus (One-sided Bottlebrush)***
- ***Melaleuca adnata***
- ***Melaleuca hamata***
- ***Melaleuca platycalyx***
- ***Melaleuca radula (Graceful Honeymyrtle)***

Numbat

Myrmecobius fasciatus
Family: Myrmecobiidae
Conservation status: Endangered

Identification

Also sometimes called the walpurti, the numbat is a pointy-nosed, reddish-brown animal with bold white transverse bands across its back and a long bushy tail. Its large, black eyes are framed by black and white eye stripes extending between the nose and the base of the ears. The numbat is unusual among Australia's native mammals by being diurnal (active by day).

Habitat and distribution

The numbat was once found across most of southern Australia, however, its distribution is now restricted to several small populations in the south-west of Western Australia and a number of sites where they have been reintroduced. They are found in Woodland and eucalypt forest with Wandoo, Powderbark or Jarrah as the dominant tree species.

Before Foxes were present, Numbats were also found in York gum woodland, Mulga woodland and heath. They require fallen hollow logs for shelter, protection and nest hollows. Numbats also construct burrows, especially in winter, which they line with plant material such as grass, shredded bark leaves and flowers.

Diet

The numbat is a specialised feeder, using its well-developed sense of smell to detect termites as they move around below the soil surface. Its long, sticky tongue is well adapted for reaching into termite runways and removing the tiny insects. A Numbat's tongue collects 20,000 termites per day, as well as a few ants, probably by accident. Like their tongues, Numbats teeth are adapted for their diet and are small and peg-like. Termites are easily chewed by the Numbat. They are one of the lightest of all the world's termite eaters because, rather than digging into rock-hard termite mounds, they specialise in licking up termites from the surface channels that radiate out from mounds.

Reproduction

Breeding in numbats starts in January. Pregnancy lasts for 14 days. The female has four teats and carries her young after birth, with one usually attached to each of teats. By July, the young are deposited in one of the female's burrows while she hunts. At night, she returns to feed them. By September, the young begin to emerge from the nest with their mother but stay around the burrow and return to the nest soon after she leaves for the day.

Over the next six weeks, the young make short journeys away from the nest and by October they are weaned. The young gradually start to spend nights away from their mother and by mid-December they have left to find their own home range where they will usually stay for life. Female Numbats are able to breed in their first year of life, males in their second year.

Threats

The Numbat population began a decline from 1900 to 1950 following the introduction of Foxes to the Wheatbelt. The Numbat survived in low numbers until the 1970s when it began a rapid decline, possibly due to habitat fragmentation from an increase in land clearing and increased predation by foxes.

Management actions

The Western Australian Government conducted a detailed research project during the 1980s which contributed to a greater understanding of the biology of the numbat and the reasons for its decline. A collaborative recovery plan has been implemented for the Numbat which includes ongoing Fox control in remaining Numbat habitat. A highly successful translocation program which has re-established the species in a number of secure sites within its former range where fox control will be maintained.

Information reproduced from the 'Mammals in the Avon Region' Booklet published by Wheatbelt NRM and the Department of Environment and Conservation.

NUMBAT FACTS

SIZE (head and body length)
200 - 274 mm (males)
200 - 272 mm (females)

SIZE (tail)
164 - 210 mm (males)
161 - 195 mm (females)

WEIGHT
300 - 715g (males)
320 - 678g (females)

HABITAT
Woodland and eucalypt forest dominated by wandoo, powderbark wandoo or jarrah trees.

DIET
Termites and some ants, probably by accident.

REPRODUCTION
Young born in January - February and weaned by late October. Females mature in their first year, males in their second year.

LONGEVITY
Up to 5 years

Djilba - Kambarang

The Noongar people recognised six seasons in their year, Bunuru, Djeran, Makuru, Djilba, Kambarang and Birak, and managed the budjar (land) accordingly. The climate of this country ranged from mild to temperate and was divided into these six seasons, during which, land management practices and hunting & gathering patterns were guided.

Djilba - August to September

Becoming warmer

As Mukuru progressed into Djilba, kangaroo, quenda, emus and possums were hunted.

Kambarang - October to November

Rain decreasing

The blossoming of the Christmas Tree signalled the time to return to the coast. Berries and fruits were able to be colected along at this time.