Soil Biology—What Lies Beneath

By Jacinta Christie

Francois Retief using his microscope to check for micro and macro organisms at the recent Soil Biology workshop held at Humula.

Soil organisms play a crucial role in decomposing organic matter, cycling nutrients and fertilising our soils. An understanding of the four levels of organisms, their functions and their relationships allows us to better manage our soils to encourage and maintain healthy soil biology and more productive pastures and crops.

Microflora

The microflora, bacteria and fungi make up 75-90% of the soil living biomass and are the primary decomposers of organic matter. They are responsible for transforming organic, unavailable forms of nutrients into mineral, available nutrients which plants can take up and use.

There is an estimated 60,000 different bacteria species and they are generally found around the root tips of plants. Their activity helps to bind soil aggregates and to create more stable soils. One species of bacteria, actinomycetes gives the soil its 'earthy' smell. Fungi consists of hyphae which can be a few cells or can stretch for metres even kilometres throughout the soil. Fungi perform important functions within the soil such as nutrient recycling and disease suppression.

Microfauna

The microfauna are the small soil animals and include protozoa and nematodes. They are responsible for providing the link between the larger soil fauna and the small microflora. You can not see them with the naked eye and graze on bacteria, fungi and algae in the soil. They are also able to ingest small particles of soil organic matter which are then decomposed by enzymes within organisms

Mesofauna

The mesofauna are organisms that you can see with the naked eye and include mites, spiders and springtails. These remain in the larger soil pores and graze on fungi, algae and lichens in the soil. They have an important role in mixing the soil.

Macrofauna

These are easily seen by the naked eye and include earthworms, pot worms, beetles, termites, ants and slaters. They can be described as shredders, predators, and soil engineers. They are responsible for recycling dead and decaying matter, aerating soil through their burrowing activities which allows water penetration, provides channels for root growth and increases soil aggregation.

Soil Biology Workshops

Soil Biology Workshops are organised by Murrumbidgee Landcare through the Cross Property Project and the Riverina Local Land Services (LLS). They can be held locally and allows participants to have two free chemical soil tests conducted on their properties followed by a one day workshop.

For more details on upcoming workshops contact Jacinta Christie on 0431 953 788 or jchristie@mli.org.au

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THE KYEAMBA VALLEY LANDCARE GROUP

KYEAMBA VALLEY LANDCARE NEWSLETTER - Summer 2014-2015

Message from the Chairman

Peter Lawson - Chairman KVLG

In this edition we are looking at the issues and beauty of the humble paddock tree. They can be a pain in the neck if they die, fall over, are constantly dropping limbs or are in the middle of a cropping paddock but they can also be extremely useful when supplying shade to your livestock, feed and shelter to birds, insects, reptiles etc that play some role in keeping the environment in a state that you enjoy. The question is 'How do we best look after them?' We all need to make a living, mostly from livestock in this area but they are also part of the reason so many are dying, due to constant stock camp pressure, eating their bark and just having a good old scratch.

There are obviously many more features about our paddock trees and their importance to wild life, function in the ecosystem and just plain old eye catching appeal to those who live here or those just passing through. We hope you will gain some insights into some of the things that work and why in restoring, or extending the life, of existing paddock trees and their importance. Or maybe just reinforce the reasons behind the work you have already been doing, which given the change in the landscape in our area over the past 25 years is probably closer to the mark.

Our case study this issue is on Stephen and Sarah Palmer looking at some of the encouraging and fulfilling work they have done on their property Kyeamba Downs.

It was great to see so many of you at the Landcare Christmas party in mid Nov, (early I know but it was our last get together). We realise that the timing doesn't suit everyone but it was an enjoyable evening for those who could make it.

We hope you enjoy this issue and have a great Christmas and summer holiday season. If you have any ideas as to what you would like to see featured in future editions please let us know. We're all ears..

Peter Lawson

"SLOW THE FLOW" Project Update

By Cam Wilson

Landcare Murrumbidgee — clean energy future — NSW Government — NSW Environmental TRUST

The Kyeamba valley Landcare 'Slow the flow' project will result in the implementation of a range of low-cost erosion control and watercourse stabilisation techniques which are relevant to land degradation issues commonly faced by landholders in the Kyeamba valley. The project is the result of a successful funding application which was submitted by KVLC in 2010.

A variety of techniques will be implemented, utilising a range of locally available materials (such as logs, brush and rock) and vegetation types (both native and exotic) to suit different landscape settings.

To maximise the learning opportunity, the demonstration projects will be largely implemented as a series of hands on workshops guided by Cam Wilson, spaced out between February and September, giving you the opportunity to participate and help implement those techniques which are most relevant to your situation.

Thankyou to the those landholders who have made submissions. The final locations will be decided following a site visit by Cam Wilson in early December.

Beyond Bank AUSTRALIA

The Kyeamba Valley Landcare Group is grateful for the support of Beyond Bank Australia

Tree planting proves fruitful at Kyeamba Downs

By Bundle Lawson

Fifteen years of planting trees and protecting remnant native vegetation is paying dividends for Stephen and Sarah Palmer, through reduced erosion, improved surface water quality and the provision of corridors and shelter belts for livestock and native birds and animals.

All the tree-planting projects the Palmers have undertaken have tied in well with their beef and cropping enterprises.

Fenced in

The Palmers first began looking at ways to protect and enhance the remnant vegetation on Kyeamba Downs in 1999. Greening Australia was offering grants to fence off areas to prevent further erosion and protect remnant vegetation. The Palmers fenced off a 70 hectare site, which they continue to manage by crash grazing it once a year.

This management encourages a continuous coverage of native vegetation, which fosters the survival of indigenous plant species including ironbarks, hardenbergias, chocolate lily, leptosperman, nodding blue lily, hibbertia and many native grasses.

The fenced off area also provides a refuge for many native species of animals, reptiles and birds.

From an environmental management perspective, fencing off this area has been very effective in slowing down the flow of water from areas of surrounding properties that have been previously cleared.

This has prevented erosion starting or continuing in many areas, and has improved the quality of water eventually running into dams and the lower Kyeamba Valley.

Planting projects

In the early 2000s, the Palmers began undertaking a number of Landcare-funded projects on Kyeamba Downs.

The main purpose of these projects was to prevent erosion along creek lines. They began fencing off and planting about 6,000 trees over a two year period.

In 2006, the Palmers participated in a major planting project co-ordinated by the Murrumbidgee CMA, which also involved Earth Tech and Greening Australia.

Eroded Gully before ....

And after

The aim was to stabilise severely eroding banks on Kyeamba Downs, whilst working in with remnant vegetation.

Twelve kilometres of fencing was erected by the Palmer family over three months, to fence off the areas included in the project. Tree lines were ripped in during 2006, but due to the drought, the planting of the 10,000 trees did not take place until winter 2007.

Broader picture

By 2007, many of the environmental protection projects being offered were focussing on the broader picture, on a whole farm scale.

With guidance from the Murrumbidgee CMA, the Palmers drew up an Incentive Property Vegetation Plan.

This involved fencing off two sites totalling 10 hectare, to protect and maintain the indigenous vegetation of this area.

They then planted about 1,000 trees to compliment the existing vegetation.

In 2010, an Ecotender project from the Murrumbidgee CMA was used to link up with the 2007 project.

Preparing and Planting a revegetation site—Tips for success

By Jacinta Christie

The information below explains the steps involved in planting a site, from ground preparation and weed control through to planting tips and follow-up care. Good preparation and management can help minimise seedling losses and encourage healthy plant growth.

Ground preparation

Deep ripping soil helps root development, as it improves aeration and infiltration of water. This allows deeper penetration and faster growth of plant roots. Rip the planting lines to a depth of 40-60 cm or more if possible. Double ripping with rips 50-100 cm apart is very beneficial as it shatters the soil. On slopes, rip along contours to reduce erosion risk. On flatter sites, cross ripping on a grid layout will guard against roots growing in one direction along a single rip line (which can result in trees blowing over).

Ideally ripping should be done several months before planting, when the soil is fairly dry, to optimise the shattering effect. If the rip line is too loose or full of air pockets close to planting time, this can be remedied by driving a tractor tyre along it.

Trees should be planted between the rips. Where a single rip line is used, trees should be planted on the shoulder of the rip line, as trees planted in the bottom of the rip line can get waterlogged in winter.

Fencing

Fencing should be used to protect seedlings from stock for at least the first three years. Fencing also preserves the leaf litter at ground level, and protects low leafy shoots. All fencing should be completed before planting.

Controlling weeds

Poor weed control accounts for most planting failures, due to their competition for light, moisture and nutrients. Eliminate weeds early before they use up stored water – ideally, keeping the planting area free of weeds for a year or more prior to planting will ensure the best results.

If using chemical weed control, apply a knockdown herbicide well before planting, and then apply residual herbicide just before planting (in conjunction with a knockdown herbicide, if weeds have emerged since the first spray). Other techniques for weed control include moudboarding, cultivation, grazing and weed mats.

Selecting plants

Locally indigenous species are always recommended, as they are most suited to the local conditions and dimate. Where possible, use seedlings from locally collected seed.

Spacing

Recommended spacing between seedlings varies depending on the location, but generally trees within a row and between the rows themselves can be spaced 3-5 m apart. Smaller trees and shrubs can be spaced 2-3 m apart.

Planting

Planting in autumn or winter takes advantage of the winter rains, and allows seedlings to establish slowly over the cooler months, enabling quick growth as soil temperatures warm up.

Seedlings should be given a good soaking in their pots the day before planting. In most situations, fertiliser is not necessary for native species. To plant tubestock, dig a hole slightly larger than the tubestock, then remove the seedling from the tube. Try to minimise root disturbance, however if a seedling is root-bound, the roots may need to be teased out. Place the seedling in the hole, so that the base of the seedling is just below the surface. Place the soil back around the hole, and firm down to collapse any air pockets and give good root to soil contact.

Watering

Ideally, time your planting with rainfall to avoid the need to water at planting time. If it is particularly dry, one litre of water (or more) poured slowly around each planted seedling will help overcome transplanting shock and remove air pockets. In most cases, no further watering should be required. However, it is always wise to check the seedlings over the months following planting to ensure they are surviving. If the summer is especially hot and dry, seedlings may benefit from watering; a litre per seedling should be sufficient, and watering should be limited to once a month at most, so as not to weaken the seedlings.

Guarding

Placing tree guards around your seedlings can help prevent grazing by rabbits, hares and kangaroos, helps protect the seedlings from winds and maintains a warm and moist environment around the seedlings. The most economical guards are milk cartons, which are held in by two bamboo stakes. Another common tree guard is the plastic sleeve, which is held in by three hard wood stakes.

Further information and acknowledgement

The information in this article has been provided by Greening Australia. For more detailed information on anything described here, visit the Greening Australia website at: www.greeningaustralia.org.au

PADDOCK TREES of the Kyeamba Valley


Courtesy of Pamela Lawson

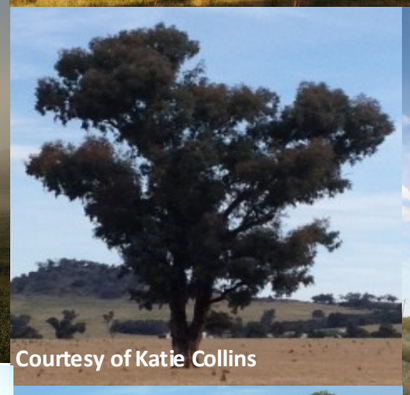

Red Box
Courtesy of Anthony Dunn


Yellow Box
Courtesy of Anthony Dunn

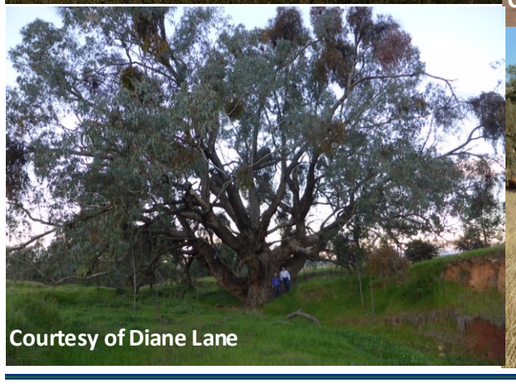

Courtesy of Katie Collins


Courtesy of Pamela Lawson

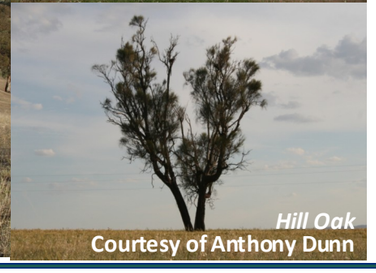

Courtesy of Pamela Lawson


Courtesy of Katie Collins


White Box
Courtesy of Anthony Dunn


Courtesy of Diane Lane


Courtesy of Lyn & Francois Retief


Hill Oak
Courtesy of Anthony Dunn

Tree planting proves fruitful at Kyeamba Downs—*continued*

Kyeamba Downs Wetland

This involved about 5 kms of fencing and the planting of 2,000 trees for the conservation of native vegetation.

Recent activities

The focus of environmental projects has continued to spread in recent years, led by the Communities-In-Landscape project, which began in 2011.

This project gave the Palmers great scope to connect remnant vegetation patches throughout the property and the broader Kyeamba Valley.

At the same time the Palmers also became involved in CSIRO's on-farm Biochar trials, which have shown no significant results to date.

Another significant project the Palmers undertook in 2013 of their own initiative was to create a wetland area on Kyeamba Downs.

With advice from Alison Elvin, the Palmers fenced off an area of about two hectares from livestock. They then planted over 200 trees including grey box, blakelyi, apple box, callistemon, acacias and casuarina species. These were all specifically planted in species groups, creating a 'patchwork effect' as suggested by Alison.

The Palmers have already seen a fantastic improvement in water clarity, and a dramatic increase in the birds, natural grasses and native plants in the wetland area.

Earlier this year, the Palmers used CMA funding to connect existing remnant vegetation areas at three sites, planting 2,500 trees in these areas.

Growing tips

According to the Palmers, site preparation is a key aspect of successful tree plantations.

"All the areas where we have planted trees on Kyeamba Downs were fenced off, deep ripped and sprayed before planting.

"To date, our most successful plantings were those done in 2007, with rip lines initially done in 2006, despite it being during the peak of the drought.

"Interestingly, one contracted tree planting project had the worst survival rate of any plantings on the property.

"As far as tree species selection goes, we do not use a huge variety of plantings. Only those species which have survived through the drought are now continually replanted.

"This year, of the 2,500 trees we have planted, 100 were supplied through the Provenance seed collection, so it will be interesting to see how they survive.

"We will continue to plant trees where appropriate and possible on Kyeamba Downs, as we believe it not only benefits our property but also contributes to the improved environmental health further downstream in the Kyeamba Valley."

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PADDOCK TREES

By Mason Crane, Research Officer, ANU

Scattered paddock trees are a common feature across Australian agricultural landscapes, and are generally relics of the original woodlands and forests that once covered these landscapes. As I drove down the Hume Highway the other day, I tried to imagine the countryside without scattered paddock trees -it would look very foreign indeed and hard to picture. However that is the future many agricultural landscapes in our region are facing, given the current trend. A study conducted in the south west slopes predicts that within 120 years almost all paddock trees in the region will be lost, due primarily to a lack of recruitment.

The value of paddock trees

Paddock trees are considered a 'keystone' structure in agricultural landscapes around the world. This means that they have a disproportional influence on how the environment functions. In Australia, paddock trees have been shown to enhance water infiltration and soil quality. They also have a disproportionally high value for biodiversity, providing superior habitat to other vegetation in the landscape for many species. Much of this can be attributed to the great age and size of these trees; not only do they provide habitat in their own right, but they can also increase the biodiversity value of other nearby habitats, such as tree plantings and small remnant patches.

Paddock trees also facilitate the movement of wildlife across the landscape. This is important for many reasons: it helps the various nomadic and migratory birds that occur in our region, it increases the opportunity for wildlife to disperse across the landscape to colonise new habitats, it ensures the flow of genetic material across the landscape and between populations, and at a local level it helps animals gather the resources they require.

A Travelling Stock Reserve near Ladysmith, even though it is often heavily grazed , the time between the grazing has allowed the trees to regenerate.

Threats to paddock trees

Unfortunately, despite being such a crucial resource, paddock trees are under siege. They are typically the oldest living structures in the landscape, so natural attrition is inevitable. With a lack of regeneration over the past 100 to 200 years, there are few medium to large trees to take their place.

The rate of loss of these trees is amplified by a myriad of factors associated with being in a paddock environment, including:

- Spray drift will weaken paddock trees over time, inviting attack by insects and rot
- Increased nutrient loads from fertilisers and stock camps also make trees more susceptible to insect attack and drought stress
- Ploughing and stock camps damage the root zone, again weakening the tree
- Erosion and salinity also add extra stresses.

The accumulated impact of these stresses on paddock trees can be enough to cause their premature death, but it is often a wind storm or fire which is the final nail in the coffin for these already weakened trees. For example, last February I lost 10% of the paddock trees on my property in a 15 minute wind storm. Preliminary results from our study into the impacts of wildfire show that losses of 20-80% of paddock trees can occur. In addition, deliberate clearing of paddock trees still continues, particularly further west of our region (mostly associated with changing land management practices e.g. pivot irrigation).

How landholder's can help protect paddock trees

While the prospects of the paddock tree seem grim there are still a few things we can do to protect existing trees, recruit new trees, and take advantage of the habitat the existing trees provide while they are still about. If we can reduce the extra stresses on paddock trees, it's possible that some could survive another 100-200 years. Here are some tips:

- Respecting these centuries-old trees, and the contribution they make to a sustainable environment, is an essential first step

PADDOCK TREES—*continued*

- Consider them when planning general farm management practices, such as spraying, fertilising and prescribed burning
- When considering environmental works on your property, paddock trees should be given high priority. Including paddock trees in tree planting programs can give your new plantings a 200 year head start, and the protection from wind, spray drift and insect attack the new plantings provide may also extend the life of the existing tree

Planting new paddock trees

Recruiting new paddock trees is also desirable, not only from an environment perspective but also for production reasons, such as stock shelter. There are a number of ways to do this effectively:

A great example of planting shrubs and trees around existing paddock trees, near Ladysmith.

- Change grazing regimes, to allow time for the new tree to germinate, and to recover from grazing. This is particularly successful in pastures that are not heavily modified,
- Adopt the principles of whole paddock restoration, or plant a whole paddock with scattered trees, and remove grazing for 2 or more years until the new trees can withstand stock, or
- Plant individual trees with stock proof guards, or plant clumps of trees protected with temporary fencing.

Increasing the number of paddock trees within a paddock will not only reduce the stress on individual trees from the burden of stock camps, it can also increase the biodiversity values of that paddock. Studies conducted by the Australian National University show that even a small increase in paddock tree density, from 2-4 trees/ha to 5-10 trees/ha, has a significant impact on the diversity of insectivorous bats and birds. However when considering this we must be mindful that the tree we plant today will not fully deliver the same benefits that most existing paddock trees provide -at least not in the next 150 years!

I am hopeful that through the innovation and adaptability that is continually shown by our rural communities we can address these issues, and that future generation will inherit agricultural landscapes that contain paddock trees.

Pasture Cropping and Planned Grazing Workshop (2 day workshop)

A two day workshop, funded through Murrumbidgee Landcare (MLi), and presented by Col Sies and Graeme Hand will be held around Tarcutta/Humula in early 2015 if there is sufficient interest. The main focus for the workshop is how to design your farm to lower risks and make a profit every year while regenerating your soils and pastures.

Topics covered over the 2 days include:

- An overview of planned grazing
- An overview of pasture cropping
- Developing a grazing plan, including a field walk and training in monitoring
- Developing a pasture cropping plan
- Decision making, enterprise design and financial planning
- Healthy farms – healthy soils
- Field walk – including discussion on 'what are the options for this paddock'

If you are interested in attending this workshop please contact Jacinta Christie, Murrumbidgee Landcare Inc. on 0431 953 778 or email jchristie@mli.org.au.

Col Sies

Graham Hand