March 2010

Grassy Groundcover Gazette

News, updates and on ground action

Greening Australia

Paul's Piece

Hi folks.
Welcome to all the readers of the Grassy Gazette with a happy (*hopefully*) Christmas and New Year come and gone, and all the kiddies back at school and work.

As usual in our Grassy Gazette, we feature a number of really interesting stories from Grassy Groundcover-related activities, including updates from original, and more recent, Grassy Groundcover sowings, seed production sites, and updates from some student experiments introduced in our June edition.

I should also mention that Nat Cook, wonderful Grassy Gazette compiler, has taken on a new role at Greening Australia, and has handed the Grassy Gazette mantle to the most capable and charming Lynne King. So thanks to Lynne for taking on this role and a mega vote of thanks to Natalie for the fantastic job she did putting together Grassy Gazettes for the last two years.

Glenelg Highway/Wickliffe Grassland Restoration

Last edition I reported on our exciting new project with Vic Roads at two sites west of the township of Wickliffe (*on the Glenelg Highway*). As a refresher, these two sites had been plantations of introduced native trees which were removed in 2006 and 2007.

We were asked by Frank and Natasha at VicRoads to undertake a combination of Grassy Groundcover Research Project methods to restore species-rich grassland within this degraded area (*thus rejoining the high quality grassland at either end*). In May we scalped and in spring a 'crack Grassy Groundcover Research Project restoration team' sowed both sites using locally sourced grassland species. We also propagated and planted a number of Button Wrinklewort (*Rutidosis leptorrhynchoides*).

I'd been past the site a number of times since our spring sowing. Happily almost all planted material has survived and weeds were scarce. However, there were few seedlings emerging from our sowing.

I called to the site in early December, following some good rainfall in the previous weeks. Well, I can assure you it was a very happy visit. Emergent seedlings were common across the length and breadth of the sites, these being both grasses and forbs (*See photos*).

This is very exciting, and I'm confident, that even with some mortality over the summer, many plants will be likely to survive and establish during the next 12 months. And I predict that by the Dec 2010 edition of the Grassy Gazette I'll be showing some really impressive images of established grassland on these sites.

Emergent seedlings in great numbers

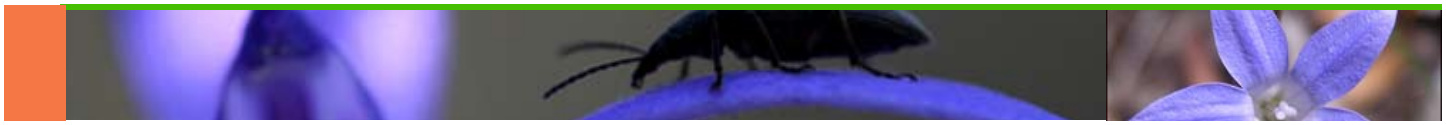
Mr. R White reciting bush poetry

But wait there's more!

It is also worth noting that in early 2009 we were asked by the Pyrenees Shire to rehabilitate (*by direct seeding*) some small sections of roadside following road widening works (*three in fact*). In this instance we wanted to return phalaris-dominated areas to native grasses.

Using locally harvested native grasses and a small number of common forbs we prepared the site over autumn/winter and again the crack team *(this time Rowdy Roddy White, Damaging Dave Franklin and Grizzly Glen Mansfield*) swung into action and sowed the site down. Rainfall at the site has been modest which at least restricts weeds a bit. I plan to visit the site in the coming weeks and fingers crossed, will see good germination of our native grasses.

The gentlemen at work (note, no Kookaburra sits being hummed….)



Another development has come about through some kitchen table discussions between David Franklin and myself, musing about other opportunities for direct seeding of grassland flora. David being the man of action that he is, then followed this up with phone calls.

Before we knew it, discussions and visits to David Hermans Grassy Groundcover Research Project site at Moyston with representatives of Great Western Winery, resulted in the implementation of a trial sowing of native grasses and wildflowers at one of their vineyards.

What a great opportunity if this is successful. Lower water use and maintenance requirement, low growing native grasses between vines, end-caps of vines sown to taller grass mixes (*competitive against local weeds*) and areas of high forb richness – excellent for attracting pollinators to the vineyard and increasing biodiversity in general.

Sowing a small wallaby grass between vines, and mixture of large natives at the end of vines

Possibly a very economical and environmental step forward for the wine sector. Well done to Andrea Hart, vineyard manager at Great Western for taking this opportunity with us.
These developments are very exciting for all parties, and we hope will further demonstrate the value of indigenous herbaceous vegetation. I'll report further developments in future Grassy Gazette issues.

Werribee Plains Vision

Our Grassy Groundcover Research Project list took another boost recently when it was announced that Greening Australia and the Werribee Open Range Zoo (*with other partners including Melbourne University, Sustainable Gardening Australia and Friends of the Zoo*) were successful in receiving funds as part of the State Governments '*Werribee Plains Vision*' program.

Over the next three years we'll be promoting education about native grasslands in 36 schools in the Werribee Plains region, establishing a containerised seed nursery for future zoo and regional grassland projects and expanding the area of grassland previously directed seeded by Grassy Groundcover Research Project methods within the Zoos 'Basalt Plains' display.

Most readers will know that grasslands to the west of Melbourne and in the Werribee region are under increasing pressure from urban sprawl (*considering proposed new urban growth boundaries*). This has seen the decimation of many grasslands which are home to threatened mammals, birds, reptiles, amphibians, insects and plants. This project will help to educate young children about the plight of these communities and raise their profile to Zoo visitors by showing through our sown communities how wonderful and diverse they can be.

SPA at the Open Range Zoo (complete with fetching Zoo staff)

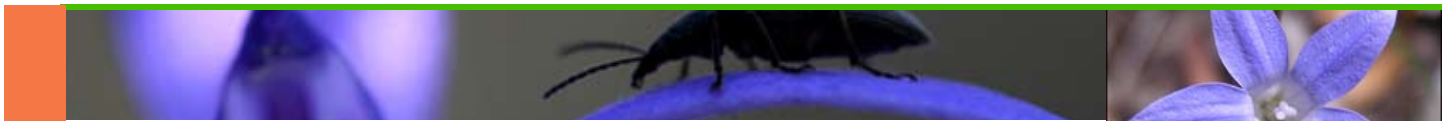
Already things are moving well. Zoo and Greening Australia staff have already set up a small containerised SPA (*it will get bigger in time*), and we've (*mainly Dave Lockwood*) collected seed from a good range of species for the field sowing later this year.

Brief round-up of what's been happening at Grassy Groundcover Research Project sites

At the moment we are in the very happy position of having native grassland established at all our Grassy Groundcover Research Project sowings. As you would be aware, each is unique in terms of species composition and levels of weeds within various treatment areas (*eg. scraped or not-scraped*) depending on initial species collections, seeding rates and subsequent site conditions.

However, we are now in the lovely position of having to consider the management of biomass (*native and exotic*) in order to maintain native species diversity (*imagine if our direct seeding hadn't worked at all and there were no native species to worry about*). Most readers would be aware that the 'conventional wisdom' is that high quality grassland remnants should be burnt to manage grass biomass (*native and exotic)*, weed loads and hopefully to maintain diversity.

But when is it best to burn? Can you get a permit in time? Can a burn be undertaken safely at your site? Are the conditions right on the day? (*eg. temperature, wind speed, humidity, and moisture content of the vegetation*). These are just a few of the many questions/factors that, in reality, restrict the implementation of this option.



In my experience, slashing is then the second most likely management option undertaken. Grazing is also a valid means to control biomass (*see Zhongnan Nie and Reto Zollinger of DPI Hamilton's exciting 'Steep Hills - deferred grazing study*), where stocking rates can be sensitively managed on grass-dominated native pasture.

As you will read in Geordie Scott-Walkers piece, we have had the wonderful opportunity to study experimentally both fire and slashing management at Neville Oddie's Chepstowe property. In general our Grassy Groundcover Research Project sites present a unique situation for further studies in that we know exactly what is on each site, and have plant counts and biomass measurements since sowings were initiated in 2005.

At Neville's we can (*and have*) applied these burn, slash (*and remove*) treatments at some scale (*each plot is 10 m x 20m*) across differing initial site preparation treatments (*scraped and non-scraped*) and across two age classes (*2006 and 2007 sowings*). Geordie's honours project will hopefully give some valuable insights into how we can manage the species composition trajectory of a grassland site through biomass management.

However, at other sites, we've had to manage biomass with the best option at our disposable. For example at Claire's we mowed and removed vegetation. At our Hamilton site we could only slash (*litter retained*) – and while I'm glad we were able to cut

Lovely open vegetation and bare ground in summer following previous autumn burns (Moyston & Laharum).

back the growth, I would have much preferred to take away the litter which in some areas lay very densely on the ground. David Hermans Moyston site and Proo and Will's Laharum sites were burnt (*See photos*). I was really thrilled to see the great effect the burns had, especially on the more diverse scrape areas. Ongoing management is definitely something we'll be following closely and report on further in upcoming issues.

Just quickly my colleague John Delpratt and I took advantage of the slashing works undertaken for Geordies project to establish a supplementary study which will investigate the impact of cut material left on the ground following slashing. We have set up treatments where various levels of biomass have been left on plots (*from very little to 'clumping'*) and will look to see how this affects regrowth and recruitment.

Some interesting data from one site

As most readers would realise the Grassy Groundcover Research Project sites were established as experiments imposing various treatments. This was done to quantify the various developments at each site and perhaps learn from these findings. I've reported some general findings previously (*eg. the Werribee Zoo site*).

Below is some interesting data comparing two years of biomass measurements from vegetation sown in 2006 at Neville Oddie's Chepstowe site. There are numerous factors likely to be influencing these outcomes including nutrient conditions, rainfall, weed identity and treatment type.

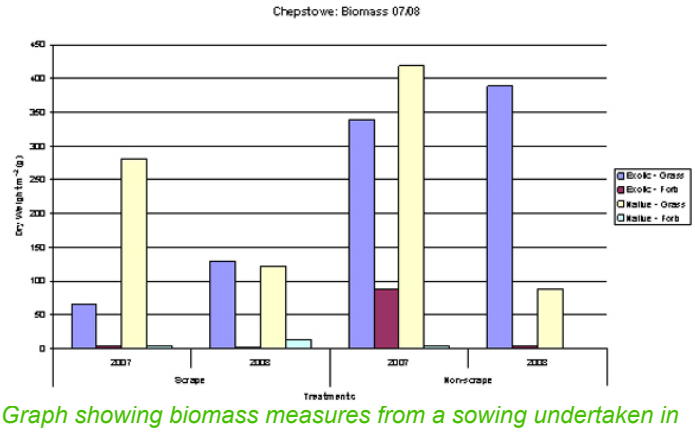
For example, it was clear that between the scraped and non-scraped areas sown in 06 that weed loads following twelve months growth (*blue and crimson columns*) were higher in the nutrient-rich non-scraped plots.

However, it was also clear that the native grasses (*yellow column*) grew more vigorously under these conditions (*indeed dominating in that first year following sowing*).

Then look forward two years after sowing and its interesting that:

1. exotic grass and native forb biomass increased in scraped plots while native grass biomass declined, and
2. exotic grass biomass increased further in the non-scraped plots while the native grasses declined pretty dramatically and the native forbs almost disappeared.

It's interesting to note that the main exotic grass species we are dealing with at this site is Brown-top bent grass, a particularly problematic character that now covers hundreds and hundreds of kilometres of roadsides in Victoria.

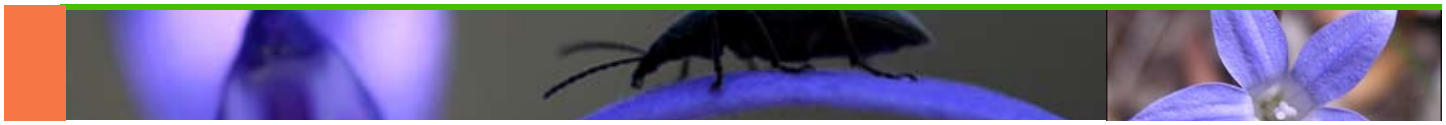


Graph showing biomass measures from a sowing undertaken in 2006 at the Grassy Groundcover Research Project Chepstowe site

It is rhizomatous and forms a very thick sward that collapses in winter to smother the ground and for these reasons it's one of the biggest threats to grassland remnants *(particularly where ploughing of roadside firebreaks spreads the vegetative material and loosens the soil for this species to grow into and dominate*) .

While the grasses and forbs are still doing ok in the scraped plots and grasses to a lesser degree in the non-scrape, this graph indicates why managers of grasslands need to implement biomass management techniques in order to preserve native biodiversity.

Building on information of this type, we will use future studies such as those discussed earlier, to help us to determine what are the most appropriate methods and conditions to manage factors such as excessive biomass accumulation.



More Critters to report!

For some time now I've been indicating that we've found many species of bugs, birds and other "*furry things*" colonising our site. In just about all examples these things were not present (*or seldom*) present in the pre-existing exotic sward. I've got lots and lots of these images over the past five years, but thought I'd include a few that have been taken recently at Grassy Groundcover Research Project sites.

Frog at Chepstowe, moth on Chrysocephalum at Hamilton, fungi on Kangaroo Poo at Laharum

Managing Enthusiastic Spear and Wallaby Grasses

Native grasses, Hoary Sunrays and Pussy-tails growing happily after the slashing

Our highly successful Grassy Groundcover Research Project site (*located in the Mt Gellibrand region near Colac)* has been established for some years now. We have noticed that over time grasses (*native and exotic*) were beginning to dominate and swap plots.

Slashed material removed from windrows and heaped outside native plots

Plots following slashing (early May 09)

In the scraped plots (*which are the most diverse and floristic – see photos*) waist high Spear Grasses and Wallaby Grasses were beginning to dominate. The low-growing flowers were struggling underneath all the taller grasses and we were concerned that we would lose many of them and there would be very few new seeds germinating. On the non-scraped plots mixes of introduced and native grasses were also dominating.

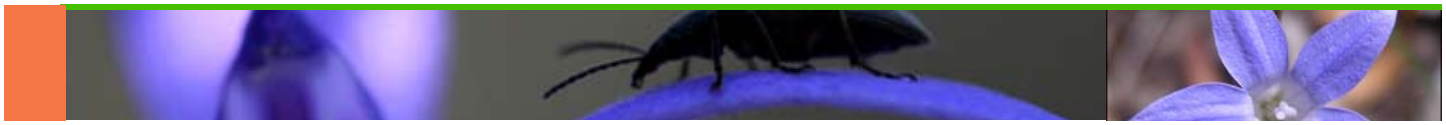
Common everlastings and Hoary Sunrays hanging out together.

We discussed with Paul what we could do to reduce the amount of standing grass. We wanted to allow some light into the ground layer and to create some spaces for new seedlings to establish.

After much discussion of the different options, we opted to slash the area and remove the slashed material. So we went ahead with this plan (*once species had finished flowering and dropped seed*), slashing the long grass, which was made up mainly of the native grasses with some weed species, windrowing it and then removing to a heap on the side.

This has worked really well and this spring we are able to see many more of the plants that we knew were there from the original sowing. We are able to see more space between the existing plants and we are hoping many of these will seed into the bare ground.

With more light able to penetrate to the ground level, seedlings will be able to establish and persist. We believe it is important to control the biomass of the native grassland areas to increase the diversity of species. Slashing and removal is one way to do this.
Claire Dennis



Chepstowe Grassy Groundcover Research Project

– a brief update on biomass management

Earlier in the year, the gazette introduced the Chepstowe Grassy Groundcover Research Project investigating the relative benefits of three grassland management activities – burning, mowing with slash removal, and doing nothing. Six months later, and under the context of relatively high spring rainfall in recent times at Chepstowe, the site has provided an exciting and impressive floral display. The site was surveyed in late October for changes in cover, biomass and counts of native and exotic plants in response to these treatments. This data is currently being analysed and some general trends have become apparent through the survey process.

Several species are particularly responsive to changes across the plots, irrespective of the treatments. While Cape weed (*Arctotheca calendula*) is prominent in two-year vegetation, it was poorly detected in three-year vegetation. The older vegetation appears stable in species composition and the absence of Cape weed may be due to strong competition from established perennial vegetation. Two-year vegetation may still be undergoing vegetation establishment (*ie. the disturbance of the sowing experiment is still a factor determining species composition*) and opportunities remain for recruitment of more plants.

The exotic grass Brown-top bent (*Agrostis capillaris*) is common across all vegetation and dominant in cultivated plots. These are expected to have more nutrients relative to scraped plots. This species is reduced in vigour on scraped plots and has a much reduced competitive effect than was observed on enriched plots *(ie. the swamping effect reported in the June '09 Gazette*). It appears that enriched plots dominated by grasses - both native and exotic, but mostly Brown-top bent grass - support reduced abundance and vigour of native herbaceous species relative to scraped plots, particularly native daisies (eg. *Calocephalus citreus, Chrysocephalum apiculatum, Leucochrysum albicans*).

This lack of herbaceous abundance was observed on all three-year vegetation (*both cultivated and scraped plots*) and to a lesser degree on two-year cultivated plots. It will be interesting to see if treatment effects are detected on two-year vegetation since this may represent a practical method of maintaining greater herb numbers on cultivated plots if biomass intervention is done early in the development of the vegetation.

Hoary Sunray (Leucochrysum albicans) seedlings recruiting on bare scrape areas

Scraped plots were particularly interesting as the consistency of scrapes appears to drive vegetation patterns and may over-ride treatment effects in this study. Scrape consistency may be dependant upon operator error and the inherently natural micro-topographical effects exhibited at small-scales on plains landscapes. The obvious effect of areas inconsistently scraped is greater biomass of both herbs and grasses, particularly exotics. This is expected as patches that were poorly scraped are thought to be similar to cultivated plots in both nutrients and seed-bank composition.

As mentioned in the June '09 Gazette, three-year vegetation was more challenging to conduct burns and mowing on due to high amounts of biomass, however two-year vegetation had less biomass than might have been expected as requiring removal. The scraped two-year vegetation was particularly impressive during spring with prolific flowering of native daisies and a mass recruitment of Hoary sunray (*Leucochrysum albicans* var. tricolor) from seed. This was very exciting for all involved in the project and hopefully we detect some evidence in the survey that shows the importance of bare-earth for successful recruitment of this species and how fire may well be preferable to mowing for the success of this recruitment. Many thanks go out to Paul, John and Neville for their supervision and guidance of this project.

Geordie Scott-Walker

Greening Australia's Moolapio staff caught frolicking in the SPA!

Here at Greening Australia's Moolapio project at Point Henry (*Geelong*) we are used to scandal! We deal on a daily basis with folks frowning at us. We stand tall in the face of other staff members' jealousy... and we love it!

Why we are so thick skinned? It is because we are often found in the spa! Yes it is true! Yes we are paid to be in the spa. We can often be overheard discussing the spa. Candice Parker is frequently in the spa - for hours on end in fact. Caring for and cleaning our spa takes a lot of dedicated time and Candice is our champion. Rod White is always checking the water level and making sure that the systems are running smoothly.

Whilst Lyn Willcock isn't in the spa as much nowadays she certainly has had plenty of time relaxing in the spa.

No wonder we can't stay out of the SPA! It is just beautiful. Podolepis jaceoides (Showy Podolepis) is in the foreground.

Hence we called it the 'pummel horse'. From this point attached semi horizontal struts to the legs and covered it in shade cloth so as to be able to catch the seed.

The 'SMP' with Convolvulus erubescens growing vertically. We hope to collect the seed from the black plastic 'catcher'

This is no ordinary spa, it is our SPA – get it? It's a SEED PRODUCTION AREA! We spend many hours outside in our lovely SPA because our Moolapio grassland project relies upon the many species (*in particular flowers*) we grow in the SPA for seed collection. Two species we have been madly collecting seeds from this season include the nationally threatened *Rutidosis leptorrhynchoide*s (Button Wrinklewort) and regionally threatened *Podolepis jaceoides* (Showy Podolepis).

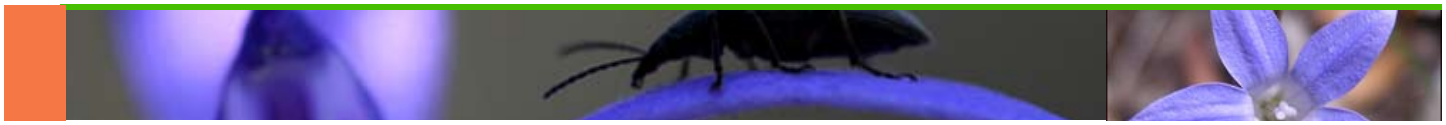
You may remember my writings about the SPA from last year (*we were auditing our plant species and numbers of each, increasing our number of boxed species, rejuvenating our existing stock, planting many species out into the grasslands and preparing ourselves for a busy seed collection time over summer*). In the past six months we have increased the total number of plant boxes to 490, all under timed irrigation.

The SPA under full production. The tube stock are under the shade cloth on a timed watering system. The green house, the 'pummel horse' and 'SMP' systems are at the rear of the SPA

We have installed another water tank to ensure that when we have recycled water delivered via a tanker we can store every drop that the tanker holds and that we pay for *(previously we were paying for an extra 10, 000L that we had no capacity to store*). We have also built some innovative seed collection systems. One system we have dubbed 'the pummel horse' and the other is the 'SMP' (*the six month project because that is how long the damned things took to build!*). We have also constructed a greenhouse from a 600 page 'easy to follow guide'.
Lyn Willcock

Our new water tank

Using the pummel horse system we are collecting Kennedia prostrata and Einadia nutans (pictured here).



Moolapio Grassland Establishment Area

Midway through 2009, the Moolapio project commenced stage 2 of the Grassland Establishment Area (GEA). A hectare of land (*25 x 400m*) was scraped to a depth of 100mm using heavy earthmoving equipment. The new grassland site is linear in shape and adds another hectare to the adjoining GEA stage 1 which was completed in 2008.

Scalped areas all sown. The GGRP crack team responsible (David, Lisa, Rod, PGR, Lyn, Simeon on camera).

Soil scraped from the area was distributed along the entire 400m western perimeter of the scrape site at a width of 15m. The disturbance of the soil from scraping the site resulted in the fresh germination of weed seed which was followed up by two herbicide applications. One carried out in late June and another application in late July. In both applications a 'knock down' herbicide was used, with the second spray containing a residual (*Simazine*) herbicide which achieved a good result.

Sticky mud causes problems on our seeder-tines. Nothing Mr R White can't attend to by drawing on earlier life-skills

August saw the team sowing seed into the freshly scraped area, a process that had a few headaches which included rain falling at the wrong time. This resulted in sticky mud forming that clung to the machinery and made sowing extremely difficult, causing some machinery breakdowns. The sown seed contained a mix of grasses and forbs, apart from the 15m spoil strip (0.6H) which contained purely grasses. This was the same method used in the stage 1 grassland. *contd below*

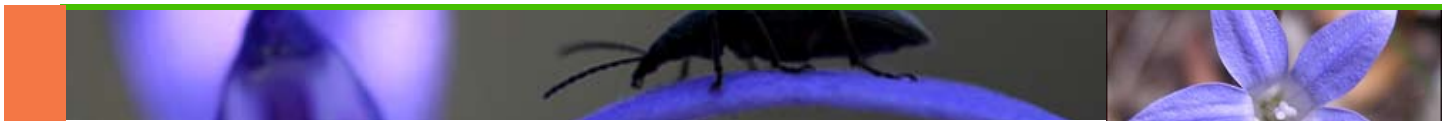
The sowing was followed up by a number of reasonable spring rains resulting in good initial germination particularly *Pelargonium australe* and *Bulbine bulbosa*.

Continuing rain events in late spring and early summer combined with the depth of the scrape (100mm), has proven to be too shallow for this area, and resulted in particularly aggressive weed growth especially Bind Weed and Toad Flax. This situation created a management dilemma in how to best manage the weed issues with so many native plants germinating at the same time. The decision was made to cover each individual plant (*or as many as possible*) in half of the grassland site and spray this area with a broad leaf herbicide, while using contractors to spot spray the other half, concentrating predominately on the Bind Weed. This approach is just beginning to show positive results both in the areas of weed control as well as native grassland species establishment.

After a sluggish and nervous start to GRA1 we are finally starting to see great results in this area with grassland species finally dominating the landscape to the point where our weed management strategy is simply a matter of the occasional spot spray to keep particularly invasive weeds at bay.

The 1.5H area of stage 1 which was sown exclusively with grasses is beginning to show real progress after struggling to compete with reoccurring Oats. The chosen strategy for this area has been to slash bi-annually as well as treat the area annually with a broad leaf spray. This is hoped to increase light penetration and decrease weed competition.

Finally our grassland has turned the corner ...



Glenys's Update

Please note that Gleny's earlier article in the June 09 edition of the Grassy Gazette (introducing this study) was published with some editorial alterations. Unfortunately, this was inadvertently done without Glenys having a chance to approve them. My apologies to Glenys for this oversight – Paul GR.

Hello there from Glenys,
here is an update on my work.
Over the last half of this year I have been conducting three experiments with the seeds of *Leucochrysum albicans* var. tricolor – Hoary Sunray and *Leptorhynchos squamatus* – Scaly Buttons. L. albicans faces extinction in the wild due to changes in disturbance regimes while L. squamatus is common in the wild but is failing to emerge when we direct seed it. It is thought that if seed falls into deeper tine-holes created by our Grassy Groundcover Research Project seeder *(rather than onto the surface between holes*) the sowing depth may be too deep for the seeds to germinate and still have enough energy to grow up through the soil to reach sunlight.

Firstly I ran an experiment to test the germinability of seed from both species. As has been found in past experiments *L. albicans* seed germinated faster and at a higher overall percentage compared with *L. squamatus* seed (*see Figure 1*).

Plate 1 Light (l) and Dark (r) coloured seed coats L. squamatus seed. Photo Paul Gibson-Roy August 2009.

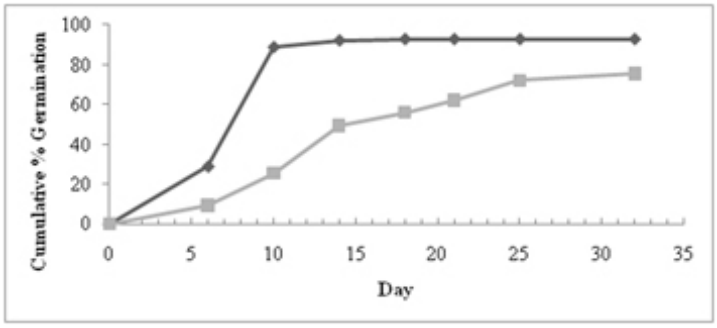


Fig. 1 Cumulative percentage germination of Leucochrysum albicans var. tricolor ♦ and Leptorhynchos squamatus ■ seed. Seed lot L. albicans collected 23/12/2008, L. squamatus collected 28/09 – 24/11/2008. Germination experiment conducted 23/05/2009 – 23/06/2009, 12 hr light, 12 hr dark at 20°C/10°C temperature, germination recorded when radicle protruded through seed coat.

L. squamatus has seed with both light and dark coloured coats (see *Plate 1 on left*) but we did not know if this seed coat colour influenced germination rate. So I ran another germination experiment from 12/08/2009 to 22/09/2009 and found germination percentages were 56% for dark-coated seed and 25% for light coated seed.

This came as a bit of a surprise because experiments from other studies with species exhibiting two coloured seed coats found that the darker seed germinated at a lower rate. It was thought that this was because the dark coat was thicker and therefore physically slowed germination. Another study with yet another species, however, found that darker seeds were more likely to germinate more quickly and that storage temperature and relative humidity are of importance in this situation. *contd below*

It is thought that the different coloured seeds create differences in the speed of germination to ensure a seedbank is formed (*regardless of the conditions of the growing season*). For example, early germination from dark coloured seeds leads to early plant maturity and earlier seed production in dry growing seasons. This may well be the case for *L. squamatus* and this feature may become more important with our varying weather patterns into the future.

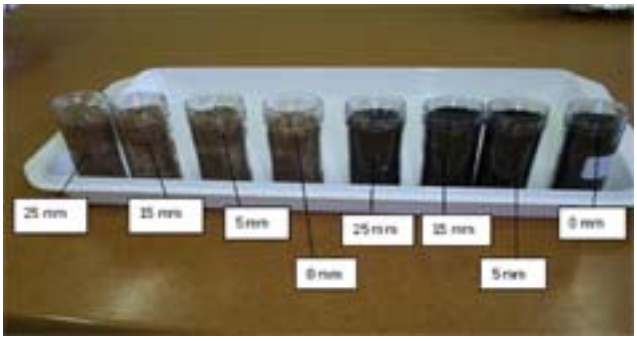


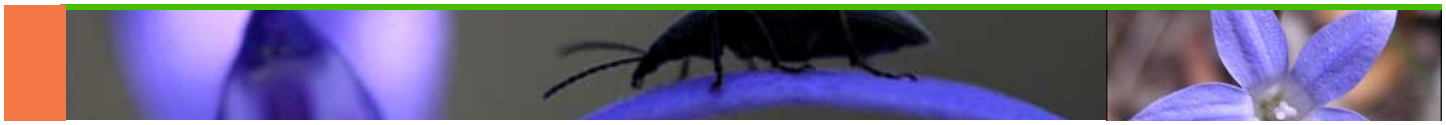
Plate 2 Sample of 30 mm diameter polycarbonate tubes illustrating sowing depths. Photo Glenys Rose August 2009.

The last experiment I conducted was to assess the effect of sowing depth on seed emergence. The set up of this experiment ended up being completely different from what was discussed in the last gazette and the following describes the experiment. I put seeds from both species in sand and soil at depths of 0, 5, 15 and 25 mm in polycarbonate tubes and covered them with foil (*see Plates 2 & 3*).

I also set up some tubes where the seed was planted around the outer edge so that we could observe what was happening as the seeds germinated and tried to grow. A measure of water was applied to each tube to simulate damp media. All the tubes were put in a metal test tube rack and placed in an incubation cabinet set for 12/12 hours light and dark at 20°/10°C temperature and emergence was considered to be the appearance of a cotyledon at the media surface.

Each time observations were made 300 ml of water was sprayed over all the tubes, simulating light rainfall and counteracting the drying effect of the incubation cabinet.

At completion, this experiment showed that for both species a sowing depth of between 0 and 5mm was ideal and we were able to observe germination with failure to emerge at depths greater than 5 mm (*see Plates 4, 5 & 6*).



This may have implications for these and other depth-sensitive species sown from the Grassy Groundcover Research Project-developed seeder where seed falls into deeper tine-holes (*potentially to 50 mm depth*), particularly if low sowing rates are used.

Conversely, this may not be an issue if such species are sown at higher rates and enough seed falls onto the ground surface between tine-holes (*and is pressed into the surface by the roller*). In this situation seeds are likely to encounter conditions more appropriate (*depth-wise*) for successful germination and emergence.

Glenys Rose

Plate 3 Foil covered tubes labelled and ready for the incubation cabinet. Photo Glenys Rose August 2009

Plate 4 L. albicans seeds 5 mm sowing depth in sand.

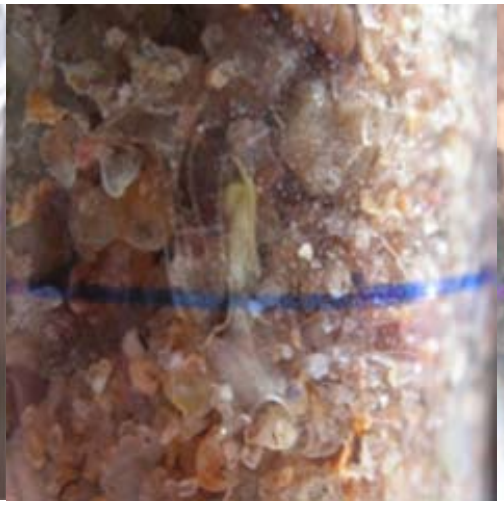


Plate 5 L. albicans seed at 15mm sowing depth in sand, this seed failed to emerge.

Plate 6 L. squamatus seed at 15mm sowing depth in soil. Two days after this photo was taken the germinant had died.

Photos Paul Gibson-Roy September 2009

News from the Burnley SPA

A friend gave me a wonderful book for Christmas. '*The Place for a Village: how nature has shaped the city of Melbourne*' by Gary Presland. On my first browse though the book, I came across the plant lists at the back and was somewhat taken aback when tears of happiness suddenly filled my eyes. I was looking at a list of plant names that I have come to know intimately over the past year through working a day a week at Burnley in the seed production area: a job that I love.

Through the germination, propagation, seed collection and general looking after that has gone on throughout the year, I have come to understand a number of the Basalt Plains forbs. What I have come to learn, doing the bread and butter tasks of seed production is still hardly anything in terms of what there is to know, but it is way more than I knew before.

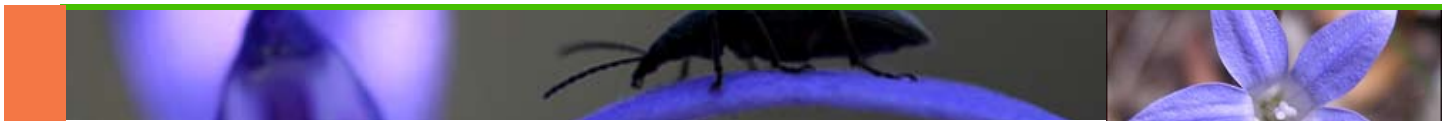
I am sure many of you would relate to the pleasure you can get from simply learning what seeds look like; how to handle them efficiently for propagation; how long each species takes to germinate and which particular species you have to be really patient with.

It is seed collection time at the moment and we are collecting great amounts of *Rutidosus leptorhynchoides, Leuchochrysum albicans, Leptorhynchos squamatus* and *Microseris lanceolata*. Other species we have been collecting this season are *Arthropodium strictum, Bulbine Bulbosa, Perlargonium australe, Plantago gaudichaudii, Ptilotus spathulatus, Ptilotus macrocephalus, Vellia paradoxa, Vittadinia cuneata* and Whalenbergia, spp.

This year with nearly every species, I have collected too early, only to realise two weeks on, when the seeds were really ready. Like with many things, it is bleeding obvious in hindsight but you just don't know till you get there yourself.

One difficulty at Burnley is that we often only have one day a week available for seed collection. This means having to compromise on optimal timing. I often find I have to collect seed a bit on the early side, knowing that if I don't get it then, it will be gone by the next time we can collect.

It would be great to see if these timing compromises with seed collecting matter, and whether collecting seed slightly earlier than is optimal, but keeping it on its stalk and letting it ripen up in the bag work just as well or not.



Maybe next year, we might be able to do some small germination studies on a few species to help answer this question.

Paul and I have learnt a few specific lessons this year. *Ptilotus macrocephalus* for example. Early in the year, when Paul, Rod White and myself were weeding and tidying up the boxes, we ended up with a lot of loose Ptilotus root. Paul had the good idea of trying to see if we could get the bits of root to strike. Lo and behold the little things took. Once they had enough new growth, we planted some in the regular more shallow polystyrene boxes and some in deeper boxes. The difference was astounding. The plant growth in the deeper boxes was so much more than the shallower boxes. Strong and healthy looking flower heads have since shot up and will be ready to collect no doubt in another month or so. Paul thinks that with a larger seed production area, this would be one species worth planting in the ground,

We are still learning about the germination time for certain species and are still having very little success with growing other species once they have germinated. We have learnt to be very patient with *Caesia callianthа*. We sowed the seeds back in June and are still getting seedlings coming up six months later. Others like *Comosperma polygaloides* are still a mystery to us. We seem to get the seeds to germinate but have had no luck yet in our attempts to produce healthy and productive plants.

With a small seed production unit, we have also learnt how easy it is to end up losing certain species or having very reduced seed numbers of a species for next season's direct sowing. This year, virtually none of the *Vittadinia cuneata* germinated successfully. We still had the old boxes from last season, so we pruned these back and replanted them into cleaner boxes. Unfortunately most of these plants died. We have some seed to collect this season but it will only be enough to try and get enough germinated to put back into seed production for the following year. This means we will have no or very little Vittadinia for 2010 direct sowings.

I guess these problems that happen every year, taking various shapes and forms mean that we always need back up plans. Having enough seed set aside in storage, should there be a problem with germination or with plant loss for some other reason, is just one of many simple back up plans that can help get us out of trouble.

Because of a lack of funds, we have run the seed production area this year on a shoestring of human resource. Without the people who have come in to help, we simply would not have got through the workload. Rod White took time out from Moolapio on many occasions and has done heaps of work up at Burnley throughout the year. Simeon Buckley spent a couple of months working with us as part of his university degree and his input was invaluable to the seed production area. Glenn Mansfield and Glenys Rose also helped out during the year. I even made my mum, Margot Rasmussen come in one afternoon in December when the seed collection job felt a bit too overwhelming and I needed some help*(as you do!*).

Thanks to everyone who has helped out and especially to Paul for his leadership, guidance, infectious enthusiasm and commitment to the project.

Lisa Rasmussen
Dec 2009

The only wildflower cricket oval in the world?

Thanks to my involvement with the Grassy Groundcover Research Project and being infected with Paul's enthusiasm I now spend more time wandering in and wondering about the extraordinary grassland areas of South Western Victoria.

This spring I have spent a lot of time at the Wannon Reserve a few kilometres west of Hamilton. This reserve is near the site of the old township of Wannon which was settled in the mid 1880s and once boasted two schools, timber mills and an Inn. Now it is a beautiful small settlement scattered along the banks of the Wannon River, near the Wannon Falls Scenic Reserve with none of the above facilities but still a great sense of community and perhaps the only wildflower and native grass cricket oval in the world. This spring I photographed almost 20 different wildflowers in bloom on the oval along with a couple of native grass species. The oval is now visited more for it's wildflowers than any other purpose (*see photos*).

Armed with my photos of the flowers on the oval and other parts of the reserve I spent several mornings with groups of older people from our region showing them photos and hearing of their memories of the wildflowers of their youth, many of the tales dated back to the early 1900s and involved picking armfuls of flowers that are now not common.

Wildflowers at Wannon Reserve

Wildflowers at Wannon Reserve

In the early 1900s the Wannon reserve was a favourite place for local people to visit both to go courting and also to play very competitive cricket against teams from neighbouring settlements. Both the men and the women seemed pleased to be reminded of their youth and following my talk one group organized a bus to take them out just to look at the oval and its flowers again.

There was a bit of a gender division with the stories that I heard. The women told mostly of picking flowers for their teachers and of their favourite flowers when they were small children. As well as stories of the great cricketers of the time, the men spoke of picking bunches of wild flowers for their sweethearts. Some of these sweethearts are now spouses of many decades.

As well as the oval and the falls, the Wannon reserve has about sixty hectares of bushland, some areas more pristine than others. There have been almost 300 species of indigenous, largely ground flora including many orchid species recorded there.

Sadly, as is so often the case due to the lack of recognition of areas of significant ground flora, a significant part of the reserve was damaged this year. Also the oval which was looking colourful with a number of local species blooming was mown thus reducing the opportunity for seed to set and also removing the very asset which was attracting visitors to the site.

This to me highlights that while thanks to Paul and Grassy Groundcover Research Project there has been a huge increase in community awareness and appreciation of native grasslands and wildflowers, we still have a lot of work to do if we are to have them going on into the future.

Elizabeth Fenton

Industry Project Wrap-Up

In the last issue of the Grassy Groundcover Gazette I wrote a short article outlining my Industry Project, "*the effect of harvest season on seed viability, after-ripening period and germinability of grassland Asteraceae*". The purpose of this research project was to investigate if there are any differences in early spring and late autumn seed harvest-lots of three grassland Asteraceae species, *Rutidosis leptorrhynchoides, Microseris lanceolata* and *Vittadinia gracilis*.

The project assessed the quality of the seed produced from each harvest-lot by quantifying the percentage of viable seed produced; the percentage of seed that germinated; and if varying temperature or cold stratification improved germination rates. Seed germination tests were undertaken during semester 1 and semester 2.

Semester 1 tests were conducted under cabinet conditions at 20°c light and 10°c dark (20/10°c) for 28 days for all three species. In the semester 2 tests *R. leptorrhynchoides* seed was germinated at four different temperature treatments 10/5°c, 20/10°c, 30/15°c and 40/20°c. *Micoseris lanceolata* and *V. gracilis* seed was germinated using three different treatments, 20/10°c only and cool stratification of 4 days or 14 days at 4°c before being germinated at 20/10°c.

These results of the semester tests were compared to determine if there were any changes in the germination response between semester 1 and 2 tests at 20/10°c (*Figure 1*) as a result of a longer period of storage, and (ii) a comparison was made of germination responses at 20/10°c for each harvest-lot after a period of approximately five months dry storage.

RESULTS

At the end of the semester 1 tests, all three species were assessed for seed viability by testing using tetrazolium (TZ). Testing indicated that there was a range of viability for each species and each harvest-lot.

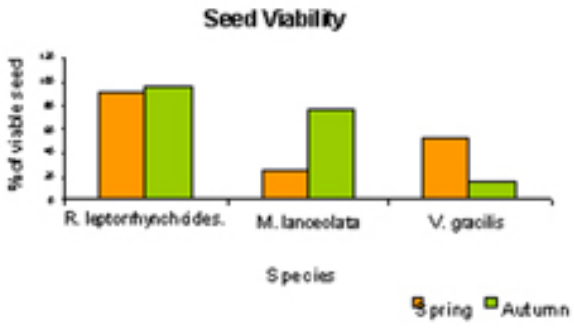


Fig. 1 Results of TZ testing indicating viability of each harvest-lot of each species

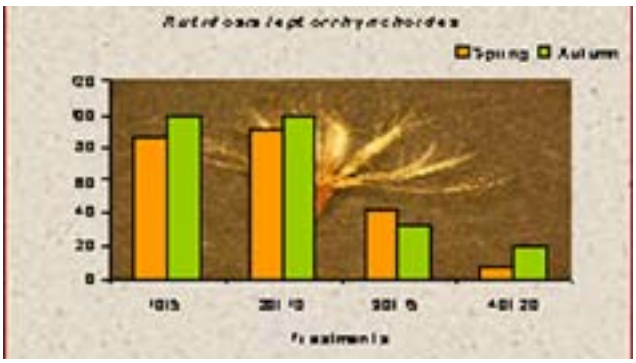


Fig. 2 Germination percentage of spring and autumn seed of R. leptorrhynchoides seed tested under each treatment, showing two distinct germination response patterns.

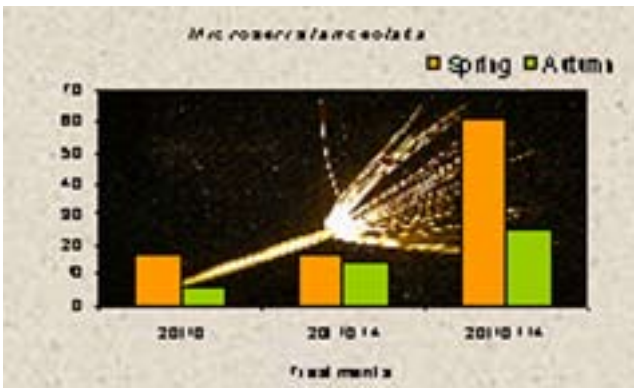


Fig. 3 Germination percentage of spring and autumn seed of M. lanceolata seed tested under each treatment.

Rutidosis leptorrhynchoides
Testing of *R. leptorrhynchoides* indicated that spring and autumn harvest-lots had:
- high seed viability >90%

and when germinated at 20/10ºc:
- high germination of viable seed >90%
- rapid germination within 14 days >95%
- seed germinated readily after 1 month of storage

Under the various temperature treatments there were two distinct germination patterns
- 30/15ºc & 40/20ºc
- 20/10ºc &10/5ºc

Micoseris lanceolata
Testing of *M. lanceolata* indicated that spring seed had:
- seed viability of 24%

and when germinated at 20/10ºc:
- low germination of viable seed
- +14 days stratification significantly increased germination

Autumn seed had:
- seed viability of 76%

and when germinated at 20/10ºc:
- low germination of viable seed
- stratification did not significantly improve germination

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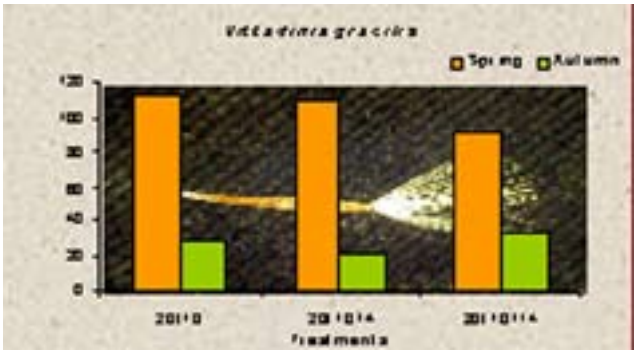


Fig. 4 Germination percentage of spring and autumn seed of V. gracilis tested under each treatment.

Vittadinia gracilis
Testing of *V. gracilis* indicated that spring seed had:
- seed viability of 52%

and when germinated at 20ºc:
- 100% germination of viable seed
- stratification did not significantly increase germination

Autumn seed had:
- seed viability of 16%

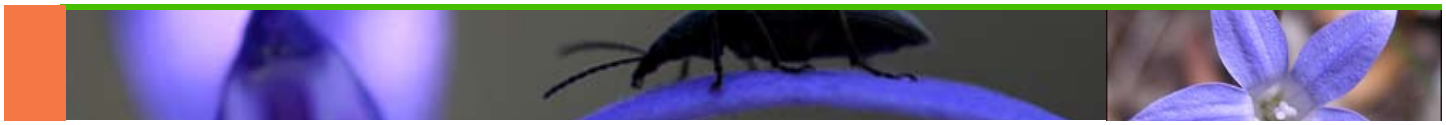
and when germinated at 20ºc:
- low germination of viable seed
- stratification did not significantly improve germination

IS STORAGE DURATION MORE SIGNIFICANT THAN HARVEST TIME?
Statistical analysis of spring and autumn harvest-lots of *R. leptorrhynchoides, M. lanceolata* and *V. gracilis* at approximately five months storage indicated that there was a significant difference in seed harvest-lots, but that storage duration for each harvest-lot of each species was not significant.

IMPLICATIONS
The results of this study indicated there was a range of viability of seed and a range of germination responses to the specific treatments applied to each harvest-lot of each species.

Testing indicated that germination of *R. leptorrhynchoides* was inhibited by high temperature and that the germination temperate of *M. lanceolata* and *V. gracilis* may not have been optimal, which has implications for the scheduling of the sowing of these three species. This information can be used to maximize the use of the resources involved in the propagation, production, collection and storage of good quality seed with the aim of increasing seed production for restoration project.

As seed viability and germinability may vary from year to year, depending on environmental conditions, subsequent testing may be required to confirm these results. The information in this study represents a single population, grown under controlled conditions, using seed harvested in a single year, which may not be representative of each species.
Debra McKeown



Testing success – seed testing for the GGRP

There are a couple of key questions that should be asked about any seed lot.

- How much of the seed lot is living seed that is ready to germinate?
- Are there seeds of weedy species in the seed lot?

Most commercial seeds are cleaned to a very high level of purity. They undergo rigorous testing for species purity, weed seed content and germination capacity in certified seed laboratories. In these respects, Grassy Groundcover Research Project seed lots differ from commercial seed produced for pasture and food crops.

Grassy Groundcover seed lots are mixes of many species of local native grasses and wildflowers. The various species are harvested either from remnant communities or from a cultivated seed production area. When Paul and his team are preparing these seed mixes for direct sowing, they do not clean the seed to a high percentage of purity. Instead, they deliberately leave much of the straw and chaff harvested from the plant. They weigh the amount of material for each species that they include in the mix.

This approach has several advantages:

- cleaning each species to pure seed and testing each species in a commercial laboratory is prohibitively expensive for this project;
- the cleaning process may remove critical dispersal appendages that help seeds locate suitable germination microsites on the relatively tough Grassy Groundcover Research Project sites;
- the associated plant chaff and straw forms a light mulch on the soil surface, helping to reduce the evaporation of soil moisture – vital for germination and seedling establishment.

However, it remains critical to know the germination potential of the seed that is sown on Grassy Groundcover Research Project sites. Knowing how much germinable seed of each species is sown allows us to assess the success of each sowing and design improved mixes for future sowings.

At the Burnley Campus of the University of Melbourne we are developing and refining seed testing protocols that suit the seed lots that go into Grassy Groundcover Research Project site mixes. Our aim is to test seed lots quickly and with enough rigour to accurately estimate the number of germinable seeds within a given weight of a chaffy seed lot. *contd below*

We use two different approaches.

1. 1. Initially, for most species, we test five small but representative samples of the seed lot (*including seeds, chaff, straw etc.*). Each sample is weighed accurately, laid onto moist paper in a lidded plastic tray and placed into a germination cabinet (*See photo 1*). The cabinet is set to temperature and light conditions that represent the germination season for the species being tested. We count and remove the germinating seedlings weekly for four weeks (*sometimes longer*). This gives us a relatively quick and easy measure of the number of readily-germinable seeds per weight of the chaffy seed lot. However, this test doesn't tell us about any live seeds that are not able to germinate quickly, either because they are dormant or because they are not suited by the germination conditions.

1. 2. The second approach is initially more time-consuming but it can reveal more information. For seed samples that are easily cleaned to pure seed, or when the first test reveals very low or no germination, we take a more traditional seed testing approach. Again, we take five representative samples from the chaffy seed lot. Each sample is weighed and all whole seeds are extracted and counted (*sometimes a very slow and tedious process, best avoided by a sane person*).

Photo 2. Individual Button Wrinklewort seeds.

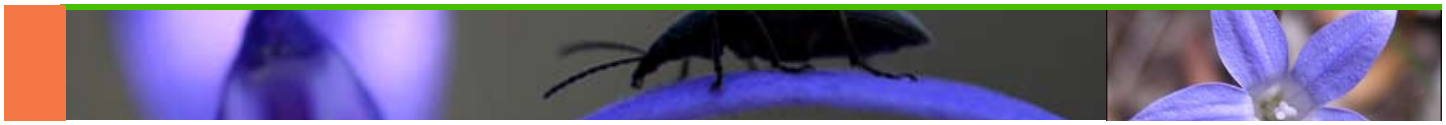
Photo 1. Five sub-samples of 'bulked material' from a wallaby grass seed lot.

From this we can calculate the number of seeds per weight of the seed lot. The pure seeds are laid out in four replicates of 25 seeds, again on moist paper in the plastic trays, and placed to the germination cabinet for (*usually*) four weeks (*See photo 2*). Using this test, we can follow the fate of individual seeds – germination, death or un-germinated but sound. If a high proportion of the seeds remain un-germinated but sound, we can test the seeds for viability. If the seeds are alive, it is likely that they are dormant. This is not unusual in freshly harvested seed.

If a high proportion of a seed lot is dormant, we may make to decision to keep the seed in dry storage for a few months before re-testing and sowing. Alternatively, the seed may still be included in the sowing with the understanding that we may not see germination for that species for some months or longer. An important part of this research is determining how well laboratory germination predicts field results. As we gather more information, it may be possible to establish field factors (*likely seedling establishment from know quantities of sown seed*) for many of our species. This will help us make the most efficient use of limited and expensive seed resources.

In a subsequent article, I will write about specific species and the variety of germination patterns we are seeing in both the laboratory and the field sowings.

John Delpratt, Hon. Assoc., The University of Melbourne, Burnley Campus



Please September

Paul Gibson Roy

To collect this seed
From September last year
We toiled for months
Harvesting wildflowers and lilies and grasses
All beautiful and rare
Along roadsides and from reserves
Under burning sun and driving wind
On brilliant clear days
Under huge skies
We bustle and laugh and scheme
Brush-harvester behind the twin-cab
Or crouched for hours on end
Cutting countless stalks by hand

We are mindful of snakes
Circled by hawks
And sung to by larks
We pause only for lunch
Under the shade of Acacias and drooping Casuarinas
Sipping sweet thermos tea and devouring cut sandwiches and fruit
As huge bull ants carry away our crumbs
And occasional passing utes or trains toot their horns
In the end we have many woolpacks full
And so, covered in dust, sweating like pigs and grinning like fools
We stack it all away

September this year
Out once more
I'm behind the wheel of a tractor
Mr White is on the back of the seeder stirring
Bumping over bare earth
PTO engaged
Tilling the soil into a welcoming bed
Round and round and round we go
Travelling at a walking pace

Between runs, in the back of a trailer,
We mix the seed with sand by shovel
And load it
Bucket by bucket by bucket into the hopper
We have limitless energy in the morning
By sunset we are totally shagged
But covered in dust, sweating like pigs and grinning like fools
We have covered every square centimetre of these paddocks
Over three long days
We have watched the seed fall back to the soil
Pressed in gently by our machine
And we wish it very well indeed
For this is the end of a long road

And now we wait
For it to spring back to life
Beautiful and rare
And cover this place
So please September
Let it rain

Want to know more about the Grassy Groundcover Research Project ?

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