NEW ZEALAND PLANT CONSERVATION NETWORK

TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

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Deadline for next issue: Monday 15 December 2014

SUBMIT AN ARTICLE TO THE NEWSLETTER

Contributions are welcome to the newsletter at any time. The closing date for articles for each issue is approximately the 15th of each month.

Articles may be edited and used in the newsletter and/or on the website news page.

The Network will publish almost any article about plants and plant conservation with a particular focus on the plant life of New Zealand and Oceania.

Please send news items or event information to events@nzpcn.org.nz

Postal address:
P.O. Box 16102,
Wellington 6242,
NEW ZEALAND

PLANT OF THE MONTH, p. 2

Davallia tasmanii subsp. *tasmanii*.
Photo: Peter de Lange.

Opinion: The Planet Needs More Plant Scientists

Alan M Jones, Kenan Distinguished Professor, University of North Carolina, Chapel Hill

Academia is not producing sufficient PhDs in the plant sciences to solve the crop production challenges facing a rapidly growing population. Though the message is not new, the declaration of the flaws of the US biomedical research system by four prominent life scientists this spring captured everyone's attention. Bruce Alberts, Marc Kirschner, Shirley Tilghman, and Harold Varmus wrote in Proceedings of the National Academy of Sciences (Alberts et al., 2014) of how "demands for research dollars grew much faster than the supply . . . [due to] perverse incentives [that] encourage grantee institutions to grow without making sufficient investments in their faculty and facilities." Rather than devote money to faculty salaries, universities built infrastructure to house more self-paid researchers able to bring in more money via research grants, of which a large fraction was used as revenue (overhead) for the university. More labs required more students to fill them, leading to a dramatic rise of PhDs in the biomedical sciences, which then produced more researchers competing for dwindling grant dollars. In short, research institutions have no incentive to support individual faculty and instead have perverse incentives to encourage further research spending: more grants = more overhead = more buildings = more PIs = more PhDs in an increasingly out-of-control spiral (Fig. 1). This is not sustainable, and we are now experiencing the consequences, with the most despairing being the lack of adequate jobs for our post doctorates and perceived insufficient funding for all of us.

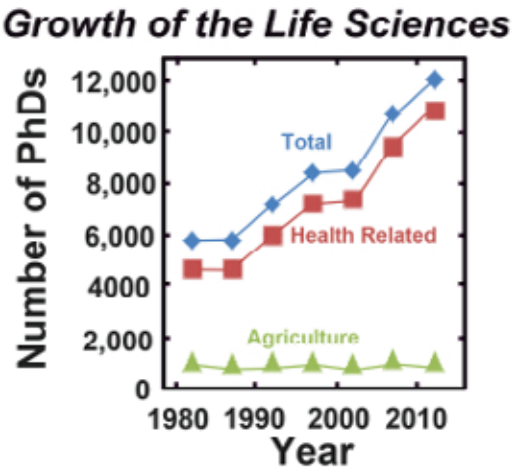

Figure 1. PhDs in the U.S.: From 1982 to 2012, the total number of PhDs in the life sciences (blue) has grown dramatically. Most of these PhDs are in biological, biomedical, and health sciences (red), however; the number of PhDs in the agricultural and natural sciences (green) has remained flat over that same time period.

The unsustainable rate of PhDs awarded per year in the biomedical sciences does not extrapolate to the rate of PhDs in other life sciences, however, especially the agricultural sciences, where the rate of PhDs per year has remained flat for decades. Since 1982, we have consistently trained only about 1,000 PhDs in applied agricultural and related sciences each year. And, over the last decade, the U.S. has annually produced only 800 or so plant scientists working in applied agricultural science and only 100 with the skills for basic plant research (Fig 2). Given the global agricultural challenges we now face, this is a problem.

PLANT OF THE MONTH – *DAVALLIA TASMANII* SUBSP. *TASMANII*

Davallia tasmanii subsp. *tasmanii*. Photo: Peter de Lange.

Plant of the month for November is *Davallia tasmanii* subsp. *tasmanii, the* Three Kings davallia. It exists in a very restricted habitat, found only on the Three Kings Island group and also the Arbutus and Hinemoa Rocks in the Princes Group. Its current threat status is At Risk—Naturally Uncommon.

It is a creeping fern with branched rhizomes. The rhizomes are 2–8 mm and densely covered with scales that will shed with age. It has dark green to yellow green foliage depending on its exposure to light. It is usually terrestrial but will climb on low branches or fallen logs. It will happily live in full sun or heavy shade.

There is a similar species, *Davallia tasmanii* subsp. *cristata*. The only known population grows in Puketi Forest, Northland. It is known only from cliff face margins and its status is Nationally Critical. Unfortunately, it is vulnerable to grazing feral animals and trampling by people.: The Network factsheet for *Davallia tasmanii* subsp. *tasmanii* can be found at www.nzpcn.org.nz/flora_details.asp?ID=1782.

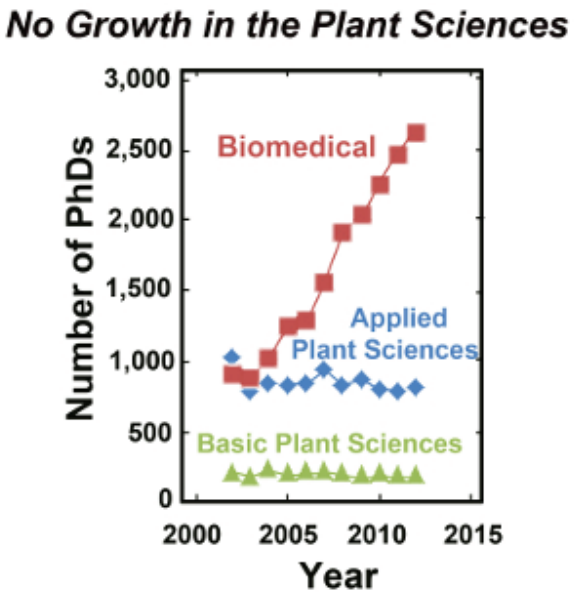

Figure 2. Plant science stagnates: Selected sub-disciplines relevant to a work force in plant industry (blue and green) have not increased this century, while selected biomedical sub-disciplines (red) have grown steeply. (Biomedical sub-disciplines include bioinformatics, biomedical sciences, biometrics and biostatistics, cancer biology, computational biology, developmental biology/embryology, neurosciences and neurobiology, structural biology, virology. Basic plant biology sub-disciplines (green) include botany/plant biology, plant genetics, plant pathology/phytopathology, plant physiology. Agricultural research sub-disciplines (blue) include agricultural and horticultural plant breeding, agricultural economics, agronomy and crop science, forest engineering, forest sciences and biology, forestry and related science, horticultural science, plant pathology/phytopathology (applied), plant sciences (other), soil chemistry/microbiology, soil sciences, entomology, plant genetics, plant pathology /phytopathology, applied plant physiology.)

The Earth must support another 1 billion humans in the coming decade, and must do so with less arable land and in an unpredictable climate. This means we must find innovative ways to produce crops with higher yields and novel traits—a feat that will require the work of PhDs trained in agriculture and plant sciences. But, at this point, we are not producing enough plant scientists to lead us out of this Malthusian dilemma.

The U.S. Coalition for a Sustainable Agricultural Workforce recently completed a confidential survey among agricultural biotech companies to ascertain near-term needs for hiring domestic agricultural scientists. This survey generated an amazing result, given the tone of the Proceedings of the National Academy of Sciences perspective, predicting that by 2015, 1,000 new employees will be needed in the

half-dozen largest plant-science companies in the U.S. alone (Bayer Crop Science, Dow Agro Sciences, Dupont Pioneer Hybrid, Dupont Crop Protection, Monsanto, and Syngenta). Almost half of these anticipated new hires will hold PhDs. Unfortunately, with what appears to be a dwindling pool of qualified applicants applying to plant science PhD programmes, we may not be keeping up with this demand.

The growing world population needs to eat, and it is past due that we elevate basic, translational, and applied plant research to the priority given to biomedical research, or more boldly, to defence. Stabilizing food supplies in a changing environment is integral not only to the world population's health, as an estimated 50 per cent of childhood disease globally is attributed to malnourishment, but also to national security. Moreover, a recent study found that, around the world, the rate of return for investment in agricultural research is ten to one, bringing into question the scaling back of funding for agriculture research and development in many rich countries.

Going forward, we must infuse more resources into plant biology research, to boost research output and to train tomorrow's plant scientists. In the early 1980s, the National Science Foundation (NSF) established an 11-year postdoctoral fellowship programme with the primary objective to nurture future leaders of plant biology research. By many accounts, this programme was successful; among a cohort of 236 fellows, four are members of the National Academy of Sciences today, and over 80 per cent remained in plant biology. Of those, the majority stayed in academic institutions, while an impressive number (25 per cent) went to industry, where many now hold corporate officer positions. Anticipating the need for leaders to alleviate hunger and to prevent global instability, we should reinstate this programme to recruit our best talent to plant science and agricultural research.

In conclusion, it is important that the sirens of a glut of biomedical PhDs do not fallaciously harm other areas of science that are still in desperate need of young researchers and more research funding. This is especially true for the plant sciences, where the next generation of researchers must conquer significant challenges to feed a growing world population in a changing environment.

Acknowledgement

I thank Machi Dilworth for providing annotated data on the NSF Postdoctoral Fellowship program. Data source: NSF.

Reference

Alberts, B. Kirschner, MW, Tilghman, S., S.Varmus 2014: Rescuing US biomedical research. *Proceedings of the National Academy of Sciences* 111(16): 5773-5777.

(*Editor's note: This opinion piece first appeared in the 1 October issue of* The Scientist. *Is there a university academic who might like to comment on the New Zealand situation? It was brought to our attention by member Professor Dennis Woodland.*)

DNA tests complete kakabeak jigsaw

DNA tests on newly-discovered, nearly extinct plants have given researchers the most complete picture yet of how the critically-endangered kakabeak (*Clianthus maximus*, or *ngutukākā* in *te reo*) is clinging to survival on the inaccessible cliffs, bluffs and ledges of New Zealand's wild back-country.

The tests, conducted by Dr Gary Houliston, a plant geneticist at Landcare Research, found distinct groups of plants in clearly defined areas. The Forest Lifeforce Restoration Trust (FLRT), a conservation trust working with the Department of Conservation (DOC) to prevent the extinction of kakabeak, will use this information to re-stock conservation land with genetically diverse plants it is rearing from wild seed.

The deep red flowers of the kakabeak, curved like the beak of the parrot after which they're named, hang in heavy bunches.

Imported pests such as rabbits and deer have impacted wild populations of kakabeak severely and the species now holds New Zealand's highest possible threatened species ranking: 'Nationally Critical' (de Lange et al., 201). Although grown widely in gardens, domestic kakabeak have limited genetic variation and therefore little genetic value. Until recently, only about 110 naturally-seeded kakabeak were known to exist in the wild but, earlier this year ,a DOC-led field trip to Ruakituri, a part of inland Hawke's Bay where only six wild plants had previously been known to exist, yielded 18 more. DOC ranger Helen Jonas said: "The department had four people searching for kakabeak during the flowering period last season. The plan is to follow this up in the new year with aerial searching, using a helicopter to continue to look for this rare and important species."

Tests on these most recent discoveries have resulted in the most complete genetic picture of the nearly extinct New Zealand native that anyone has ever had. "We now have DNA data from pretty much every accessible wild kakabeak known to us," Dr Houliston said. "This allows us to make sensible, science-based decisions about what mix of plants from FLRT's seed stock should be used in restoration plantings."

FLRT's forest manager, Pete Shaw, said the trick would be to strengthen the genetic pool of each distinct group by introducing young plants with a different genetic composition. "The genetic diversity of any plant population is a good indicator of that population's strength," Shaw said. "The fact that these plants were out there highlights the value of continued field searching."

Simon Hall, Chairman of the Forest Lifeforce Restoration Trust, with a kakabeak plant propagated in one of the Trust's Maungataniwha Native Forest seed orchards.

FLRT and DOC have recently called for hunters, anglers, trampers and rafters to keep their eyes out for kakabeak while in the bush. Any sightings of the flamboyant plant, which is typically found clinging to cliffs and inaccessible bluff systems and which carries heavy bunches of large, curved bright red flowers in spring, should be reported to the nearest DOC office. Seeds from any new plants are particularly valuable as they widen the pool of wild-grown seed that can be used in propagation efforts.

Couple's lifelong effort recognised

Neill and Barb Simpson's current project—the formation of the Wakatipu Reforestation Trust and setting up and operation of the Jean Malpas Community Plant Nursery—is perhaps the culmination of their conservation efforts over the past 60 years. Examples of their commitment to conservation in the Wakatipu Basin are everywhere and their work has been recognised with the 2014 Inland Otago Conservation Award.

Inland Otago Conservation Award winners Neill and Barb Simpson, of Kelvin Heights, at the Jean Malpas Community Plant Nursery. Photo by Guy Williams. Photograph courtesy of *The Otago Daily Times*.

What is it about the project you're involved in that got you both interested in conservation and drives your work?

The conservation of New Zealand's native plants and the education of the New Zealand public to appreciate their beauty, value and uniqueness, part of our natural heritage that around the Wakatipu Basin and in other places is disappearing under an invasion of exotic plants and introduced weeds. We are concerned that many people no longer know what is native and what is introduced. We believe that there are many local areas of ''waste" land (small gullies, roadsides, escarpments) both on public and private land that are presently covered in broom, hawthorn, blackberry, buddleia and other weeds but that could be planted in native vegetation for the benefit of our native birdlife.

How do the project/s you're involved in benefit conservation?

Small pockets of native vegetation could perhaps be connected up over time to form wildlife corridors through the area, increasing our native bird and insect population, providing a native seed source for the natural spread of native plants and reducing the need to spray weed areas. In our view this would also improve the visual landscape. This project also follows on from more than 10 years of restoration planting on Pigeon Island, organised by the Wakatipu Islands Reforestation Trust, where about 40,000 native trees and shrubs have been planted by volunteers over more than 15 years.

What do you get out of the work?

We get enormous satisfaction from planting native plants, seeing the results of that work and helping others to appreciate our wonderful native plants.

What challenges has the project faced and how have they been overcome?

We have had great verbal support and enthusiasm from the community at large and also from funders, so that funding so far has not been a problem, although it has been a lot of work. The main challenge is getting the information out – what we are doing and how others can help, getting volunteers for planting (we have had a great response for potting-up sessions at the nursery). Just on 3000 plants have been planted around the district this year by volunteers but we could do with more volunteers for planting and maintenance.

What direction do you see your conservation work going in the future?

This is a very long-term project that we hope will continue long after we are about.

(*First published in the Otago Daily Times, Friday 7 Nov 2014; published with permission.)*

Favourite Plant and Worst Weed vote begins…

Matt Ward, Network Council Member (mattdavidward@gmail.com)

The New Zealand Plant Conservation Network's annual favourite plant and worst weed election opened on 1 November, and will run until 30 November, with the winners being announced on the Network website and in the December newsletter. Each year since 2002, the Network has asked New Zealanders to vote for their favourite plant. In 2012, the worst weed was added into the mix and proved popular. Last year's favourite plant was a fern for the first time, *Hymenophyllum malingii*. The most despised weed in 2013's vote was Douglas fir, *Pseudotsuga menziesii*.

Kauri greenhood, *Pterostylis brumalis*; Kauri Glen, Northcote, Auckland. Photo: Jeremy Rolfe.

With voting having been underway for 18 days (at the time of writing), there are some expected contenders and a few not so expected candidates. In the first couple of days voting, an early leader was the kauri greenhood, *Pterostylis brumalis*, a very distinctive little greenhood orchid that was formerly in the genus *Diplodium* and is mostly associated with kauri-dominated forests. Several species of this genus unusually flower in the winter months, providing some orchid spotting throughout the cooler months of the year. Some comments about this early leader include:

"*This is a clever orchid that tricks its pollinator into pollinating it by its labellum that snaps shut when the pollinator lands on it. Recently, research suggests that greenhood orchids are sexually deceptive*"

"*It looks like a talking plant from a Disney movie. Awesome.*"

Dobson's speargrass, *Aciphylla dobsonii*; Ahuriri. Photo: John Barkla.

Another not so commonly known species Dobson's speargrass, *Aciphylla dobsonii*, is ascending the ranks. Presently in fourth place, this unique species favours the montane scree slopes of the ranges in the central South Island thus requiring a good hike to see in its beautiful natural habitat. Comments about this species include:

"*A school of these orange spikey sea creatures stranded high up on a grey mountain rock field is an extraordinary sight. Add it to your botanical bucket list. As a bonus they come with photogenic large weevils and huge heads of white flowers on stout stalks.*"

"It's a really is a cool carrot"

The very worthy and "Nationally Critical" endangered Bartlett's rata, *Metrosideros bartlettii,* is leading the race after 18 days; last year it was third in the vote. This species of tree rata is almost extinct in the wild from the effects of possums; it is the only white flowering tree rata and needs serious conservation

management to prevent its loss. Many comments refer to it rareness; one comment suggests a challenge:

"This is an amazing plant that somehow is still little known to the wider public, and which should be more widely planted to ensure its survival. The perfect tree for a truly white Christmas!"

"Simply because it's so amazing that such a large tree could have gone unnoticed in such a small area of forest for so long. I hope its conservation is assured"

"*Any botanist worth their salt should take a pilgrimage to Te Paki to see this spectacular tree*"

Unlike the favourites, there has been little fluctuating in the lead for the race to become 2014's most despised weed. As you would expect, those showing their ugly heads are species most gardeners and conservationists are familiar with: veldt grass, *Ehrharta erecta,* has led most of the time and is a highly invasive widespread pest. Initially, Spanish heath, *Erica lusitanica,* led before being overtaken by Darwin's barberry, *Berberis darwinii.* All the leaders would be worthy winners, however, they are all likely to beaten to the new habitat of winner by veldt grass.

Bartlett's rata, *Metrosideros bartlettii;* Te Paki. Photo: Jeremy Rolfe

Leader Board 18 November

Favourites	Weeds
1. Bartlett's rata, *Metrosideros bartlettii*	**1.** Veldt grass, *Ehrharta erecta*
2. Kauri greenhood, *Pterostylis brumalis*	**2.** Pampas grass, *Cortaderia selloana*
3. Kakabeak, *Clianthus puniceus*	**3.** Bindweed, *Convolvulus arvensis*
4. Dobson's speargrass, *Aciphylla dobsonii*	**4.** Darwin's barberry, *Berberis darwinii*
5. Kamahi, *Weinmannia racemosa*	**5.** Old man's beard, *Clematis vitalba*

Regularly, New Zealanders' general knowledge of their native plants is of iconic, brightly flowered and common species that most people are familiar with and can name. The New Zealand Plant Conservation Network website has over 27,000 images of native and weed species that you may wish have a look at and vote for; any species featured on the site can be voted for including native and non-native orchids, ferns, trees, shrubs, vines, herbs, grasses, sedges, bryophytes, lichens and algae. The Network's focus is to promote and highlight the protection of threatened plants and their environs. The more knowledge about plants we as a Network can share can only advantage people and plants in the future.

With time still left to vote, the Network invites members, as well as anyone else you know, to vote for New Zealand's favourite plant and worst weed of 2014. Simply select the species you wish to vote for using the "Search Flora" window on the NZPCN homepage or, alternatively, support a species' election already voted for by hitting the "Vote for New Zealand's Favourite Plant & Worst Weed" button also featured on the homepage. Voting closes at midnight on 30 November. Take five minutes to have your say, vote today!

For more information contact: Matt Ward mattdavidward@gmail.com, or mobile 021 189 1062.

New Zealand Indigenous Flora Seed Bank (NZIFSB) Update: Volunteers play a vital role in the Seed Bank

Jessica Schnell (j.l.schnell@massey.ac.nz) *and Craig McGill* (c.r.mcgill@massey.ac.nz)
Massey University

At the New Zealand Indigenous Flora Seed Bank over the past year, many hours have been contributed by dedicated volunteers assisting in the processing, quality assessment and banking of seed. The volunteers come from diverse backgrounds and include Sarah Galley and Anthea McClelland, both from Forest and Bird who gave many volunteer hours (over two months) undertaking tasks ranging from x-raying seeds, to setting up germinations, packaging seeds to go into long term storage at -20°C, and cleaning *Pittosporum* seeds! Anthea also took the opportunity while on a recent visit to the UK to call into the Millennium Seed Bank at Wakehurst Place, Royal Botanic Gardens, Kew in West Sussex, where Peter Giovannini, Pacific Coordinator for the Millennium Seed Bank Partnership, was able to give her a tour of the seed bank.

Far left: Sarah measures out some seed to calculate the thousand seed weight.
Left: Anthea and Sarah weighing seeds to calculate the thousand seed weight

Other enthusiastic volunteers include Suzanne Clark who spent many hours cleaning seed and whose botanical skills combined with her passion for tramping will be of great help in the future in identifying seed ready for collection. Assessing the seed quality was made easier with the help from two skilled seed analysts Denise Hughes and Janet Rowland who also spent tireless hours cleaning a number of seeds including the more challenging *Pittosporum eugenioides* with their sticky pulp surrounding the seeds. We would like to take this opportunity to thank the seed bank volunteers for their time, skills and assistance in working through 54 species which make up 82 accessions of seeds from different populations!

We are always looking for volunteers—if you are interested in being involved as a volunteer for the New Zealand Indigenous Flora Seed Bank please contact Jessica Schnell (j.l.schnell@massey.ac.nz) anytime.

Call for applications for the 2015 Lucy Cranwell student grant for botanical research

Applications are invited for the Lucy Cranwell Grant of $2500 from the Auckland Botanical Society to assist a student studying for the degree of PhD, MSc, BSc (Hons) or B. Appl. Sci. in any tertiary institution in New Zealand whose thesis project deals with some aspect of New Zealand's flora and vegetation. Priority will be given to projects relevant to the northern half of the North Island. The research project to be supported will be chosen on the basis of appropriateness to the objects of the Society, namely to encourage the study of botany, and to stimulate public interest in the plant life of New Zealand and its preservation, conservation and cultivation. The grant will be administered by the student's supervisor as a contribution to expenses associated with the project. Closing date for applications: **5.00 p.m. Friday 05 December 2014.**

A copy of the Application Form and the Rules of the award may be downloaded from the Auckland Botanical Society website: https://sites.google.com/site/aucklandbotanicalsociety/

Contact for enquiries: Vijay Soma, Secretary, Auckland Botanical Society, email: aucklandbotanicalsociety@gmail.com

UPCOMING EVENTS

If you have important events or news that you would like publicised via this newsletter please email the Network (events@nzpcn.org.nz):

Auckland Botanical Society

Field Trip: Saturday 6 December for the Christmas picnic/fieldtrip to Shakespear Regional Park. **Leader:** Alison Wesley.	**Contact:** Maureen Young, email: youngmaureen@xtra.co.nz

Waikato Botanical Society

Field trip: Saturday 6 and Sunday 7 December to Lake Surprise, Tongariro National Park.	Combined with Rotorua Botanical Society, see below for details

Rotorua Botanical Society

Field trip: Saturday 6 and Sunday 7 December to Lake Surprise, Tongariro National Park (combined Waikato Botanical Society). **Meet:** Saturday morning at Ohakune at 10.00 a.m. (contact the trip leader by the previous Wednesday. **Grade:** medium. **Accommodation:** DOC Mangaturuturu Hut, $15/$5 (adult/youth - hut tickets required). **Bring:** full alpine tramping gear, warm clothing and food for an overnight stay in an alpine hut.	**Leader:** Mike Butcher, ph: 07 315 7160 (hm) or 0274 555 610; email: mikebutchernz@xtra.co.nz.

Wanganui Museum

Meeting: Tuesday 2 December at 7.30 p.m. for the Christmas social meeting. **Venue:** Davis Lecture Theatre.	**Contact:** robcol.ogle@xtra.co.nz.

Wellington Botanical Society

Field trip: Wednesday 7 to Tuesday 13 January 2015 for the Summer Camp Trip to Nelson Lakes National Park and vicinity. **Accommodation**: Travers-Sabine Travellers' Lodge, St Arnaud, Lake Rotoiti; a motel nearby or DOC campsite by lake (for independents). Bring fresh antihistamine in case of wasp stings. **Booking ESSENTIAL if you intend to go.**	**Leader and contact:** Mick Parsons, ph: 04 972 1148 or 06 273 8078 or 027 249 9663, email: mtparsons@paradise.net.nz; **Menu organiser:** Bev Abbott. **Registration:** registration form down load here.

Nelson Botanical Society

Field trip: Friday December 12 to Sunday14 for the camp at Cobb Valley, Mt Peel and the Magnesite Area.	**Leader:** Shannel Courtney. **Organiser:** Don Pittham, ph: 03 545 1985.
Field trip: Sunday 21 December to Mt Robert. **Meet:** at the Church steps at 8.00 a.m. Please register your attendance with the trip	**Leader:** Sue Hallas, ph: 03 545 0294.

Canterbury Botanical Society

Meeting: Friday 5 December at 7.30 p.m. for a talk by Mark Parker, ECAN, on wetlands in Canterbury.	**Venue:** Upper Riccarton Library community meeting room, 71 Main South Road.
Field trip: Saturday 13 December to Laidmore, Waipara Gorge.	**Leader:** Jean-Marie Tompkins, ph: 027 475 6285.
Field trip: Friday 9 to Thursday 15 January Summer Camp based in Tapawera. **Accommodation:** in cabins, motel units or camping at Tapawera Settle Motels and Campground; book now with the leader.	**Camp leader:** Trevor Blogg, ph: 03 319 8850, email: tblogg@xtra.co.nz.

University of Canterbury summer course: Practical Field Botany BIOL305

Intensive, short summer course: training in the collection, preparation, and identification of botanical specimens. **Venue**: University of Canterbury Cass Mountain Research Area, Canterbury. **Dates:** 20 – 28 January 2015. **Enrolment:** starts 7 October 2014.	**Information:** Dr Pieter Pelser, ph: 03 364 2987 ext 45605, email: pieter.pelser@canterbury.ac.nz.

Celebrating 100 years of Cass Field Station

In November 1914, a group of students boarded a train in Christchurch and headed up to the newly built field station at Cass for the very first student field trip. To mark this centenary you are invited to attend a two-day symposium. **Saturday 6 December at the University of Canterbury campus:** 1.00 p.m.: lectures on the importance of Cass for learning and research over the last 100 years 6.00 p.m.: photo exhibition, drinks and nibbles. 7.00 p.m.: talks on Cass in a broader context and the influence of Cass on the general public. **Sunday 7 December at Cass:** 10.00 a.m.: morning tea followed by the unveiling of the centenary memorial plaque. 10.30 a.m.: opening of the new Sugarloaf Saddle Track. 11.00 am onwards: field excursions.	**Email: cass100th@gmail.com** to indicate whether you are intending to come for one or both days. We are also looking for photos of research and teaching activities at Cass, especially from pre-1980, so if you'd like a few of your favourite photos showcased please send them to us at cass100th@gmail.com.