

Research, education and services of the Tropical and Subtropical Weeds Research Unit, University of Queensland

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Summary The Tropical and Subtropical Weeds Research Unit (TSWRU) is a cross campus initiative of the University of Queensland to establish a solid foundation in weed science research and training. The emphasis within the TSWRU is on ecologically sustainable weed management, risk assessment and accurate prediction. We also have high priorities in education and training and are redeveloping our services program in herbicide resistance diagnostics. The following short paper is designed to give you an overview of the weeds unit at UQ and encourage your interest, collaboration or support in our future activities.

Keywords Weed research, herbicide resistance, education, training.

INTRODUCTION

The Tropical and Subtropical Weeds Research Unit was first established in 1999. It was a strategic initiative funded by the faculty of Natural Resources, Agriculture and Veterinary Science (NRAVS) to enhance the aspects of Plant Protection research and education on both the Gatton and St. Lucia campuses of the University of Queensland. Since then the TSWRU has been developing a number of important programs to contribute to the research and education in tropical weed science in Australia and the Asia Pacific.

The aims of the TSWRU can be summarised in the following points:

- To develop and undertake strong, industry focused research and postgraduate training
- To present innovative, relevant and stimulating undergraduate courses, postgraduate short courses

and workshops that equip participants for their professional roles in relation to weed management issues

- To initiate and develop programs that inform and serve the needs of the community

The TSWRU contains six staff, and seven Ph.D. post-graduate students. Several of these staff and students are based across two campuses. This does not include affiliated staff members within the university who are involved in TSWRU activities in addition to their own research areas.

RESEARCH

The aim of the research program within the TSWRU is to undertake industry focused and linked research. Research within the TSWRU is split into two main subprograms, Sustainable Weed Control Solutions and Assessing the Risks. Within these subprogram areas, we have further identified four topics each containing several projects (see Table 1).

Natural Weed Control projects incorporate a range of areas including allelopathy, biocontrol and precision weed control. At present the unit is involved in a project on allelopathic weed control in rice in Cambodia. Field trials have shown that the rice has a suppressive effect on weeds that is not related to competition. This has particular relevance to third world countries where herbicide application is not economically feasible.

Seed biology projects are a major aspect of the research activities. The unit has been involved in dormancy and germination studies of a range of plants, both native species and weeds. Recently smoke has been examined for uniform stimulation of weed seed

Table 1. The current research interests of the TSWRU.

Sustainable weed control solutions		Assessing the risks	
Natural weed control	Seed biology	Weed identification and diagnostics	Computer assisted simulation
Crop allelopathy	Tropical seed banks	Weed and seed diagnostics	Distribution and abundance
Insect and pathogen weed biocontrol	Seed dormancy mechanisms	Herbicide resistance diagnostics	Plant-plant interactions
Precision physical weed control	Seed kill	Molecular weed ecology	Climate change

germination so that broad scale herbicide usage becomes more efficient, with promising results.

Herbicide resistance is an area of increasing concern and as such the research unit is involved in identifying and isolating resistant populations of annual cropping weeds in the northern grains region of Australia. Diagnostic tests for herbicide resistance are also an important part of this project and include pot trials, laboratory studies and, more recently, the use of molecular methods for rapid detection of herbicide resistance.

Within the assessing the risks subprogram of the research components within the unit, computer assimilation on the growth and competition of weeds and crops forms an integral part. Distribution of weeds such as parthenium, and climate change on annual weeds of crops and woody weeds of rangelands are also integral parts of this research subprogram.

Please contact us for further information on any of these research projects.

EDUCATION AND TRAINING

The TSWRU has a comprehensive training program for undergraduates, postgraduates and as available short-courses. The Unit also has strong links with the education programs for both the Cooperative Research Centre for Australian Weed Management (Weeds CRC) and the CRC for Tropical Plant Protection (CRCTPP).

The teaching in weed science at the university comprises undergraduate subjects taught at both the Gatton and St. Lucia campuses in a combination of mixed pest subjects and plant protection or solely as weed science. The courses are aimed at agriculture and environmental students and contain practical exercises designed to familiarise the students with field situations.

We are currently offering a short-course in Tropical Weed Science. This has been received this year with huge interest from overseas and we envisage that as the course becomes more known, we shall continue to improve the content and offer the very latest in innovative weed science and technology.

With the increase in interest from national colleagues we have developed, in conjunction with the Centre for Pest Information Technology and Transfer (CPITT), several interactive and electronic teaching tools. The LucID key to the 'Identification of the Suburban and Environmental Weeds of South-east Queensland' (Navie *et al.* 2002) has proved to be very popular and has been of significant benefit to our teaching resources. We are currently undertaking the development of the keys for cropping weeds and the noxious weeds of Australia.

SERVICES

We have two diagnostic services being offered through the TSWRU. These include the detection of herbicide resistance and also weed diagnostics such as the detection of contaminant weed seed in seed lots.

The Herbicide Resistance Testing Service (HeRTS) is available to grain growers of the Northern Grains region for herbicide resistant weed testing. This is undertaken using the Rothamsted Rapid Resistance test (Moss 1999), pot trials, and we are in the process of developing a quick molecular detection method. The testing service is part of a project funded by the Grains Research Development Corporation (GRDC) on herbicide resistance and also includes the release of newsletters such as the Herbicide Resistance Reporter (Paterson *et al.* 2001) for ongoing extension of research progress.

The seed diagnostic testing service is only in preliminary stages but aims to detect contaminant weed seeds that are impossible to tell apart from native seeds except via molecular methods. An example of this is *Sporobolus* spp. (ratstail grasses) where the weed seeds are indistinguishable from beneficial native *Sporobolus* seed and where the presence of one *Sporobolus* seed can condemn an entire seed lot. It is envisaged that this will be improved in the future.

FUTURE

The future plan for the unit involves the following issues:

- Encourage greater collaboration and network with scientists from State, National and International organisations that have a similar interest in tropical weeds research.
- Increase output of international standard research as reflected by scientific publications and other means of information transfer.
- Increase extramural funding from National and International sources for the solution to weed problems in the agricultural industries of northern Australia and the Asia-Pacific region.
- Attract Australian and overseas postgraduate students of the highest calibre to the weeds unit
- Expand enrolments in the Tropical Weed Science and the Plant Identification short courses and create other short courses in Molecular Weed Biology and Computer-assisted Weed Science.
- Formation and publicise an expanded community services program.
- Further development of the extension program involving school students in weed science programs in the hopes of increasing their interest and awareness in weed related issues.

- Develop industry links and provide consultancy and training services to meet their needs.

CONCLUSION

The Tropical and Subtropical Weeds Research Unit aims to provide quality research, education and services to those interested in tropical and subtropical weed issues. We would like to encourage anyone interested in being involved in some way with the unit to contact us whether it is for collaboration, support or purely for interest.

We look forward to being of service to you. For more information, please feel free to contact us directly or refer to our website www.weeds.uq.edu.au.

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