Weed Warriors – increasing awareness of weeds in schools

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Summary Weed Warriors is a community education and awareness program which harnesses the enthusiasm of students and the general community in joining together to learn about and tackle local weed problems.

Although the branding of the name Weed Warriors is only one year old, the concept of involving students in activity-based learning about weeds has been conducted in Victoria for many years. The Weed Warriors program utilises biological control as a vehicle to introduce weed studies into school curricula. The value of these projects is discussed and used to provide a Weed Warriors model to assist agency staff, teachers and community groups to develop a successful program within their community.

Keywords Biological control, community education, Weed Warriors.

INTRODUCTION

The 1997 UNESCO Statement 'Educating for a Sustainable Future: A transdisciplinary vision for concerted action' states, 'It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, education will shape the world of tomorrow.' (Anon. 1999).

For the foreseeable future, sustainable management of the environment will be one of the greatest challenges confronting the world (Anon. 1999). Weed invasion is a major contributor to the loss of biodiversity and a key constraint for communities in achieving ecologically sustainable development. Education and awareness is therefore critical if we are to change community values and attitudes and improve the capacity of people to address weed issues of today and the future. If we are to achieve this, it is imperative that weed education be a continuous lifelong process, beginning at pre-school level and continuing through all formal and non formal stages.

Through various initiatives, including the Natural Heritage Trust, the Cooperative Research Centre for Weed Management Systems, the National Weedbusters Program and the National Weeds Program, much work has been done over the last decade in the provision of educational materials, training and information for weed professionals and community groups. At the same time, Environmental Education has been adopted into the curriculum of each Australian State and Territory. This was initiated by the development of a series of national curriculum statements related to the Common and Agreed Goal proposed in 1989 by the then Australian Education Council 'To develop in students… an understanding of, and concern for, balanced development and the global environment.' (Anon. 1999).

Despite these initiatives, the study of weeds is not clearly linked within the National Curriculum Profiles or state curriculum frameworks. Hence individual schools have the responsibility of developing their own teaching programs, taking into account government policies, available resources and expertise. Evidence suggests that the existence of weed education in primary and secondary schools is contingent on the presence of committed and sometimes isolated individuals and that whole school coordinated approaches are rare.

However, the rapid sell-out of the Gould League's 'Weed Activity Kit' in Victoria suggests a demand by educators for practical learning exercises based on weeds. The recent development of 'Weedbusters – Activities, Information and Curriculum Link' by the Gould League and National Weedbuster Program is set to facilitate greater integration of weeds into schools. An extensive array of indoor and outdoor activities are provided, and clear links to Key Learning Areas of the National Curriculum Profiles enables teachers to demonstrate relevance to the learning needs of students.

On another level, a handful of biocontrol practitioners around the world have seen the value in involving schools in biological control programs. Some examples include the Purple Loosestrife Schools Program in Michigan, USA, the Lantana Beetle Watch Project conducted by the CRC for Tropical Pest Management in Queensland and the Bridal Creeper Schools Program conducted by the CRC for Weed Management Systems. These programs have proven highly successful in educating students and raising community awareness about weeds, whilst adding value to biocontrol programs through increased biocontrol agent releases and monitoring.

This paper outlines various school biocontrol programs conducted by the Biocontrol Services Team of

the Victorian Department of Natural Resources and Environment. It provides a framework for the development of a successful Weed Warriors program, which can be adapted by teachers, weed professionals and community groups to incorporate a wide range of weed activities.

CASE STUDIES

Ragwort schools program The first Weed Warriors-type project commenced in Victoria in 1994 as part of a Dairy Research and Development Corporation funded project on the biological control of ragwort (*Senecio jacobaea*) in Victoria. Twenty four schools throughout the Gippsland, Port Phillip and South West regions commenced rearing the ragwort crown boring moth (*Cochylis atricapitana*) in 1994 and then the cinnabar moth (*Tyria jacobaea*) for a further three years. Each school was provided with an insect rearing cage, built by metalwork students at Monterey Secondary College, fitted with a plant growth light bank. Day length was regulated using electric timers. The cages were placed on benches within a designated classroom or laboratory.

The schools were provided with a starter colony of moths and sufficient potted ragwort plants to maintain one complete insect generation. For the rearing of cinnabar moths, the students were also required to collect and provide bouquets of ragwort flowers for the later instar larvae.

The program commenced at each school at the beginning of fourth term (October) with a 50-minute lesson from a scientist or technician working on the program. The lesson covered a general introduction about weeds and weed control, followed by a demonstration on how to breed the moths. This information was also provided as a set of Teacher's Notes. The schools then spent the remainder of the term, generally six weeks, breeding their agents.

Prior to term break, all schools congregated to release their ragwort agents at a designated nursery site. This release event enabled students from different schools to compare rearing efforts, exchange experiences and extend their classroom-based project to a field-based activity. In addition the pooling of agents increased the total number of agents released, providing a greater chance of establishment. An exciting result of the Cinnabar Moth Schools Program on the Mornington Peninsula was the successful establishment of the moth at Cape Schank, through the release of over ten thousand caterpillars. This is the only location on mainland Australia where the Cinnabar moth survives, despite numerous attempts to establish it in Victoria and Tasmania.

Boneseed schools program In 1995, four Mornington Peninsula schools began a painted boneseed leaf beetle (*Chrysolina picturata*) breeding program. Beetle eggs were provided to each school, and students reared the larvae on boneseed (*Chrysanthemoides monilifera monilifera*) sprigs in rectangular plastic containers. When adult beetles emerged, the students released them at the designated nursery site. The schools involved in the program had already been active with their local community groups, local government shire and Parks Rangers, in removing boneseed from the school grounds, roadsides and bushland reserves. Whilst the beetle did not establish, the program enabled students to learn more about the impact boneseed has on native vegetation and the problems associated its removal. The students were also exposed to the challenges biocontrol agents face when introduced to a new environment, such as predation and parasitism.

Gorse schools program For the past two years, twenty schools across four regions of Victoria have bred the gorse spider mite (*Tetranychus lintearius*), a biological control agent for gorse (*Ulex europaeus*). It was mainly from this program that the Weed Warriors concept evolved. Firstly, the program focused on establishing school-community networks. Each school was partnered with a community Landcare or 'Friends of' group. Program sponsorship was sought from local government and business, Catchment Management Authorities and state agencies such as Parks Victoria.

At the initial set-up, a biocontrol specialist, community group member and weeds officer or ranger conducted a joint presentation. Generally the community group representative discussed how weeds affected the whole catchment, while the government representative discussed weed control and how students could help to stop weeds from spreading. The biocontrol specialist concentrated on specifics of breeding the biocontrol agents.

As with the ragwort program, the gorse spider mites were bred in the classroom in breeding cages. A single adult gorse spider mite colony was provided for each cage. Students bred mites by transferring adult mites to fresh gorse sprigs each week, and allowing eggs and juvenile mites on remaining sprigs to be reared through in nursery containers. In this way, students could track the progress of the mite lifecycle from eggs through to adults.

Another improvement to the program was allowing the network of stakeholders to decide where biocontrol of gorse should be implemented within the catchment or shire. This ensured that the stakeholders considered the role and relevance of biocontrol within a broader

integrated weed management strategy, thereby preventing the release of agents in inappropriate areas, such as high priority zones targeted for enforcement.

Bridal creeper schools program In 2001, six Victorian schools commenced a bridal creeper leaf hopper (*Zygina* sp.) and rust fungus (*Puccinia mysiphylli*) breeding program targeting the climbing weed bridal creeper (*Asparagus asparagoides*). The leafhoppers were reared on potted bridal creeper plants in insect cages, while the rust fungus was propagated on uncaged potted plants. Students studied the development of the leafhopper and rust cultures, providing them with an introduction to the study of entomology and plant pathology and an opportunity to compare the effect of different natural enemies on its host. The students were then able to release their agents at selected nursery sites through the assistance of the stakeholder network.

The Weed Warriors program was more than the breeding and release of biological control agents. It penetrated other curriculum areas such as art, drama, research skills, biology and English. For example students were encouraged to form teams and undertake group projects. Primary school activities included undertaking Internet searches to gather more information about weeds and interpretation of the project through performing and visual arts. The Red Hill Primary School composed and performed a song called the 'Ragwort Rap', which was featured on the 'Totally Wild' television program. Other schools made posters, collages and models, which were displayed in local shire offices, at publicity events and local libraries. Secondary school students wrote essays, kept journals, mapped weeds in the school ground or nearby bushland reserve and presented findings to the class. Two students from the Bellarine Peninsula Secondary College developed a PowerPoint® presentation, which won an award in a science competition. Their prize was a computer for the school.

This year, through funding from Weeds of National Significance (Environment Australia) and the Victorian Minister for Conservation and Environment's Catchment Management Initiative, the Weed Warriors program is going statewide. The aim is to have a Weed warriors program conducted in each of the ten Catchment Management Authority regions, targeting Regional Priority Weeds, including ragwort, gorse, bridal creeper and Paterson's curse.

A WEED WARRIORS MODEL

The Weed Warriors model is comprised of eight steps and is written for use by weed researchers and extension professionals, however it can easily be adapted for use by teachers and community groups who may wish to initiate a program in their local area. It can be customised to:

- incorporate learning objectives defined by the educators (teachers),
- focus on weeds and related environmental issues important to the students and the community,
- include perspective's of stakeholders (e.g. community groups, farmers public land management agencies, etc.) affected by the selected weed issues, and
- let students work, in partnership with key stakeholders, on real-life projects that reinforce their learning experience.

Step 1 – Define and prioritise objectives Determine what objectives you want to achieve from the program, consider how you might achieve these, and develop your program accordingly. Consult with other program participants such as teachers and community groups to ensure their key objectives are also incorporated.

The objectives of the weed researchers and extension staff may be to increase community awareness, facilitate adoption of research findings, or utilise school groups to assist in weed projects, such as the release of biocontrol agents or monitoring agent progress. A teacher's objectives may be to broaden students' understanding of environmental issues beyond the more popular topics of recycling, water and energy conservation and water quality. For upper levels, particularly Years 11 and 12, teachers may wish to use the program for vocational readiness and career planning. A community group may desire to become more actively involved in educating the future land managers of their community by involving students in weed control and rehabilitation projects.

Step 2 – Select the weed issue Select a weed issue relevant to the local community and likely to capture student interest. If possible, involve the students in the selection and investigation of these issues.

Step 3 – Identify the stakeholders An important aspect of the Weed Warriors program is the establishment of networks between key stakeholders. This aspect encourages partnerships between land management agencies, community groups and schools. This enables students to explore the different perspective's of each stakeholder and to feel as though they are making a contribution towards addressing weed problems in their own community. Stakeholders may offer sponsorship for the program, making them more likely to be actively involved, interested in achieving positive outcomes and invest in future programs.

Step 5 – Identify mentors Identify and encourage representatives from local community groups and land management agencies to act as a mentor for the school. The mentor's role is to provide advice, information and opportunities for students to participate in classroom and off-campus activities. Mentors may facilitate classroom discussions or accompany students on site visits. Whatever the activity, mentors should be encouraged to create an interactive, real-world experience for the students.

Step 6 – Develop the content of the program In developing the content of the Weed Warriors program, it is essential that you familiarise yourself with the National Curriculum Profiles or state curriculum frameworks. These can be obtained from state education departments or downloaded from the Internet.

The curriculum profiles and frameworks describe what students should know and be expected to achieve against eight key learning areas: The Arts, English, Health and Physical Education, Languages, Mathematics, Science, Studies of Society and Environment (SOSE) and Technology. Each Key Learning Area (KLA) is made up of several Strands, such as Biological Science, Chemical Science etc. within the Science KLA. Finally, each Strand has a set of Learning Outcomes, which are further grouped, according to Levels (learning milestones). Teachers use the common goals and Learning Outcomes contained within the curriculum frameworks to design teaching programs that are tailor-made for their students.

The incorporation of a Weed Warriors program into an often jam-packed school curriculum can be made more attractive to teachers and principals if relevance to KLAs and Learning Outcomes can be demonstrated.

Step 7 – Design the completion of the program If the program is to span several weeks or months, it is best to include an ending phase. Students should be given the opportunity to present their findings with all the program participants, including the rest of the school, the community, mentors and their parents. Effective ways to accomplish this is to schedule an event, such as a student seminar evening or a school field day, and invite others to attend. These events also provide excellent opportunities to invite the media.

Step 8 – Publicise your Weed Warriors program Media coverage is a powerful tool in moving your program and goals forward. Good media coverage provides visibility for your organisation, builds your credibility and name recognition, educates the public about your programs, helps recruit new members or volunteers, and introduces your programs to important leaders and community members who can lend their support.

DISCUSSION

The Weed Warriors model can be used to introduce any type of weed-based activity or program into schools. It has proven itself as a successful model in Victoria in raising community awareness of weeds and uptake of biological control within urban and rural communities.

Its interactive approach has allowed students to gain greater understanding and appreciation of the environment in which they live and the impact weeds have on it and us.

The strength of the program lies in the formation of networks linking students with members of the community. Combined with classroom discussions and involvement in real-life weed activities, students develop a sense of connection to the environment. Creating a sense of stewardship is a vital component of any environmental education effort, and is critical for bringing about any lasting change. It is vitally important to instil in students a sense of connection to and responsibility for their natural surroundings, and there is no substitute for direct experience.

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