

Biological Control of Weeds Extension Programmes in New Zealand

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DSIR Plant Protection's biological control of weeds extension programmes are used to mass rear and distribute host-specific insects and mites throughout New Zealand. The programmes are funded by Regional Councils, Government Departments and State Owned Corporations, and more recently, by some private forestry companies. Contributors receiving releases of control agents are shown how to select and manage the release sites, then how to monitor establishment of the agents and later, how to collect agents for redistribution to further sites.

Introduction

There is no formal Extension Service in New Zealand to distribute agents for biological control of weeds. DSIR Plant Protection took an innovative approach to developing its own co-operative extension programmes in partnership with various organizations. In this partnership, host-specificity testing, quarantine and later, impact assessment studies, are mostly funded by Central Government. Partner organizations (Regional Councils, Department of Conservation, Landcorp Farming Ltd and private forestry companies) fund programmes that rear and distribute control agents for alligator weed, ragwort, thistles, gorse, broom, St John's wort and later, old man's beard. In addition, field staff from these organizations provide DSIR extension staff with valuable field assistance and in the process, learn about biological control. The largest extension programme is with Regional Councils which employ nearly 100 noxious plants officers throughout New Zealand.

Each of the 14 Regions includes a number of Districts. Releases of control agents may be made in more than 60 Districts. Releases are also made at various sites in 14 forests and 10 areas serviced by Landcorp and the Department of Conservation.

DSIR Extension Staff

Four people are required to run the extension programmes. Three of extension staff are based at Lincoln where all the principal research staff are based. The Extension Manager co-ordinates the programmes overall, particularly distribution and monitoring control agents, and is also responsible for liaison partners. The rearing manager is responsible for producing large numbers of control agents required for the programmes. The third technician manages a database of release and recovery records, and also prepares display material. During spring and summer, a wage-worker and 2-3 summer vacation students are employed to assist with rearing work. Another technician in Auckland, works half-time for the programme, distributing and monitoring control agents in the upper half of the North Island. Temporary staff at Waikanae and Napier visit Lincoln for training each year. They release and monitor control agents in the lower North Island for approximately 3 wks work each year, for which they are paid casual wages.

Vehicles are shared with other DSIR staff; e.g. at Lincoln, four vehicles are shared by 35-40 people. We have access to rearing rooms, outside insectaries and field rearing sites but

these must also be shared with other DSIR programmes.

The Programmes

Extension programmes usually cover a 5-yr period but they are reviewed at intervals during this period. Partner organizations support the programmes in principle for the 5 yrs although funding is provided annually.

The programmes target up to 8 weed species and propose to distribute 14 (or more) control agents during this time. Usually it takes 2-3 yrs to release each agent at 60-100 sites throughout New Zealand. Each year, the rearing manager works with 7 or 8 different species but not all are mass reared for widespread distribution every year.

The rearing manager keeps the extension manager closely informed as to when each agent will be ready for release and how many insects will be available. In turn, the extension manager determines how many releases are needed and where they will be released.

Releasing, Monitoring, Database

Releasing Control Agents

Release sites are selected throughout New Zealand with the assistance of co-operating organizations. The extension manager provides field staff with notes to assist them in selecting suitable sites.

Then, control agents are released with the field staff at a site they have selected. Details are recorded on a standard form: records include species released, name of co-operating organization for which the release was made, site name, property owner, grid reference, date, number released and the life stage, person responsible for the release and others present at the time. A sketch or map is also required showing the exact point where the release was made. This is especially useful when checking the site at a later date.

Information on the agent being released is provided for field staff that are present and also for property owners.

If extension workers cannot make the release personally, the agents are couriered

directly to field staff for them to release.

Accompanying the agents are a release form (to be returned to us with details of the release), site notes, information on the control agent and additional notes on how to go about releasing the agents.

Monitoring Control Agents

Field trips are also made to monitor establishment of other agents released previously. Whenever possible, both release and monitoring activities are carried out on the same trip; e.g., when releasing gorse thrips in spring-time, crown weevil larval damage in thistles would also be monitored.

Generally, survival of control agents is monitored at least once a year for 2-3 yrs following the release. Agents with only 1 generation/yr (e.g., ragwort flea beetles *Longitarsus jacobaeae* [Waterhouse] [Coleoptera: Chrysomelidae]) and thistle crown weevils (*Trichosirocalus horridus* [Panzer] [Coleoptera: Curculionidae]) must be present in increasing numbers for 2 or more years before we consider the population to be established. On the other hand, gorse spider mites, (*Tetranychus lintearius* Dufour [Acari: Tetranychidae]) which have several generations over summer, were considered to have established after only 1 yr if they survived winter and spring.

When extension workers monitor release sites, field staff of co-operative partners are shown appropriate recovery techniques used to search for the control agents, what typical adult and larval feeding damage looks like, and what is the best time of year to look for the control agent. As the field staff become competent at recognizing damage and finding the agents by themselves, they are encouraged to monitor the sites for us.

Standard recovery information is collected for each species of control agent.

Database Information

Research staff, the extension manager and the technician responsible for the database, all contribute to the design of recovery forms. The forms must be easy to understand and use in

the field. Entering information collected in the database and analyzing it must be a straightforward task. The information collected must contribute to assessing nationwide establishment, the rate at which control agents are spreading and coarse changes in the weed population. Despite high variability among the many observers, valuable information can be obtained because there are many records from many sites (e.g., 300 records for 100 ragwort flea beetle sites, 500 records for approximately 200 gorse spider mite sites). This information complements detailed assessment studies of an agent's effectiveness which are carried out at a few sites by research ecologists and entomologists.

Once a control agent is established at a site and has increased in numbers sufficiently, field staff are shown how to collect the insects for redistribution to further sites. When field staff feel they are proficient at collecting control agents, they conduct their own field days to expand their distribution process. For example, some noxious plants officers starting out with small, single colonies that were released 2 or 3 yrs ago, now have gorse spider mites on over 100 properties. Another noxious plants officer has released ragwort flea beetles on over one hundred properties in a few years with the help of interested farmers in his area.

Data from releases made by the extension programme are recorded in the database but not data from releases made as part of the redistribution process. Field staff are encouraged to keep their own records of this.

Liaison and Communication

The extension manager is responsible for negotiating funding for the extension programmes, setting priorities for releasing control agents, liaising with co-operative partners and reporting on progress to them. Annual reports formally summarize funding and achievements for the year and regular newsletters are used as an informal way of keeping partners and their field staff informed of current progress. Both the annual reports and newsletters are specific to each programme though much information is common to all

programmes.

Displays relating to the extension programmes are produced every year for the extension programme's use and later, these are loaned to co-operative partners for agricultural and pastoral shows, and field days. Glossy information leaflets are printed every few years.

In addition to reports, newsletters, displays and information already mentioned, general handouts on biological control of weeds are prepared which include answers to commonly asked questions, information on people in the weeds team, and information on each of the weeds and agents in the extension programmes. The handouts are prepared ourselves, laser printed and simply photo copied on colored paper. They are a cheap, effective way of communicating a considerable amount of information which can be updated every year by one of the extension technicians.

Extension workers visit field staff in all areas about twice a year. Field staff and managers are always welcome to contact any member of the extension programme any time they have queries about biological control of weeds. Similarly, co-operative partners are always very willing to put aside time to assist with extension and research work.

Good internal communication is also needed to operate large, complex extension programmes such as these. Figure 1 is a schematic representation of how the extension programme operates.

Research staff supply nucleus cultures of control agents together with information about their biology and suggested rearing methods to the rearing manager. He mass rears the agents and informs the extension manager of numbers available. The extension manager liaises with co-operative partners, then distributes and monitors control agents, ensuring field staff learn how to do this themselves. Extension staff and research staff design recovery forms which are used to monitor establishment and spread of control agents. The database provides important establishment data for research staff and the extension manager. At all times, there is free exchange of information, suggestions and ideas between research staff, extension workers and co-operative partners.

Conclusion

Extension programmes such as those described in this are effective, as the control agents are distributed rapidly to many carefully selected sites throughout New Zealand. Standard data on establishment and spread of control agents, and coarse changes in the weed population are collected from many sites each year.

Co-operative partners gain a sound understanding of the principles of biological control of weeds and their field staff also learn the practical skills to manage release sites, and monitor, collect and redistribute control agents in

their area. Noxious plants officers especially, are able to teach farmers, school children and many others about biological control of weeds in the course of their work. Redistribution of control agents is managed intelligently by many knowledgeable people. Control agents left to spread naturally would be much slower to reach areas where they were needed and far fewer people would recognize the agents or the results obtained.

These extension programmes make very efficient use of a small, skilled team of DSIR staff.

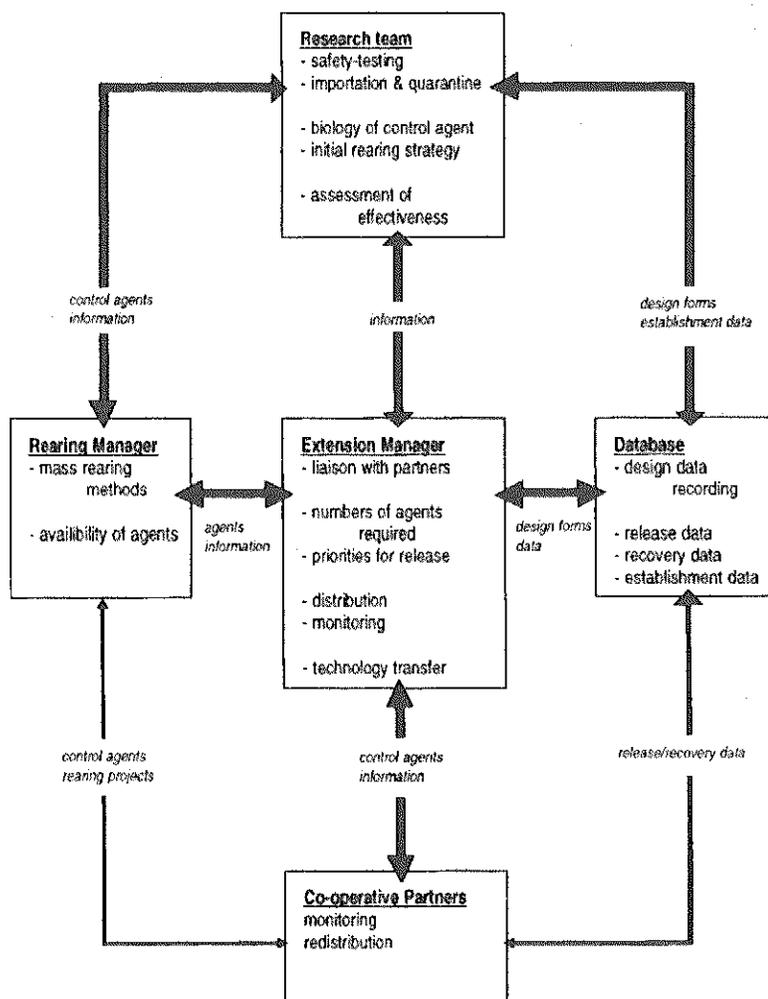


Figure 1. Schematic representation of how the extension programmes operate. Important lines of communication are bolded.