

FINAL REPORT

UA00071

Control and eradication of a parasitic weed, field trials.

PROJECT DETAILS

PROJECT CODE: UA00071

PROJECT TITLE: CONTROL AND ERADICATION OF A PARASITIC WEED, FIELD TRIALS.

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Summary

This project was involved with control of branched broomrape (*Orobanche ramosa*) in existing land use systems in the south western Murray Mallee of South Australia (SA). It was concerned with aspects of weed control using herbicides and understanding features of the weed's life cycle that may facilitate eradication of branched broomrape. The project team set up and began the task of identifying longevity of the seed in the soil so as to understand the duration of an eradication effort. The project was also involved with trialling a novel seed killing soil drench.

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Conclusions

Several issues emerged from the six years of research invested in the control of the holoparasitic weed, branched broomrape. The presence of a parasite immediately presupposes the presence of suitable hosts. The control of a parasite is about understanding the agronomy, development and contribution of the hosts. With a parasitic weed, there need to be methods to control host weeds, in this case probably approx. 25 species, however not all are weeds of cereal crops and pastures. Although there is a good range of herbicides for cereal crops and some will control broomrape, this not always the case. For a weed/host complex to emerge and sustain itself indicates that previous weed control has been inadequate. Much effort has been placed on rotational crops in this project. Very few crops are grown in such a varied and semi-arid environment and herbicide protection from broomrape is extremely limited.

In contrast, the potential success of herbicide tolerant Angel[®] medic is a project that will suit the existing land use and will fit the needs of the eradication program as well as the needs of farmers with livestock or fodder industries.

The potential success of 'Bio Seed-Eradicator' points to a new paradigm in weed control, worthy of further investigation. It is important that some method of rapid seed kill is available to such a program in emergency situations.

Outcomes

Herbicide recommendations will enable farmers to attain the necessary conditions for release from quarantine. In turn, Australian markets will be assured the threat that branched broomrape poses to production is extinguished.

Seedbank information will enable the development of a release mechanism.

The soil drench has potential to be widely used in all areas of the quarantine zone where seed destruction is required.

Achievements/Benefits

This project was established to provide useful information to growers in the broomrape quarantine area as well as provide information for and input to strategies needed for eradication. Research personnel were required to consult with and when necessary, advise the Department of Water, Land and Biodiversity Conservation (DWLBC). Information was needed about herbicide protection of existing crops and pastures. Herbicides represent the cheapest method to prevent broomrape emergence, growth and maturity leading to seed set. Information was also needed about the duration of viability of broomrape seed in the soil.

Most importantly, locally adapted cereal and canola crops have recommendations developed for complete and reliable suppression of broomrape emergence. Protection of other potential cereal crops can be deduced by the relationship to other proven crop and herbicide associations. Most pulses are not reliable in the area and there are few herbicide options for all pulses except field peas and lupins. There is some prospect of a herbicide that will suppress broomrape in vetch crops, vetch fodder crops or vetch pastures, but insufficient testing has been carried out to date.

The standard of pastures in the quarantine is poor, while attempts to control broomrape emergence with herbicides in poor quality pastures may result in loss of ground cover or in loss of medic species. The development of Angel[®] medic, which is

tolerant to many Group B herbicides, shows potential in this area. The support of the GRDC and this project for the development of Angel medic has been very useful. The variety is adapted to the area and the herbicide group to which Angel is tolerant is very effective in suppressing broomrape. Several herbicides have been trialled but only in one season (2006) due to unavailability of Angel prior to this time. There are several useful herbicides that will suppress emergence of broomrape in a sward of Angel, although not many are registered for use in pasture and permit use is required. The challenge will be to encourage planting of pastures with Angel medic at a time when grain prices are good and produce from pastures is considered a secondary enterprise. Without a substantial research effort, it is unlikely that a herbicide can be found that will suppress broomrape emergence and not reduce the performance of existing pastures.

Substantial progress has been made in understanding the seedbank dormancy with creative short term surface seedbank studies revealing dormancy protection to germination in the first few months following seed fall. A long term seedbank decline study has shown both the persistence of seed in the soil and the rate of decline.

A substantial effort to identify the risk to the horticultural industry resulted in high levels of parasitism of common vegetable crops produced in areas of similar environment in SA. New, unreported hosts in weeds and pasture species have also been confirmed by this GRDC research effort.

Field and laboratory studies have commenced to understand the variability of seed killing with 'Interceptor Seed Killer' and to compare new formulations. Early results were very successful and showed better than 98% reduction in viability of broomrape seeds. Repeat sampling of the same trial and replicate sampling showed the potential of regaining seed viability over time. Serious doubts have been raised as to the efficacy of the products used to kill seed in the soil. Work is continuing on this aspect of the project.

Other research

Weeds are often suppressed but not killed by the usual herbicide regime and competition of the crop is needed to finally kill the weed. These conditions are not adequate in the case of a parasite where eradication is the goal. Herbicide technology is vested in companies that can gather the resources to develop, test, register and promote new molecules with widespread application. It is in the interests of Australian agriculture and agriculture in many other countries that more effort is made to find herbicides that will control branched broomrape in a range of crops and pastures. However, there is currently little interest in broomrape control.

It is true to say that the Australian weed science community and crop protection hierarchy have focused on more conventional weeds for many years. The brief period of research on branched broomrape in this country has done little more than address surface issues. Regard for the dynamics and development of host weeds, the persistence of some weeds in a semi-arid hostile cropping environment and containing spread are of equal importance in the longer term. If the phyto-sanitary implications of broomrape contamination are important to Australia's exports then a more rounded effort may be required to contain this weed.