

Participatory investigation of the management of weeds in organic production systems

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Collaborators: IOR-HDRA, IOR-EFRC, HRI, ADAS, RULIVSYS
Start Date & Duration: August 2002; 48 months

Overall Aim

To define weed problems together with organic farmers and growers, propose ways of addressing these problems, and then research solutions in order to arrive at the most appropriate methods and approaches for use in organic systems.

Abstract of Research

The future uptake and success of organic systems will rely on being able to adapt and overcome production constraints that hamper the sector in an ever-demanding market. In terms of technical constraints to production, weeds have always featured as one of the primary issues concerning both farmers considering conversion and those already converted. Furthermore, weed control has been highlighted as a research and development priority by the UKROFS board (1998) and by the Consultation of Organic Farming Research Priorities (2001). There remain a range of weed management challenges that need to be explored and resolved. For example control of 'difficult' weeds such as annual grasses and perennial weeds and the integration of weed control measures into comprehensive management strategies of a range of crops. Constraints, potential solutions and priorities need discussing with all relevant stakeholders to advance organic production. Addressing these issues is critical to maintain the viability of the organic farming system in the current agricultural climate. The proposed review and decision making process will form the main objectives within this project;

1. What scientific literature is available relating to organic weed control?
2. What is the current level of weed infestation on farms and how are they being managed at present?
3. Which systems are being most constrained by weed competition and what are the main research priorities?

A participatory research and development (PRD) approach is ideally suited to take full account of farmer and stakeholder opinions focussing on the most important problems and addressing these in the context of the growers own farming system. Farmer ideas and practical knowledge will be used in conjunction with sound science to expand and develop current and new management practises. Stakeholders would be invited to prioritise constraints and to formulate potential solutions as well as research plans to overcome them. Experiments to investigate proposed solutions would be carried out on-farm or on-station, as appropriate.

The project would pay particular attention to communicating results between all stakeholders in the organic community. Methods of dissemination would include technical leaflets, open days, workshops, popular press articles and where appropriate refereed journals.

Objectives

1. Review the scientific literature and other sources of information and gather knowledge relating to weed control for organic farmers.
2. Identify and prioritise main production constraints due to weeds,
3. Facilitate interest groups of stakeholders.
4. Develop research solutions to be trialled on-farm or on-station.
5. Disseminate the results throughout the organic community through open days, workshops, popular press articles, a technical booklet, the web and where appropriate refereed journals.

Project Progress

Work has continued on the three priority research topics which were defined by stakeholders at the outset of the project. These were; Knowledge collation and dissemination, Perennial weeds, System studies.

Focus groups met in the autumn (November 2003) to discuss progress on targets, the direction the project was taking, where to take the work in the second year. Dissemination routes for collected information were considered and potential research trials were discussed.

Farmers were invited to attend a second open discussion day at HDRA in December 2003. Researchers and farmer focus group members presented work from the year. The main remit of the day was to launch the project website (<http://www.organicweeds.org.uk>) and to promote interest in farmer managed research trials. All project information is being stored on the web to make it freely accessible for all and, on the day, interactive sessions demonstrating the site and how to use it were given. A range of farmer trial ideas that arose from the farmer interviews was presented. The project statistician discussed the validity and usefulness of systematic data collection. Farmers were encouraged to take part in trials and over 40 registered their interest.

The project has expanded over the year in the four main approaches taken:

1. Collection and collation of existing knowledge

Extensive biological, physiological and management information has been collated on specific weed species, to date 37 annual broadleaved species, 18 perennial broadleaved species, 4 perennial grass weeds and all annual grass weeds considered problematic. Case study information from 52 farms has been described and presented. A comprehensive review of weed management in organic farming systems has been produced. All this information has been placed on a freely accessible website (at <http://www.organicweeds.org.uk>).

2. Monitoring existing farm weed management strategies

Monitoring weed management strategies is undertaken in the context of the farming system, described by the farmer. The initial work was done through case studies (see above). In addition, a scientific quantification of the efficacy of farmer strategies for dock management is being undertaken. 10 farms are being monitored and a further 14 farmers are monitoring their own strategies. As part of the monitoring process dock populations are described and counted at various times during the year to evaluate the impact of cropping sequences and weed control operations.

3. Small-scale trials

Farmer field trials

Suggestions for twelve small-scale field trials arose from knowledge gathered during the course of the project to date. These ranged from carrying out practical field trials to contributing and sharing knowledge on specific topics. Over 40 farmers said they would like to try some 90 trials in total. Trial information and monitoring sheets were distributed at the start of 2004. Close contact has been maintained with experimenters to help them with the recording process. All have been very keen to be involved, but have needed researcher support in the field to go through the monitoring process. As part of an on-going programme of farm visits, 11 farms have been visited in addition to those 9 taking part in the efficacy of hand removal methods for docks (begun in 2003). The baseline monitoring data from the experiments is being compiled and summarised on the website. As results become available they will be posted on the site.

Glasshouse and field trials

Glasshouse trials have been undertaken to compare the viability of seed from *Rumex obtusifolius* (broad leaved dock), *R. crispus* (curled leaf dock) and *R. pratensis* (hybrid dock). After 16 weeks germination was 99%, 92% and 46% respectively, adding to the evidence that hybrid docks seed is not as viable as the seed from the parent species.

Regeneration of root fragments from *Rumex* spp. was investigated. Root portions of the upper 5, 10 and 15 cm were removed from the field and potted in the glasshouse. Regeneration from each length was on average 77, 100 and 85% respectively with all regeneration arising from the root collar - the upper 2 cm.

In another trial the same fragment sizes were also subjected to different lengths of drying treatments (12, 4 or 8 weeks in a drying oven at 20°C). Regeneration was reduced to 20, 28 and 12% from 5, 10 and 15 cm respectively after 1 week drying. There was no regeneration recorded after the 4 or 8 week treatments in the total 20 weeks from start to end of experiment.

In the field plants that had the upper 1, 5, 10 and 15 cm were monitored for shoot regeneration. 60% that had been cut at 1 cm regenerated, 25% at 5 cm and those cut deeper at 10 or 15 cm showed no regeneration.

4. Open days

Open days for each focus theme have been planned for the year. Two days have been held so far, 'A systems approach to weed management' at Holme Lacy College in February and 'Dock management in organic arable systems' at Abbey Home and Down Farm in May. Both days were well attended and had good feedback from farmer participants.

The methodology and processes of this participatory project are being monitored and documented from within the research team. Two review exercises have been undertaken, in November 2003 and March 2004, which have helped researchers focus on the process, its strength and weaknesses and how to take the approach

forward. The two meetings have been fully described and documented (30 page report available). This internal review will continue throughout the project. There has been increased communication with other stakeholders, namely English Nature with regard to incorporating more information on rare arable plants on the project website and in any literature produced.

Expected Benefits

- The overall outcome will be increased sustainability and financial viability of organic horticultural systems with improved weed management options. It is anticipated that this will also improve dialogue between growers and researchers on weed management issues in organic horticultural systems. Open days and workshops would be held regularly to discuss results. An information leaflet with grower input will be produced at the end of project.
- The project will highlight the most problematic weeds for organic agriculture and research effective control measures. Clearly, the options for control will depend on the type of system, weed flora and soil and climatic conditions. The production of practical guidelines for weed control will summarise the “state of the art”. The project will also raise the profile of weed control problems in organic systems and has the potential to interest investors in this market, for example machinery manufacturers or research funding bodies.

We would also expect other less tangible results that are outlined below:

- Growers would benefit from a direct input into the research process by describing their own production constraints and proposing solutions that they could test on their holdings. Apart from solving problems of direct interest to growers, this often provides a stimulus for rapid innovation and improvement.
- Organic researchers would benefit from a deeper insight into horticultural production problems that could be expected to improve the relevance of applied research to the organic horticulture industry.
- Other stakeholders, such as certification bodies or retailers, could benefit from an understanding of growers’ perspectives on production problems and how this affects their production processes. They will also be able to communicate their concerns to growers.

Project Output

Anon. 2002. Organic weed management – a new approach. *EFRC Bulletin* **63**:7.