

Knowledge development for organic systems: An example of weed management

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Summary

Despite the large amount of information on weed biology and specific weed control measures produced by researchers, organic farmers still prioritise weeds as an important area for further research. A recent project investigating weed management in organic farming systems has established that knowledge and learning are key requirements for this to be effective. Development of relevant, practically useful knowledge depends on access to information generated 'scientifically' by researchers and also to knowledge generated as a result of farmer experience with weeds. This requires that farmers, advisors and researchers take a participatory approach to collecting and processing information on weed management, using it to develop new and relevant knowledge. The appropriate framework for knowledge development is thus a collegiate one in which all stakeholders' value and learn from the observations and experience of others. These findings have implications for the way in which research is conducted and funded.

Key words: Organic, weed management, knowledge development, participatory research

Context for Research into Organic Weed Management

Attaining relevant outputs from organic research programmes, as well as a clear purpose for undertaking them, requires an understanding of the context in which the research will be conducted and an appreciation of who will benefit and in what way. Over the course of a recent Defra funded project (OF0315) on weed management in organic farming systems the various participants (mainly farmers, growers, advisors and researchers) have sought to establish common ground from which weed management can be viewed and tackled in organic systems (see also a series of papers presented on the subject by Davies & Turner, 2004; Davies & Rosenfeld, 2004; Davies *et al.*, 2005; Davies *et al.*, 2006). A précis of this current understanding is presented below:

- weeds have a direct impact on desired farm system outcomes (e.g. on yield, on financial returns, on farmer well being, etc.)
- all farmers manage weeds (or 'unwanted' vegetation)
- organic farms are complex systems (with many different rotations, enterprises, market systems, and values depending on socio-economic and environmental context)
- weeds are just one aspect of the farm ecology and socio-economics (but an important one! Most farmers have low tolerance of at least some weed types or species but other stakeholders value

them for their biodiversity value)

- weed management technologies and techniques underlie many farm operations (but are not always the only factors taken into consideration)
- a deep understanding of any specific weed situation depends on many factors at field level (e.g. field history, crop, weather), at farm level (e.g. size, enterprises, location), and at regional level (e.g. markets, policy, environment)

As a result of this narrative it is clear that effective weed management in organic farming systems will depend on a large number of contingent factors, some of which the farmer will be able to control, but a large number of which will be outside their direct control. In addition, useful answers to farmer's weed management questions are likely to be very situation specific and dependent on farm context.

In contrast, researchers (and to some extent organic advisors) generally formulate very specific research questions and then undertake detailed replicated trials of limited scope, which are statistically evaluated, to give overarching 'recommendations' of very general applicability. Such trials are not likely to provide farmers with enough detail to satisfy their requirements. This difference might go some way to explaining why, after a considerable research investment over many years, farmers still prioritise weeds and weed management as important research topic even though research funders have generally pulled back from funding basic weed research, an indication that they perceive the topic has, in some sense, been sufficiently covered.

Participatory weed research

Based on experience in the weed management project we propose a more farmer centred view of weed research as likely to be more effective in meeting the needs of farmers when considering weed management. Experience during the project has shown that organic weed management is about learning for improving complex situations (see above). A developing narrative during the project has been that:

- no farmers (or advisors or researchers) think that they have all the answers
- effective organic weed management is likely to need an integrated systems approach and a range of approaches will work best over period of time. In practical terms it will necessarily be a mixture of longer term planning (e.g. rotations, crop variety choice) combined with short term reactive or direct measures (e.g. harrowing, flame weeding).
- a consequence of the complex circumstances surrounding weed management practices is that farmers are constantly seeking new knowledge on weeds to incorporate into their weed management strategies and constantly adapt and try out different weed management techniques (i.e. they engage in research in its widest meaning)
- researchers and advisors are best used to support this on-going process either in facilitating information exchange, providing specific information where necessary or helping to place on-going farmer research on a more 'scientific' basis

Farmers generally carry out a lot of their own 'generic research', some of which has been documented as part of the project process. Farmers seek information on weeds (especially succinctly written information and press articles), they are especially interested in how other farmers are managing weeds (farm walks, farmer groups) and undertake a great deal of informal experimentation with weed management techniques and methods in their own fields (trailing to see what works). Weed management strategies on their farms are the outcome of this experiential learning process; usually practical weed management methods, applicable in specific situations and not 'formally' evaluated.

The project has therefore sought to place farmers and their experiences with weed management at the centre of the development process and to draw in organic advisors and researchers to provide additional knowledge where required. The aim has been to allow farmers and growers to develop practical weed management techniques that are adapted to their specific farm situations. In this

context the results of detailed scientific trials and botanical observations are one element of a large pool of knowledge on which farmers can draw on to make decisions about weed management.

Processes for organic weed research

The central theme for any future organic weed management projects should be to reconcile the two predominant strands of knowledge development as defined in the project narrative; that is farmer experiential knowledge and researcher scientific knowledge. It is towards this end that many of the current project resources have been devoted rather than developing technological fixes to particular problems. In short, the project process has developed a participatory approach and has tried to construct a learning collegiate framework in which all perspectives on weed management are valued. The various approaches taken to try and do this have been:

- development of an open website and database: an extensive literature review on weeds and weed management, largely carried out by scientists, has been made freely available to all stakeholders through a website (www.organicweeds.org.uk). The database is flexible enough to allow for the input of farmer and advisor knowledge and experience, which can be set alongside the scientific knowledge in order to make the information more relevant and the site is therefore a database of current information and knowledge on organic weed management practice in the UK.
- development of case studies: specific weed management stories from working farms have been elaborated and are available for critical analysis. They are a unique source of farmer knowledge and experiential learning which allow farmers to share knowledge and provide a learning opportunity for converters and young farmers. All are available on the website alongside the database on weed information.
- farm walks and open days: interactive meetings have been organised on specific topics and used to discuss and develop knowledge (e.g. farm walks focusing on dock management, annual weed management in arable systems). They have proved an invaluable opportunity for mixed groups of farmers, advisors and researchers to exchange ideas and experiences. Special attempts were made to capture 'farmer stories' at these shared field experiences and these are available through the reports on the website.
- talks, discussions, meetings, focus groups and workshops: the project has helped facilitate a large number of organised talks, farmer discussions (often with field walks), meetings and workshops themed by weed, farm type or crop depending on requests. Many of these were for existing farmer groups but the project also helped facilitate focus groups of researchers, advisors and farmers, which evaluated and reflected on the main project themes, ensuring that the project remained relevant to the concerns of farmers. An annual stakeholder meeting was held to which farmers and advisors were invited and asked to explore weed issues and reflect on the project progress.
- on-farm trials and surveys: the project has facilitated a number of on-farm trial themes and surveys for farmers and/or farmer groups (themed by weed, topic or crop). Some of the work has provided valuable information where researchers were able to help monitor the effect of weed management practices over a period of time.
- flexibility in producing other outputs: outputs have included bulletins, leaflets, press articles and conference papers according to demand. They have mainly been aimed at improving communications, diffusing information and reflecting on project achievements.

The various methods employed by the project have generally been effective in allowing individual participating farmers to reflect and act to resolve specific weed management situations. However it is clear that not all methods suit all actors and that it is important to have a range of different approaches to sharing information that allow all stakeholders to participate. A more critical analysis and reflection on the project process is provided by Davies *et al.* (2006).

Implications for weed research projects

Actual weed management practice in organic farming systems will depend on a large number of contingent factors. Research to help farmers improve weed management situations best places

farmers at the centre of the process. This demands a reorientation of the conventional roles of advisors and researchers to facilitate information exchange in a flexible format and to help farmers develop knowledge in a manner that provides them with appropriate information or solutions. Such a research system aims at combining farmer, advisor and researcher knowledge for more effective weed management options, rather than generating new basic ‘scientific’ knowledge (as traditionally perceived), which is of limited use to farmers. Other stakeholders, such as funders, may also need to adjust their expectations of what researchers deliver to end users as part of scientific projects.

Central to this approach is the sharing of information between stakeholders on an equitable basis. Whilst it has been possible to fund the current project it has also become apparent that the nature of the project, an open-ended enquiry into weed management, does not fit easily within existing funding structures which tend to demand fixed length projects delivering scientifically ‘robust’ outputs. Future work will require flexibility on behalf of funders, researchers and farmers.

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