Farmers’ Understandings of GM Crops within Local Communities

Final Report to the ESRC

REFERENCE No. RES-151-25-0046

Professor A B Lane
Dr Sue Oreszczyn
Dr Susan Carr

The Open University
July 2007
Farmers’ understandings of GM crops within local communities

Background
This project was distinctive in both the subject of the research and the approach taken to the researching. First, it researched a neglected aspect of a contentious technology – the practitioners’ views of GM crops. Second, it developed an interactive, relationship building methodology using mapping techniques (cognitive maps, influence maps). Third it developed new models for social learning systems in the farming context where there is a highly distributed organisational framework. Fourth, it framed those views within the theories of knowledge management and communities of practice in a dispersed organisational context, or ‘networks of practice’ and developed these ideas to include communities of influencers. In doing this we have drawn on theories about situated learning3, ‘communities of practice’ 4 and networks of practice5.

Much of the debate surrounding the science and technology of genetically modified organisms (GMOs) has focussed on the policies and practices of national governments and international organisations or on the acceptability of GM products with consumers. Little work had been done at the local level, particularly with respect to farmers, who would be the primary users of GM crop technology. Yet the adoption and acceptability of new technology such as GM crops depends in part on how farmers judge and manage it. Further, the management of knowledge has become a significant issue for all sectors of the economy6. However, little attention has been given to small and medium sized enterprises such as those run by farmers. Farmers (and their families) are a very specific societal group and set of businesses with particular characteristics that make them subject to 'knowledge-based' influences from many other societal groups. One significant characteristic is the often competing and contradictory demands placed upon them by economic policies (delivering private goods) and environmental policies (delivering public goods).

Objectives
The objectives of our research and how we met them are as follows:

1. To explore how farmers construct their understandings of GMHT crops through their interactions with others, in particular family members, neighbouring farmers, seed companies, farming advisors and the local community.

This objective was met through the outputs of telephone and face-to-face interviews and a workshop. Farmers’ understandings of Genetically Modified Herbicide Tolerant (GMHT) crops were explored with the help of cognitive maps, while their interactions with others were explored using a novel influence mapping technique and by including ‘influential others’ in some of the interviews and at the workshop.

2. To ascertain the acceptability to farmers (both those with experience of GMHT crops and those without) of recommended management practices for GMHT crops used in Farm Scale Evaluations (FSEs).

This objective was met by means of specific questions in the telephone and face-to-face interviews.

3. To develop models of social learning systems appropriate to support individual farmers within informal social settings who decide to adopt contentious new technologies such as GMHT crops.

This objective was met through detailed analysis of the evidence from the interviews and workshop.

Full details of our findings may be found in our project reports (see Outputs) and the results section.

Methods
The interactive, relationship building research method we developed was an important part of this research and so is explained in some detail.

The three phases in the project used three different, and progressively more interactive discussion and mapping techniques to engage with (often the same) participants (see project diagram in Annex 1). Overall we wanted to treat the participants as valued partners in the process and not simply as research subjects. Our relationship building approach ensured that the research outputs (the maps and associated transcripts and notes) were relevant and grounded in participants' actual experiences and everyday practice. In addition key stakeholders - the National Farmers Union (NFU) administration, the secretary of the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC) and a farmer board member of the NFU - were involved in advising us on the research process throughout the project. They helped us with making contact with farmers, with suggestions for invitees to our workshop, with suggestions on our interview questions, and with comments on our draft reports.

As we wished to interview farmers with experience of growing GM crops, the project focused on non-organic, larger scale, commodity crop farming, although the farmers interviewed were varied in terms of what they grew and their farming approach. The initial group of farmers was chosen because they had been involved in the Farm Scale Evaluations (FSEs) for GMHT crops. A second group of farmers was then selected who were situated locally to these farmers, but who had not been involved in the FSEs. Groups of farmers were selected from the east and west sides of the country to see if there were any significant regional differences, although the precise locations were dependent on the location of the FSEs.

**Phase 1: What farmers say about new technologies and GM crops**

The first phase focussed on objective 2, as a basis for the rest of the project. It addressed the following questions:

- What do farmers see as the pros and cons of new technologies generally and what do farmers believe about GM crops?
- For farmers who were involved in the FSEs, what were their experiences of growing GM crops?
Lengthy, loosely-structured, tape-recorded, telephone interviews (in addition to one preliminary face-to-face interview with a key farmer on our advisory panel), were conducted with 30 farmers. The interview questions fell broadly into three categories - issues concerning new technologies and agriculture generally; experiences of using GM crops (or for the non-FSE-farmers what they thought about potentially using GM crops); and farmers’ social interactions. The interview tapes were fully transcribed and sent to interviewees for checking and to add any further information if they wished. Key common themes were drawn from the interviews and cognitive maps of individuals’ views were drawn up from the interview evidence using Decision Explorer, to aid analysis (see Annex 2 for an example).

A draft report, suitable for a lay audience, based on analysis of those interviews, was sent to the farmers and advisors together with a further questionnaire. Participants were also asked who they would disseminate the information in the report to, to gain further information about their networks. A meeting was held with senior staff members of the NFU, an FSE farmer and SCIMAC representative to discuss the report and our outputs.

**Phase 2: What farmers say about influences on their decisions about farming, new technologies and GM crops**

The second phase addressed objective 1 and provided background information for objective 3. It addressed the questions:

- Who or what are the influences on farmers concerning the introduction of new technologies to help run their farms as a business?
- To what extent do farmers engage in learning?

Twenty farmers in three regions of the country were selected from the original group of telephone interviewees for face to face visits. Of these we were able to visit 17 farmers, 11 of which were involved in the FSEs. Six of these visits involved interviews with the farmer and someone else connected with farm decisions, for example, their farm manager, agronomist or a relative.

At the start of each interview the cognitive map drawn from the initial telephone interviews in phase 1 was discussed with the farmer and any corrections or additions to the maps were made. An interactive mapping exercise was then carried out whereby farmers were asked to place the influences on their decision making on a circular grid (see Annex 3 for an example of a map). Once the initial influence map was completed the participants were then asked how the map would change if they were just thinking about new technologies, such as GM crops, and how influences have changed over the last 10-15 years. Full details of this process are given in the Phase 2 report (see Outputs).

Using the information associated with the placement of the influences on the grids, the information from the maps was analysed and synthesised into foreground, mid-ground and background influences in a second report. This was sent to the participants for comment before being more widely distributed. A further meeting was

---

7 Of the 30 farmers interviewed, 15 had been involved in the FSEs and 15 had not.
9 A total of 23 people were therefore involved in the face-to-face interviews in this second stage.
held with senior representatives of the NFU and SCIMAC to discuss the findings from phase 2 of the project and to seek advice on the workshop planned for phase 3.

**Phase 3: New technologies and scientific developments: Exploring better ways to support farmers’ decisions**

This phase addressed objective 3 by drawing on the findings from the other phases of the project and by running a workshop with farmers and key members of farmers’ community of influencers\(^{10}\). In our original proposal we had planned to carry out two small local workshops with farmers and members of their local community. However, early on in our research we found that the local public community has very little influence on farmers’ decision making and thinking about new technologies. The project therefore limited its focus to the farmers’ direct influencers from within the agricultural community, rather than attempting to draw in the wider public community.

The aim of the workshop was to bring together farmers and other decision makers to explore thinking within groups that may bring out issues that interviews with individuals miss, but that may be important for understanding current and future farm decision making. We considered it important that this exercise should not be regarded as a process that was only of benefit to the researchers. For participants we hoped the workshop would offer an opportunity to share understandings of potential futures for new technologies and scientific developments, including GM crops, and to have a direct input into a project designed to inform UK policy making. It also offered them an opportunity to learn about our research findings so far, to ensure that it addressed their priorities or concerns, and to network with people with similar interests to their own.

The workshop attracted 25 participants. It used a further mapping technique - Harman fans - to engage participants in an action-research style process to explore potential futures. Like the cognitive mapping technique used in Phase 1, Harman Fans can be used to display complex topics in a relatively simple way and show connections and interactions between issues, rather than simply drawing out themes. They also enable a temporal analysis (see example in Annex 4). Full details of the process may be found in our workshop report (see Outputs).

We asked participants to consider the following questions:

- ‘New technology in agriculture: Why is it important and what does it mean for the farmer?’
- ‘GM Crops: What are the issues around growing GM crops?’
- ‘What help and support do you need?’ and ‘How could this be organised best to meet your needs?’

Immediately following the workshop a photo report was sent to participants so that they had a record of the day’s activities. A full report was then drafted and sent to the participants asking for their comments and any additional contributions to the report. Space within the report was deliberately left free for their additional contributions.

**Results**

The key findings from an integrated analysis of each of the three phases of the research have been summarised for a leaflet to accompany our posters and are listed in Annex 5. Full details emphasising the empirical findings of our research may

---

\(^{10}\) Farmers’ community of influencers consists of all the people farmers placed on their influence maps in Phase 2.
be found in the reports produced for each phase of the research. Throughout the research few discernable differences were found between the FSE and non-FSE farmers' thinking or between those who lived in different regions of the country and so we treat them as a single group in what we say below.

Phase 1: What farmers say about new technologies and GM crops

There were three main themes arising from the telephone interviews: the economic and policy environment for agriculture and new technologies, farmers' understandings of GM crops as a new technology, and their views of the FSE process itself.

First, the farmers thought the government perceived agriculture as being of low priority and all those interviewed, except one, felt that in the last five years things had become more difficult for their farm as a business. At the same time farming was becoming an increasingly complex business employing a wide range of often expensive technologies that were needed if they were to be competitive in global markets. Being able to compete in world markets was a key issue, placed at the top of all their cognitive maps. New technologies were viewed as important for “moving forward” and GM crops were considered a particularly advantageous step at a time when there are few new major agricultural breakthroughs. Farmers also felt the pressures of increasingly having to serve many goals, some of which can conflict e.g. to deliver high quality products and also to farm in an environmentally sensitive way.

Second, GM crops were viewed as part of the plant breeding continuum, i.e. simply another step in the process and a quicker and more scientific route for doing what was done before by chance. The farmers felt the economic and environmental benefits that GM crops could provide were vital for enabling farmers to be deal with their present situation, for example, by offering a way of reconciling the conflicting demands of increasing competitiveness and better environmental measures. The FSE farmers were responding to GMHT crops much as they would to any new technology, i.e. by experimenting and assessing how the ‘theory’ set out by the companies is borne out in practice in their local situation. Particular advantages of GMHT crops were that more flexible applications (in terms of timing) and fewer herbicide applications, meant simpler management, time and labour savings, increased flexibility and reduced costs, so improving farm efficiency and hence profitability. Further, the use of less and safer chemicals was seen to provide human safety and wildlife benefits, fitting in well with their increasingly pro-environmental activities. The non-FSE farmers were equally optimistic about the benefits of GMHT crops so the view overall was consistently positive.

Third, the recommended management practices for the FSEs proved acceptable to all FSE farmers and they did not feel that they had any difficulty following them. However, farmers’ own tacit evaluations were seen as more realistic to the farming community than the scientific evaluations of the trials, with their narrower focus. Some farmers were particularly annoyed about the way the final results of the trials were presented by the scientists and did not feel their practices were represented fairly, as the FSE requirement to apply the maximum dose of herbicide did not represent what they would do in normal practice. Thus, while farmers acknowledged the wider contested debate around GM crops, their situated experience and knowledge around such technologies has led to their view that the controversy surrounding GM crops is not a significant issue.
Phase 2: What farmers say about influences on their decisions about farming, new technologies and GM crops

This phase found that farmers have large and fairly similar community of influencers that were relatively stable over time, although learning is mostly apparent within farms. Often it is key individuals in organisations that have most influence rather than the organisation itself, while the most consistent change was in relation to Defra11

Although farming is a more geographically-isolated occupation than many other occupations, farmers are regularly interacting with a wide number of individuals and organisations in their community of influencers. All the farmers who participated in the project have a shared identity. They have common concerns and show a remarkably similar set of views on new technologies and GM crops in particular, whether or not they were involved in the FSEs. Whereas their individual sets of influencers may differ, there is strong overlap between the sets of influencers and fairly consistent trends over the most and least important influencers. However, farming neighbours and discussion groups where farmers can gather and exchange ideas and views were not considered particularly influential by most of the participants. Learning arising out of their interactions with each other was therefore not very evident. Indeed it was notable how many other people and organisations who are not farmers contribute to the learning and knowledge management of individual farmers.

While farmers’ strong community of influencers gives them access to a rich knowledge and information environment, most knowledge creation and management is through experiential problem solving done individually rather than collectively. Farmers are responding to changing circumstance and new technologies by drawing on their informal, or tacit, knowledge about their farm and their conditions to experiment with and to adapt their use of new technologies to their own context. They do share some of this knowledge with their network of practice, however, new technologies such as GM crops are increasing the amount of formal knowledge that farmers, as small businesses, have to absorb and synthesise. At the same time, requirements to comply with regulations, etc, reduces the scope for their informal knowledge to be employed.

Our research also highlights the importance of individuals within organisations, rather than simply the organisations themselves. Like family members, and employees, key individuals such as the farmers’ agronomists, respected scientists or individuals from the companies involved in the FSEs, were found to be instrumental in influencing what they are thinking and what actions they took. This highlights the importance and need for trusted independent advice from people they respect. This sort of advice is becoming more important as new developments in agriculture increase the complexity of farming practice.

With regard to changes over the past 10 years, Defra now dominates their decisions, but in a constraining rather than an enabling role. Defra is seen by farmers in our study as being remote and imposing regulations that ignore the realities of agricultural practice and the tacit or situated knowledge that farmers possess. While family members and research institutes were found to be very influential in farmers’ decision making on new technologies, the local community was found to be a weak, background influence, even on a topic as controversial as GM crops.

---

11 Department for the Environment, Farming and Rural Affairs
Phase 3: New technologies and scientific developments- Exploring better ways to support farmers’ decisions

The workshop discussions and activities confirmed the findings from the two previous phases and also suggested a number of proposals for future changes in the farmers’ community of influencers that might improve how new technologies and scientific developments are pursued and supported. The discussions identified a need for:

- An enabling environment that is responsive to farmers’ needs, with clear, consistent and long-term policy signals about the future of agriculture, to allow farmers time to adapt to changing demands.
- Improved connections between farmers and consumers.
- Greater awareness amongst policy makers, regulators, scientists and the supermarkets of what farmers can and cannot do.
- Independent, trustworthy, sources of research and advice for farmers.
- The valuing of farmers' informal and experiential learning, for example in the shaping of agricultural research.

The findings from the workshop also suggested that the following features are among those that would most improve the systems of support available to farmers in their decisions about new technologies:

- horizon-scanning on behalf of farmers, to synthesise information, look at the potential of new technologies, and develop clear long-term directions for agriculture
- better co-ordinated and more widespread initiatives for marketing and promoting new technologies used in agriculture
- government-sponsored intermediaries qualified in and knowledgeable about agriculture, to improve the links between government policies, scientific research and the grassroots

Full details may be found in the workshop report for phase three (see Outputs).

Farmers social learning systems

Through analysis and synthesis of all the phases of our project, we are able to make the following observations about farmers’ social learning systems.

- Farmers’ tacit knowledge and learning through experience, rather than formal training, was important for farmers concerning the introduction of new technologies.
- Farmers learn by engaging with their network of practice (mostly other farmers) and their community of influencers. That is, they draw on and exchange knowledge and experience from the range of people in their farming networks.
- Farmers' community of influencers is complex but relatively stable and consistent over time, although the degree of influence of individual members of the community may change. Most farmers’ community influencers are not local.
- There is little appropriate connection between both the scientific research occurring in the agricultural science community of practice, and in agricultural policy development, with the day to day agricultural practices and long term plans of farmers.
As noted earlier, our research identified the way that key people, rather than organisations, played an important role in farmers’ network of practice. These key influencers are examples of brokers who are able to span the boundaries between the farming network of practice and other communities or networks of practice in farmers’ community of influencers. Currently the exchange of knowledge across the boundaries between policy, research and practice in the farming context tends to be one way. For example, farming guidance and research reports tend not to be discussion documents. Boundary brokers ideally need to interpret practice in both directions, for example, between government policy research and farming practice at the ground level, rather than simply gathering and transmitting information.

Our research identified a lack of boundary brokers between farmers' network of practice and other key members of their community of influencers. While boundary brokering is inevitable, it does not necessarily easily arise organically from such a distributed community. Furthermore, to be efficient (in terms of the number of people who devote their effort to it) and effective (in terms of the benefits it brings to the network of practice) it may be better if it is organised formally. Currently as individual and isolated businesses without a strong organisational framework, farmers themselves are largely responsible for their own individual brokering at boundaries and for obtaining access to the wealth of information that surrounds them. Many individual farmers’ gathering information for themselves is not as efficient or effective as having certain people carry out that role for the network of practice as a whole. We conclude that in cases such as this, and where a distributed community or network of practice has both a public and private responsibilities, this role may need to be formally structured, as was the case in the past with the Agricultural Development and Advisory Service (ADAS).

Developing Theory
As noted earlier, our research drew on theories about situated learning, communities of practice and networks of practice (see references in notes 2, 3, and 4), and further developed these ideas in the context of farmers social learning systems and new agricultural developments to include communities of influencers. A paper based on these ideas is currently is in preparation for submission to the Journal of Rural Studies (see nominated output).

Communities of practice are informal groups of people who share a common activity or concern. Members form a common identity and understanding through their common concerns, interests, history and interactions. Such communities are informal and self-managing. The development of this concept by John Seely Brown and Paul Duguid (see reference in footnote 3) to include networks of practice - forms of organisation that have all the properties of a community of practice but are more loosely connected, was particularly useful for our research. In Phase 2 we were generally able to characterise farmers as a network of practice, however, it was also clear from this phase that the concept had limitations as farmers draw extensively on people within their wider network of influencers. Thus from our research we were able to conclude that theories about communities of practice, and particularly those about networks of practice, provide a useful lens through which to view contexts where there is no strong organisational framework linking the many highly distributed members, such as with farming. However, these ideas can be usefully extended to include the concept of a community of influencers that farmers’ can draw on.
Activities
Regular (formal) research team meetings were conducted throughout the research and meetings were also held in each phase of the research with our key stakeholders. Members of the team have also attended all the ESRC-organised Science in Society Programme meetings.

We have disseminated findings at 3 conferences, including a practitioners' conference (see Outputs section) and a fourth conference paper is being delivered in September 2007. A presentation on the project was also made in a workshop at the ESRC Policy and Genomics Forum launch 21-23 September, 2005. This project has also been affiliated to the ESRC Centre for Social and Economic Research on Innovation in Genomics (INNOGEN), held jointly by the Open University and Edinburgh University. This has enabled us to be involved in several INNOGEN workshops and seminars and so provided strong links to the Genomics research community as well as the Science in Society community. We were included in INNOGEN’s mid term review report. SO was also invited to, and participated in, an ESRC Genomics Policy Research Forum workshop on biodiversity, conservation and land use, November 2006. AL was invited to contribute to and review one of the Science in Society research brochures on Science and Genomics and also attend its launch in June 2007.

Outputs

Journal publications
Oreszczyn, S., Lane, A., and Carr, S., Networks of practice and community of influencers in the farming context. Draft paper on our theoretical development for submission to the Journal of Rural Studies (see nominated output).

A further 2 papers are being drafted:

Lane, A.B., and Oreszczyn, S., Knowledge management amongst farmers: the importance of non-formal, interactive learning. For submission to Agriculture and Human Values.

Oreszczyn, S. and Lane, A.B., Grounding research in the farmers view: using visual mapping techniques in participatory research for policy and planning. For submission to Qualitative Research.

Conference papers/publications


Project reports


A project web site was set up and all the project reports have been made publicly available their - http://technology.open.ac.uk/cts/esrcfarmer.htm

Conference Posters
A poster detailing our key findings has been prepared for the Science in Society final programme meeting and for the Open University Research Festival.

Data sets
Transcribed interview data from telephone and face to face interviews; a set of 30 cognitive maps representing the farmers thinking on GM crops and new technologies; a set of influence maps and associated interview notes; a photo report of a set of Harman Fan maps and associated notes from the workshop activities.

The project was granted a waiver on depositing the data due to the sensitive nature of the materials and assurances given to the research respondents. A letter dated 21/12/04 from the Director of the UK Data archive refers (Acq1983/KS/SC). While were given this waiver, our detailed reports present this material in a way that is close to its original form. These, along with all our other papers, have been lodged with the Regard database and are publicly available on our project website, which is also linked to the Innogen web site.

Impacts
Impacts have been greatest so far with our participants and others in the agricultural industry. Farmers appreciated the use of a more participatory methodology that sought the inclusion of their view, as users, into the broader societal conversations about new technologies. They also valued the interactive, relationship building nature of the research approach. In particular, there were a number of complimentary comments and e-mails following the workshop: “I found the subject and methodology of the day fascinating. I had never experienced that approach before and it was intriguing to see the thought processes that it puts you through” and “It (our workshop report) makes interesting reading and bits will be of particular interest to certain organisations within agriculture. I enjoyed taking part in the survey”.

We have generated a list of over 60 contacts who have requested information on what we have been doing. The good participation response from those in our study, and particularly our workshop, indicates the degree of interest in the project from members of the agricultural industry and farmers. The workshop also provided us with several contacts interested in collaborating on further research. For example, Brooms Barn are interested in developing novel approaches to farmers' adoption of
new technologies, and NIAB and the British Potato Council are interested in developing social research around GM potatoes, the most recent GM crop to be trialled.

Impact on the academic research community is growing and the project has been described by a social science commentator at one event we spoke at as “an innovative contribution in an area that has been under researched up to now”.

**Future Research Priorities**

While the crops in the FSEs are not being progressed further for licensing at the moment, other crops are and so similar research is required into the social issues surrounding the introduction of GM potatoes, which sit in a very different context from the large scale commodity crops that were the subject of the FSEs.

Second, there is a need to study the effectiveness of using participatory techniques to help shape a new research and development agenda for agriculture in projects that bring farmers, scientists, industrialists and policy makers together.

Third, the interactive mapping techniques also require wider evaluation as data gathering methods in other situations, either within the projects described above or in new ones.

Fourth, further development of theories about social learning systems within networks of practice and communities of influencers in at least three areas:

- As much of the work on communities of practice and networks of practice has been developed in the within-organisation context, further empirical evidence is required from another sector of the economy which shares some of the distributed small business characteristics of farming.
- Research on the reasons how and why key individual influencers, or boundary brokers, are important for promoting learning in distributed networks of practice.
- Linking theories about communities and networks of practice in the context of social learning with the new, emerging developments in network theories coming from the field of communication studies.
Annex 1

*Farmers' understandings of GM crops within local communities*

Project diagram

### Phase 1
What do farmers see as the pros and cons of new technologies generally and what do farmers believe about GM crops?

For farmers who were involved in the Farm Scale Evaluations, what were their experiences of growing GM crops?

- Activities:
  - Extended telephone interviews with 30 farmers
  - Thematic analysis
  - Cognitive maps drawn up for each interview

- Outputs:
  - Report: 'What farmers say about new technologies and GM crops: a report on the initial telephone interviews.'
  - Project website
  - Conference paper

### Phase 2
Who or what are the influences on farmers concerning the introduction of new technologies to help farm business?

To what extent do farmers engage in learning from these influences?

- Activities:
  - 17 Farm visits, 23 face-to-face interviews
  - Themes and cognitive maps developed.
  - Influence maps and interviews analysed

- Outputs:
  - Report: 'What farmers’ say about influences on their decisions about farming, new technologies and GM crops: a report on the farm visits.'
  - 2 Conference papers

### Phase 3
What are the models for social learning amongst farmers?

What systems will better support farmers' decisions around new technologies?

- Activities:
  - Interactive Workshop with farmers and selected organisations involved in their network, or ‘community of influence’
  - Analysis of the Harman Fans and workshop discussions
  - Synthesis of the findings from each phase

- Outputs:
  - Report: 'New technologies and scientific developments: exploring better ways to support farmers' decisions.'
  - Executive summary for the project
  - 1 further conference paper and a journal paper (further 3 journal papers being drafted)
  - End of award report to the ESRC
An example cognitive map

F2FSET~1 Technology 28 Sep 05

- Technology is very important
- new tech such as biofuels, bioplastics offer another market
- important for the viability of agriculture in this country
- doesn't necessarily mean growing different crops - modification to existing ones

- need to compete in highly competitive market
- need it if competitors have it
- if nobody has the technology it would not be important
- companies tend to push a new product regardless of farmer needs
- is the farm viable without the new technology
- is it a new market?
- is there a market for it?
- grow a crop if it can pay, make a profit, ditch those that are marginal
- does it fit the market we are going for?

- gm has potential
- more potential for an organic farmer (eg ... immunity in a crop means no sprays)
- double standards - if its organic it should be organic (no sprays)

- advantages increased yield and decreased herbicide use
- estimated savings on both but beet saving around £54/ha/yr by using gm
- time before can plant another crop in same field
- some disadvantages
- sensible to approach gm with care
- will still be a trial when it goes to commercial stage

- involved in FSEs
- SCIMAC guidelines no problem
- growing arrangements need to be fair
- need to work together
- whoever farm there first should have priority (when new farmers coming into area)

- most problems as a result of the rules of the FSEs rather than what would happen in normal practice
- no problems with neighbours - no reason to believe future needs for contact would be a problem
- Monsanto arrogant attitude did not do the tech any favours
- preference being given to organic farmers
- Bayer/Aventis totally different bedside manner - supportive
- organic OSR being grown to prove a point
- want to increase separation distances all the time
Annex 3

An example interview map
(NB. These were originally drawn on A1 flip chart paper, so this example is significantly reduced in size)
Annex 4

An example Harman Fan from the workshop
Farmers’ Understandings of Genetically Modified Crops within Local Communities

Prof Andy Lane, Dr Sue Oreszczyn and Dr Susan Carr
Technology Faculty, The Open University, Walton Hall,
Milton Keynes MK7 6AA
Contact: a.b.lane@open.ac.uk or s.m.oreszczyn@open.ac.uk
Tel: 01908-653433

Key Findings

Farmers’ understandings of GM crops as a new technology

- Farmers view GM crops as a technology derived from new practices in plant breeding that build upon previous technologies.
- Farmers are responding to GM crops much as they would to any new technology, as a technology that provides improvements that are assessed for their value in practice by experimentation in the individual farm context.
- Farmers who had been involved in the farm scale evaluations, and those who had not, believed that GM crops offer clear economic and environmental benefits to themselves and the wider public.
- New technologies, such as GM crops (and biofuels), are attractive to farmers as a way of reconciling conflicting demands on farmers to deliver high quality products at low cost and also to farm in an environmentally/socially responsible way.

Farmers’ social learning systems and links to their communities

- Farmers learn:
  a) by experimenting, that is they draw upon their tacit knowledge and experience in their own setting to develop new technologies in practice, and
  b) by engaging with their network of practice (mostly other farmers) and their community of influencers. That is, they draw on and exchange knowledge and experience from the range of people in their farming networks.
- Farmers’ community of influencers is complex but relatively stable and consistent over time, although the degree of influence of individual members of the community may change. Some influence over practice is one way (e.g. regulations), some influences result from two way negotiation.
- Most farmers’ network of practice and community of influencers are not local.
- Key individuals within organisations are often important, rather than simply the organisations themselves.
- Most farmers act individually at the boundary of their network of practice and community of influencers.
- There is a lack of official boundary brokers between farmers’ network of practice and other key communities of practice, or networks of practice, within a farmer’s community of influencers.
There is little appropriate connection between both the scientific research occurring in the agricultural science community of practice, and in agricultural policy development, with the day to day agricultural practices and long term plans of farmers.

The value of the research approach

- Farmers appreciated the use of a more participatory methodology that sought the inclusion of their views, as users, into the broader societal conversations about new technologies.
- Farmers valued the interactive, relationship building nature of the research approach.

Recommendations for improving farmers’ social learning systems

There is a need for:

- An enabling environment that is responsive to farmers’ needs, with clear, consistent and long-term policy signals about the future of agriculture, to allow them time to adapt to changing demands.
- Improved connections between farmers and consumers, through initiatives such as improved marketing, and to inform consumers about how and where their food is produced.
- Greater awareness amongst policy makers, regulators, scientists and the supermarkets, of the practicalities of farming – of what farmers can and cannot do.
- Independent, trustworthy, sources of research and advice for farmers.
- The valuing of farmers’ informal and experiential learning, for example in the shaping of agricultural research.

The following features are among those that would most improve the systems of support available to farmers in their decisions about new technologies:

- horizon-scanning on behalf of farmers, to synthesise information, look at the potential of new technologies, and develop clear long-term directions for agriculture
- better co-ordinated and more widespread initiatives for marketing and promoting agriculture
- government sponsored intermediaries qualified in and knowledgeable about agriculture, to improve the links between government policies, scientific research and the grassroots

Project web site: http://technology.open.ac.uk/cts/esrcfarmer.htm