

# GROWING GM CROPS:

## The Need for Contamination and Liability Rules



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One major concern about growing GM crops is whether it will be possible to maintain non-GM food supplies which have not been contaminated by GM and who will bear the cost if contamination arises. In July 2004, the Government announced that it is to hold a consultation on the co-existence of GM and non-GM crops to consider these issues<sup>1</sup>. The outcome will be important because it will establish the rules for GM crop growing in this country. Key issues include:

- what level of contamination is the target maximum for conventional non-GM and organic produce;
- who will pay for any economic losses caused by GM contamination;
- whether or not areas of the UK could establish themselves as GM-free; and
- who will pay for any environmental damage that may arise.

This briefing considers these issues and the impact decisions are likely to have.

### **The Government's thinking**

The Government set out its new GM policy in March 2004<sup>2</sup>. Following the 'GM Nation' public debate and its science and economics reviews, the Government decided that GM crops should continue to be assessed on a case-by-case basis and that there was no scientific case for a ban on cultivation. However, following advice from the Agriculture and Environment Biotechnology Commission (AEBC)<sup>3</sup>, the Government considers there is a need to have a system to limit contamination from GM crops if they are grown, because this might affect the economic interests of non-GM farmers. The Government wants rules in place before any commercial growing of GM crops is allowed, which is unlikely before 2007-2008 at the earliest.

In 2003, the European Commission published guidelines on the co-existence of GM and non-GM farming based on the rights of all farmers to be able to grow the crops they wished, GM or non-GM, if these have European approval<sup>4</sup>. The

guidelines allow Member States to make their own rules for how GM crops are grown and managed to limit the economic impacts of contamination. The UK Government's approach is to establish a statutory code of practice for GM farmers. This would be intended to prevent GM contamination of neighbours' crops going above the 0.9% threshold which triggers labelling under new EU regulations<sup>5</sup>. As well as this overall approach, the consultation is also going to consider:

- whether there should be a lower contamination threshold for organic production;
- guidance for farmers on establishing voluntary GM-free zones; and
- what compensation scheme is needed for non-GM farmers who suffer economic loss through contamination.

Although the AEBC has also recommended changes to the law to cover any environmental harm that might arise from growing GM crops, the Government has left this to a later date. This decision has been criticised by the Environment, Food and Rural Affairs Committee<sup>6</sup>.

### **The contamination threshold**

The level of 0.9% contamination which has been set as an 'acceptable' threshold arose from negotiations in Europe which led to new rules concerning the traceability and labelling of GM crops and foods.<sup>5</sup> If a food ingredient contains, or is derived from, a crop that is more than 0.9% GM, it has to be labelled. In designing these rules, intended to provide consumer choice and allow the removal of products from the market place in case a problem arises, it was considered that there needed to be a margin for error. This is to allow for the presence of GM ingredients at a level below 0.9% if this is, according to the regulations, '*adventitious or technically unavoidable*'. In other words, to allow for unintentional or accidental contamination which could not have been prevented. The actual level of 0.9% was the product of horse-trading

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between the biotechnology industry that wanted higher levels, and consumer groups that wanted to avoid all contamination. An impression was also created by the biotechnology industry that a zero contamination level was not achievable. Two important questions arise from this 0.9% threshold:

1. Is 0.9% the right level? Is this what consumers want and is it practicable?
2. Should a co-existence regime aim to meet a 0.9% level or less, if it is possible to do so? What should '*adventitious or technically unavoidable*' mean in practice?

Research has shown consistently that the public believe people should have a choice whether to eat GM food or not, and support labelling even if they are happy to eat GM foods<sup>7</sup>. There are no data as to what level of contamination people consider acceptable before a product is labelled as GM, so this remains uncertain. However, supermarkets continue to believe that their customers do not want to buy GM foods<sup>8</sup>. Food producers and supermarkets that have removed GM ingredients from their products because of consumer pressure to do so, work at or towards a 0.1% threshold – this is effectively zero as it represents the limit of detection. Therefore, based on these experiences, it appears practicable to achieve a threshold of 0.1%. If an increasing proportion of GM crops are grown globally, this may become increasingly difficult unless controls are in place to limit levels of GM contamination.

There are also legal questions that will need to be addressed. In relation to the 0.9% threshold, or margin for error, below which foods do not have to be labelled as GM, Article 12 (3) of the Food and Feed Regulation (1829/2033) says: "*In order to establish that the presence of this material is adventitious or technically unavoidable, operators must be in a position to supply evidence to satisfy competent authorities that they have taken steps to avoid the presence of such material*" (emphasis added).

GeneWatch believes the Government may be wrong in law, and is failing to recognise the scientific uncertainty that exists and the safety margin required, if it designs a co-existence system to allow 0.9% contamination by intent (not adventitiously) and where technical means could avoid or reduce contamination.

### **Special protection for organic crops?**

Organic production does not allow for the use of GM methods<sup>9</sup>. There is no defined threshold of allowable GM contamination in organic regulations, but the Soil Association, the UK's main organic certification body, has said it considers that 0.1%, the limit of detection, is what it expects a co-existence system to support<sup>10</sup>. The International Federation of Organic Agriculture Movements' EU Regional Group has also argued that if any GM contamination of seed is allowed, this will undermine organic systems because organic farmers have to use non-organic seed at times because of limited organic seed supplies<sup>11</sup>.

If a 0.9% threshold is made the primary aim of co-existence measures, and routine contamination up to this level is accepted, Europe's growing organic market may be compromised. One option is that organic produce be given special status with rules to protect its non-GM status. Special status of organic crops with respect to GM contamination would have additional significance for any economic liability rules that are established (see below). If the 0.9% threshold is accepted as officially tolerable, an organic farmer could find him or herself with a crop contaminated at 0.5% which they would be unable to sell as organic, but with no access to compensation.

### What should a co-existence regime involve?

The European Commission's Scientific Committee on Plants (SCP), has considered at what stages during the growing, harvesting and movement of crops GM contamination may occur and what levels may arise at each stage (see Table 1). This was undertaken as part of an exercise to determine what levels of GM contamination should be allowed in non-GM seed which would not lead to breaches of the labelling threshold.

**Table 1. Estimated average potential rates of contamination occurring at various stages during on-farm production<sup>12</sup>**

	<b>Oilseed rape (fully fertile)</b>	<b>Maize</b>	<b>Sugar beet</b>
<b>Seed</b>	0.3%	0.3%	0.5%
<b>Drilling</b>	0%	0%	0%
<b>Cultivation</b>	0%	0%	0%
<b>Cross pollination</b>	0.2%	0.2%	0%
<b>Volunteers</b>	0.2%	0%	0.05%
<b>Harvesting</b>	0.01%	0.01%	0.01%
<b>Transport</b>	0.05%	0.01%	0.01%
<b>Storage</b>	0.05%	0.05%	0.1%
<b>% achieved</b>	<b>0.81%</b>	<b>0.57%</b>	<b>0.67%</b>

The table illustrates the fact that, according to the crop concerned, contaminated non-GM seed, cross-pollination from a neighbouring GM crop, and the presence of volunteers (where seed shed from a crop grown in a field in the previous season, germinates and is a weed in the following crop), are the most important sources of contamination. A co-existence system will need to include:

- separation distances between GM and non-GM crops to limit pollen movement;
- seed which is not contaminated;
- management practices to control any volunteer GM plants;
- cleaning of equipment used for sowing, harvesting and transport of GM crops;
- record keeping about which fields have been used; and
- monitoring and policing to ensure that rules are followed and that contamination does not arise.

What the SCP did not consider systematically is the inevitable variation around contamination values at each stage of production. However, the SCP did point to some of the potential difficulties: *“With oilseed rape a problem in attaining the 1% threshold may arise if the influx of external pollen or volunteers are not adequately controlled. The 0.2% value for volunteers represents a scenario where good management practice has been followed, though values can be considerably higher.”*

During the farm-scale evaluations with GM herbicide-tolerant crops, a set of industry guidelines (the 'SCIMAC Guidelines') was developed<sup>13</sup>, intended to limit contamination to below 1% (the labelling threshold at that time). This approach is likely to shape initial discussion on any statutory co-existence system for the UK. The kinds of uncertainties and their impact in the three key areas - separation distances, seed purity and farm management regimes - are considered below.

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### Separation distances

Separation distances between GM and non-GM crops are intended to limit cross-pollination. Pollen can move between plants either on the wind or carried by insects. The distance pollen moves, and the extent to which it will fertilise other plants, depends on a wide range of biological and physical factors. Many of these relate to the characteristics of the crop itself, including the weight of the pollen and whether the crop tends to be self-pollinating or out-crossing. However, other factors such as how large the field of the crop is (affecting the volume of pollen produced), landscape, weather (especially wind speed and direction) and insect behaviour are also important.

Generally speaking, gene flow as a result of pollen movement and fertilisation is highest in an area closest to the crop and then declines with a very long 'tail'. This means, low levels of pollination (0.1-0.3%) can be found at quite long distances of several hundred metres and only decline very slowly. This makes it difficult to determine what distances will be required to restrict contamination to any particular level. Oilseed rape, which produces large volumes of pollen, transported by wind and insects, is particularly difficult. Table 2 shows the distances in the current SCIMAC Guidelines, together with examples of evidence showing how much further contamination may be found on occasions.

**Table 2: Separation distances as required under SCIMAC guidelines**

GM crop	Non-GM crop	SCIMAC separation distance (meters)	Contamination evidence
Maize	Sweetcorn	130	Purple grains of maize were detected in ears of yellow maize grown up to 1600 feet away (approx 500 meters) <sup>14</sup> . Data from the FSEs shows that the 80 meter separation distance usually delivers a 0.3% contamination level. <sup>15</sup>
	Fodder maize	80	
Oilseed rape	Fully fertile	50	Levels of over 0.5% contamination were detected at 200 metres in one UK farm-scale evaluation <sup>16</sup> . Pollen can be carried up to 26km and successfully fertilise other oilseed rape plants at low frequencies <sup>17</sup> .
	Varietal Associations – a hybrid system more susceptible to contamination	100	
Sugar/fodder beet	Sugar/fodder beet	6	Research into Italian wild sea beet has shown that genes from sugar beet can become established in wild sea beet populations that are 30-40km away <sup>18</sup> . Pollen does not move this distance all at once, but moves in steps over time.

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Because of all the factors involved, there will inevitably be situations where SCIMAC's separation distances do not provide the protection needed. For example, studies of maize gene flow in the farm scale evaluations illustrate this variability: *"In 2000, evidence of cross-pollination was found up to 200m from the GM crop in two of the three sites where samples at this distance were tested, and in one of these sites values on two of the transects were particularly high (0.42% and 0.14%).[...] to ensure contamination levels of less than 0.9% and 0.1% crops would need to be located at distances greater than 24.4m and 257.7m respectively."*<sup>15</sup>

The separation distances that are adopted will have a big effect on the places and extent to which GM crops could be grown and so are highly contested. The degree of precaution that is allowed for variation due to factors such as landscape and wind, will be a matter of deciding between competing GM and non-GM interests.

#### *Seed contamination*

Obviously, if the seed a farmer plants as non-GM contains some GM seed, it will compound any problems of contamination that may arise at a later stage. Europe is struggling to come to agreement on a regulation concerning seed purity. The Commission is intending to follow the advice of the SCP in its proposal, with levels of 0.3-0.5% contamination allowed according to the type of crop. This is going to be very difficult to agree between Member States because of the conflicting pressures from the biotech industry, and from the organic and consumer movements. However, it will be vital in determining the extent to which wider contamination is likely to occur and what other control measures are needed.

The SCP was asked to consider what threshold would allow the final food products to avoid the need for labelling, not what threshold was needed to protect the environment or health. Even low levels of contamination can result in large numbers of a GM plant being found in the crop. In an average 10 hectare oilseed rape field, at a 0.3% seed contamination level, 30,000 plants in the field could be GM. English Nature believe that for herbicide-tolerant crops, this would pose an environmental problem because additional weed control measures would be needed with consequent harm to farmland wildlife<sup>19</sup>. English Nature have called for contamination levels to be set according to the type of genetic modification involved rather than the type of crop.

Although seed production systems are more tightly controlled than normal crop production systems, with larger separation distances than those in the SCIMAC Guidelines, contamination of non-GM seed produced in North America is becoming a problem. In the USA, the Union of Concerned Scientists reported widespread GM contamination at levels of up to 1% in non-GM maize, oilseed rape and soybean seed<sup>20</sup>. In 2000, Advanta Seeds imported oilseed rape seed into the UK which was found to be contaminated with around 1% of GM<sup>21</sup>, and this was sown on approximately 4,700 hectares<sup>22</sup>. Systems for seed purity will have to be stringent and making allowances for contamination may ultimately make the production of GM-free crops impossible.

#### *Managing GM contamination*

According to the auditing of the SCIMAC Guidelines in the FSEs, the rules were followed by farmers although only FSE farmers were questioned and not neighbours. However, these Guidelines will now have to be revised to meet the new regulatory demands and realities that commercial growing would entail. There are real questions about the extent to which farmers will observe any rules put in place because they may not be practicable on a large scale. At the very least, there will be variation between farms. Oilseed rape volunteers are likely to form one particular problem. Research suggests that GM oilseed rape volunteers may remain and act as sources of contamination for more than 1% of non-GM crops for up to 16 years if not properly managed<sup>23</sup>. If volunteers are vigorously controlled, it can still take five years for contamination levels to fall below 1%.

#### **GM-free zones**

Because GM crops and foods have been very unpopular in many parts of Europe, there has been a move to establish GM-free zones. Ten regions in Europe: Aquitaine, the Basque Country, Limousin, Marche, Salzburg,

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Schleswig-Holstein, Thrace-Rodopi, Tuscany, Upper Austria, and Wales, have expressed their wish to be GM-free and have been supported by the Assembly of European Regions to preserve their 'local, traditional and organic produce'.<sup>24</sup> In the UK, over 80 councils have passed GM-free resolutions.<sup>25</sup>

In the Commission's Co-existence Guidelines, there is only provision for 'voluntary' agreements between farmers to reduce the potential for GM contamination. In the UK, the Government has said it hopes to produce advice for farmers on voluntary schemes. However, it is difficult to envisage how these will work in practice without leaving democratic institutions, such as County Councils and the Welsh Assembly, potentially powerless in the face of individual farmers who insist on growing GM crops. Some of the European regions wishing to be GM-free are developing co-existence plans so precautionary that they will effectively prevent GM production.

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### **Liability for contamination**

An important 'back stop' to coexistence rules is a system of liability to ensure that if the system fails, and a non-GM farmer finds his crop contaminated and loses economically as a result, he or she will be compensated. The AEBC's report on coexistence and liability showed that there is no means for economic losses to be claimed under existing law because such losses are not considered as 'harm'<sup>26</sup>. Therefore, a new system is required which recognises economic losses and ensures farmers are compensated without undue obstacles. Key questions about any regime that may be established include:

1. Who should be liable for economic damage?
2. What level of contamination should trigger compensation?
3. What defences should there be?

Public opinion is very sceptical about GM crops and foods, is reluctant to see early commercial growing here, and wants its choice to have non-GM food maintained. Compensation from the public purse is unlikely to be popular and the Government has already indicated that this is not an option. Placing liability on the GM farmer is also unlikely to be an acceptable solution, although this is the approach taken in Germany<sup>27</sup>. Contamination may arise from many different farms onto a single non-GM farm so the burden of proof that would be placed on the person suffering the loss could be extremely high and lead to direct disputes between neighbours.

Although seed companies selling the GM seed to farmers might seem well placed to accept liability because they will profit from the sales, there may be several seed companies using a gene or genes in their seeds and proving which particular seed company was involved may prove difficult.

The most practicable and just solution from GeneWatch's perspective, is to make liable the company holding the European marketing consent for the GM line involved. Under the new European laws, unique identifiers for GM crops, food and feeds have to be provided and contamination will, therefore, be able to be linked to this unique identifier. The GM crop may have been licensed to seed companies, but the consent holder would have the full information about this and could draw up contracts with seed companies and farmers to reclaim costs if they are shown to have acted negligently, or outside the terms of their contract. Importantly, this would also ensure that compensation was available in cases where unexpected or unpredicted contamination arises where it is not possible to attribute causation to one farmer or seed company.

Should compensation be triggered if contamination reaches the 0.9% level (when labelling would be required under EC laws) or at 0.1% (effectively zero)? Arguments for a lower level of 0.1% where it can be shown economic loss has

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arisen include the fact that:

- organic producers are clearly not allowed to use GM ingredients and would lose markets if systems are designed to operate at the 0.9% level; and
- food producers are working to this level for their conventional non-GM products and will require their suppliers to meet this.

Usually there can be 'defences' against being held liable. Someone could argue they had followed the law or that scientific knowledge at the time had not predicted that contamination would occur. This could leave the non-GM farmer carrying the loss. At such an early stage of the use of GM crops, experience is limited about how contamination may arise in practice. Therefore, some kind of protection is needed in the event of unpredicted events. Having the company that holds the consent as liable is one way of doing this, but there will also need to be provisions to ensure that the liability is strict and there are no unreasonable defences.

Insurance is not an option at this stage as insurers say they do not have the evidence upon which to estimate risk<sup>28</sup>. Not only does this underline the limited nature of our knowledge in this area and the need for caution, but it highlights the extent of losses they must consider possible. Therefore, a statutory liability scheme with the consent holders made liable is the only practicable solution.

### **Environmental liability**

As well as the potential for economic losses as a result of contamination of non-GM crops, GM organisms could cause environmental harm. Potential adverse effects include the genetic contamination of related wild species and impacts on ecosystems if the GM crop itself becomes invasive. Critical debate of environmental liability has been lacking and the Government has used this to avoid addressing the issue.

As the AEBC pointed out in its report, and the Government acknowledged in its response to the public dialogue<sup>29</sup>, whilst there may be unforeseen adverse effects on the environment, the EU Liability Directive would only cover specified habitats and species. For the vast majority of the UK's agricultural landscape and species there would be no requirement for remediation if harm arose through the use of GMOs. There is also no mechanism to claim reimbursement for this from those responsible unless a criminal act had been proven. The Government has merely said that it will respond to the AEBC's recommendations to address this gap in 'due course'.

### **Conclusions**

The Government will have to make some decisions about where the balance of interests should lie. Experience with growing GM crops in the UK's agricultural system is limited, public opinion is not supportive of commercial growing, and the organic sector is thriving. As well as the farmers considered here, bee keepers will want to have protection for their honey. It would seem to make sense to take a precautionary approach, with any growing of GM crops accompanied by careful monitoring to allow adjustments in either direction. This will need to be backed up by a strict liability system and provision for areas or regions to make themselves GM-free. Aiming to avoid contamination is the appropriate response in the current climate.

In developing the details of the co-existence regime, the Government must first decide what approach to take to seed purity in its negotiations in Europe. Allowing contamination at this stage not only rules out a truly non-GM sector, but will also limit the ability of farmers to restrict contamination below 0.9%, thus demanding much larger separation distances and more stringent field management. A decision to allow 0.9% contamination now could quickly become irreversible.

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A compensation system, funded by the biotechnology industry but independently arbitrated, which ensures that conventional and organic non-GM farmers are not penalised if GM contamination arises, is important. Without this, it will prove extremely difficult to develop public confidence in GM crops and foods.

In relation to environmental liability, GeneWatch believes that the Government has failed to act in the public interest in this area. Their laissez faire approach means the environment and society will inevitably pick up the bill for any harm that arises.

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