

Objecting to an Application to Trial GM Wheat in Hertfordshire

July 2011

Summary

Rothamsted Research in Hertfordshire has applied to conduct a field trial of genetically modified (GM) wheat in 2012 and 2013 (reference [11/R8/01](#) – see link for full application details). The wheat has been genetically modified to produce hormonal chemicals known as “alarm signals” to decoy aphids away from the crop.

Full details of how to object to this application are below. **The deadline for objections is 19 August 2011.**

Background

Rothamsted Research is one of the leading agricultural research institutions in the UK and has conducted GM crop trials in the past. The institute has been very supportive of GM technology for many years, including hosting and carrying out field trials for GM wheat in 1998-2001 and 2002-2005. (Defra 2003)

The Director of Rothamsted Research, Professor Maurice Maloney, has spent his entire career on GM technology. He was appointed in January 2010 having previously been Chief Scientific Officer of SemBioSys Genetics Inc, a biotechnology company he founded in 1994 based in Calgary, Canada. He was also responsible for developing strains of transgenic oilseed rape for Calgene.

The current GM wheat project has received over £1.28 million in public money via grants awarded by the Biotechnology and Biological Sciences Research Council (BBSRC).

Table 1 Grants from the BBSRC contributing to the development of GM wheat to be tested at Rothamsted Research

Grant reference	Title	Grant	Duration
BBS/E/C/00005010	A new generation of insect resistant GM crops: transgenic wheat synthesising the aphid alarm signal	£70,432	01/12/08 to 31/03/13
BB/G004781/1	Ditto	£732,112	01/12/2008 to 30/11/2013
BB/H017011	Design of aphid alarm signal, here: Design of bioactive sesquiterpene-based chemical signals with enhanced stability	£479,026	01/01/11 to 30/06/14
Total		£1,281,500	

Source: www.bbsrc.ac.uk/pa/grants/AdvancedSearch.aspx

The application

Rothamsted Research has applied to release GM wheat seeds into the environment in Spring 2012 and again in Spring 2013. The wheat variety Candenza (which is Spring sown) has been genetically modified to produce a hormonal chemical compound acting as an alarm signal to keep aphids away. This chemical is a pheromone, known as sesquiterpene (*E*)- β -farnesene (EBF), that aphids produce when they are being attacked by predators and parasites. This alarm pheromone causes other aphids to stop feeding, develop wings and move away from the source, which reduces the chance of their being eaten or parasitised. The chemical is also said to repel other

aphids about to infest the crop. In addition Rothamsted Research says the emission of EBF would be expected to attract predators and aphid parasitoids to the GM crop.

The crops would be harvested in August/September 2012 and 2013.

There are three main aphid pests of wheat in the UK:

- The bird cherry-oat aphid, *Rhopalosiphum padi*.
- The grain aphid, *Sitobion avenae*.
- The rose grain aphid, *Metopolophium dirhodum*.

These harm wheat in three main ways: by sucking sugars from the plant and reducing the amount available for growth and filling ears; by encouraging fungal infestation because their sugary exudates provide an ideal growth site; and by carrying infectious plant virus diseases, such as barley yellow dwarf virus. (HGCA undated) Conventional crops are walked regularly to look for aphid attack. Insecticides will be sprayed if aphid populations are above the threshold at which economic damage to the crop would occur and beneficial insects are not working the crop.

Virus diseases in cereals carried by aphids are more of a problem in Winter varieties of wheat and barley, and it is therefore surprising that Rothamsted Research have selected a Spring variety to genetically modify against these pests. Costs to UK farmers for controlling aphids in Spring sown cereals are lower than Winter varieties. Typically total insecticide costs in Winter crops amount to around 5% of overall pesticide costs for the crops (Nix 2009) or between £9 and £15 per hectare for Winter varieties, compared to around £5 per hectare for Spring varieties.

The two genes involved in the production of EBF being tested in this trial ((*E*)- β -farnesene synthase (EBFS) and farnesyl diphosphate synthase (FPPS)) have been chemically synthesised and “*are not found naturally*”. (see Part A of application section 12) The application says they are:

“[S]imilar to that found in peppermint (Mentha × piperita) and the enzyme encoded by the FPPS cassette has most similarity to that from cow (Bos taurus) but is generally ubiquitous and occurs in most organisms.”

This means the GM wheat contains synthetic genes with sequences closely resembling genes found in peppermint and cows.

Rothamsted Research’s decision to use a gene sequence for FPPS cassette that closely resembles a cow gene raises questions about the acceptability of such a move with the public. This is one step removed from directly using animal genes in genetically modified crop plants, which would surely trigger moral and ethical controversy.

The two genes (EBFS and FPPS) are placed in two separate constructs, both of which include genetic materials from a number of different organisms as promoters to regulate the expression of the pheromone genes, marker genes used to confirm if each plant contains the genes and other genes to ensure that the construct functions in wheat cells. Table 2 shows the origins of each part of the two constructs. The presence of two marker genes in each construct instead of one (for resistance to the antibiotic kanamycin and tolerance herbicide glufosinate ammonium) is unusual.

The genetic constructs carrying the EBF-producing genes were put in the genome of Candenza wheat using a ballistic projectile method of genetic modification (ie, coating tiny gold particles with the gene constructs and “shooting” them into the embryonic plant cells to attempt to integrate them into the plants’ chromosomes and genome).

The test site will be located at map reference TL 1213 on the Rothamsted farm and will be fenced for security reasons. The applicant says the trial will include eight 6x6 metre plots (288 square metres) planted with GM wheat events 2803R6P1 or 2812R9P1 plus eight 6x6 metre plots of non-GM (non-transgenic) controls. Each plot will be separated from each other by 10 metres (0.5 metre

space, nine metre barley, 0.5 metre space) and from the edge of the trial by 10 metres of barley (or space) plus a three metre pollen barrier of non-GM wheat. The applicant says the nearest cereal crop will be at least 80 metres away.

Table 2 Origins of genetic materials in the genetic constructs used for both pheromone genes

Function	Source organism for genetic material
Plasmid ¹ replication in E. coli	Escherichia coli bacterium
Plasmid replication in A. tumefaciens	Agrobacterium tumefaciens bacterium
Antibiotic resistance marker (Kanamycin)	Escherichia coli bacterium
Left and right hand borders sequences (of T-DNA)	Agrobacterium tumefaciens bacterium
Promoter for: constitutive expression of pheromone genes (ie, EBFS/FPPS constantly being produced throughout the plant)	Maize
Pheromone genes EBFS and FPPS	Synthetic (closely related to mint and cow)
DNA sequence to ensure EPFS/FPPS gene products (proteins) will target and interact with chloroplasts	Wheat
Terminator DNA sequence for pheromone gene (to indicate where the gene ends)	Agrobacterium tumefaciens bacterium
Glufosinate ammonium (herbicide) tolerance marker	<i>Streptomyces hygroscopicus</i> bacterium (stated to be inoperative in this construct)

Note 1. A plasmid is a particular strand of DNA capable of reproducing independently of the chromosomal DNA. Plasmids are commonly circular and occur naturally mostly in bacteria.

Other genetic modifications have altered plants to produce the EBF pheromone in an attempt to find a defense against aphids. Experiments using, for example, transgenic *Arabidopsis thaliana* plants (de Vos et al 2010 and Kunert et al 2010) show aphids become habituated to the EBF present (eg, they get used to it, like someone becoming able to sleep in a noisy place after a period of exposure to the sound), and that this happens quickly (within 3 generations). The conclusions from their research suggest that the interrelationship between plants, aphids and predators/parasitoids is probably rather complex, and that producing a GM crop that emits EBF continuously may not prove to be an effective means to control aphids. Kunert et al state in their conclusion:

“The lack of any defensive effect of EBF in this study might be due to the fact that natural enemy attack on individual aphids leads to a pulsed emission, but the transgenic lines tested continuously produce EBF to which aphids may become habituated. Thus our results provide no support for the hypothesis that plant emission of the aphid alarm pheromone EBF is a direct defense against aphids. However there is scattered evidence elsewhere in the literature suggesting that EBF emission might serve as an indirect defense by attracting aphid predators.

“The results of this investigation demonstrate that EBF produced continuously by transgenic A. thaliana does not act as a direct defense against aphids. The same conclusion might well be applicable to the continuous emission of EBF from other plants, though more studies are necessary. However EBF might still act indirectly against aphids via the attraction of natural enemies. Some aphid natural enemies have been reported to perceive EBF and be attracted by it [such as lady birds]... Further long-term studies are needed with EBF-emitting plants to determine if these enemies can effectively reduce aphid load on EBF-emitting plants or whether they get habituated or confused by constitutive EBF emission.”

There are a number of non-GM plants that produce EBF naturally, including peppermint. The above conclusion by Kunert et al suggests that more research utilising such plants is required to

test that the approach to aphid control proposed by Rothamsted Research is likely to be effective and that there is a good understanding of the ecological or agronomic consequences as well as requirements. There is no need for GM wheat were to be used to investigate the question posed by Kunert et al, even under contained conditions.

Grounds for objecting to the application

There many reasons the release of GM wheat should not take place. GM Freeze is calling on Defra to refuse the application.

1. Using genes with animal origins

Until now commercial GM crops entering the market have avoided using animal genes in their GM constructs. It would have been highly controversial if Rothamsted Research had opted to use the gene from a cow directly as the physical, albeit slightly altered, base for the construct instead a synthetic copy. The use of synthesised genes in this way therefore needs to be very carefully considered given there are, by Rothamsted Research's own admission, other options open to them. The decision to allow the use of synthetic animal genes should not be left to politicians, regulators and scientists but be based on the outcome of a public debate. The application should be rejected to allow such a debate to take place without any deadline imposed.

2. No market for the final product

GM wheat was trialled extensively around the world, including in the UK, until the early part of the last decade when widespread market rejection of genetic modification in cereals by farmers and consumers became obvious. Monsanto abandoned GM wheat research in the EU in 2004 (BBC 2004) and more recently sources in Canada (Canadian National Research Council 2011) and Australia (ABC 2011) report that there is significant opposition to restarting GM wheat development in both countries. In the UK retailers have maintained a strict policy against GM ingredients in food since 1998, and there is no sign this will change. Using GM wheat to feed livestock would be a disaster because the presence of GM in EU feed wheat would cause huge disruption and costs for the grain trade to ensure that milling wheat (for food) remained GM-free. The strong likelihood is that the EU market will reject GM wheat for the foreseeable future, so the public expenditure on the proposed trial at Rothamsted cannot be justified, especially in the present crisis in public finances.

3. Premature move to field testing

The recent scientific paper on *Arabidopsis thaliana* suggests that the genetic modification of wheat to produce the EBF pheromone could be more complex than implied by the applicant and that there is room to doubt whether the GM wheat will have the desired effect on aphids. In addition there is evidence that the ecological consequences could be quite complex. The proposed GM field trial is therefore premature, and future research to address these uncertainties should be carried out in the first instance with non-GM plants naturally producing EBF. Such research should also include options for using EBF without the use of genetic modification, as described above.

4. Risk of outcrossing

Rothamsted Research makes a number of proposals to reduce the risk of the GM wheat outcrossing to neighbouring commercial wheat crops or other experimental crops on their land. Rothamsted Research states, "*Wheat is a self-pollinating crop with very low rates of cross-pollination with other wheat plants.*" However Rothamsted Research also states that wheat does outcross to other wheat plants at a rate "*usually less than 1%*", but add, "*[u]nder certain growing conditions individual genotypes may have outcrossing rates of up to 4-5%.*"

If outcrossing caused a GM presence of 0.09% or more in neighbouring non-GM wheat, the crop would need to be labelled as GM under EU Regulation 1831/2003. An organic crop would lose its certification in these circumstances. GM levels between zero and 0.09% may also affect the market and price received for the contaminated crop due to current retail policies on GM ingredients, many of which require that no GM is present. Any GM contamination of wheat has the potential to cause considerable economic harm throughout the food web.

A number of studies have shown outcrossing at significant levels between different non-GM varieties, some over 6% (Huc1 1996) and some at distances up to 42 metres. (Hansen 2005) Pollen was carried by the wind and on air currents (wheat is wind pollinated and pollinating insects usually play no part). Outcrossing rates are dependent on the weather and on the variety of wheat, so without specific testing outcrossing rates should not or cannot be assumed. (Hansen 2005, Huc1 1996) Rothamsted Research presents no data on the outcrossing potential of Cadenza in different environmental conditions, and therefore its true potential for outcrossing is not known.

According to the GM wheat application there is a small risk that the GM wheat could outcross to relatives in the grass family, which in the UK are noted as being from the genus of *Elytrigia* and *Elymus*. Attention should be on two species in the genus *Elytrigia* – *Elytrigia repens* (common couch) and *Elymus caninus* (bearded couch). The former is already an extremely troublesome weed in cereal and other arable crops, as well as in many other crops and gardens, the application should be refused to remove the chance of outcrossing occurring. A chance crossing between the GM wheat and a couch plant would result in glufosinate ammonium resistance developing in couch as a consequence of the presence of the marker gene and potentially an increased fitness due to reduced aphid attack (if the trait is performing according to design).

Before the UK trials of GM oilseed rape began it was stated that cross-pollination between the crop and the common arable weed charlock (*Sinapsis arvensis*) was impossible under field conditions. Yet during the Farm Scale Evaluations from 2000-2003 such a cross did occur. (Centre for Ecology and Hydrology 2005) This demonstrated that rare events do occur under natural conditions. The creation of a population of glufosinate ammonium resistant couch could cause serious agronomic problems for farmers in the long term and lead to an increased use of herbicides to control it.

5. Gene transfer via seeds

A number of wildlife species, such as house sparrows and mice, are known to feed on ripening wheat grains or grains shed on the soil surface. The applicant mentions this possibility (“*but possible by wildlife*“, paragraph 6 in Part A of the application), but makes no provision to prevent GM seeds being removed off the site by wildlife species and deposited in places where contamination of crops or seed lots may take place.

6. Food safety

Although the applicant states that none of the GM crop will enter the food chain, food safety should be taken into consideration in assessing the application. Firstly human error or unforeseeable events may lead to the accidental inclusion of the GM wheat in the food or feed chains, either directly or indirectly through contamination of non-GM wheat crops via outcrossing or seed mingling. Second there would be no point in permitting a crop that would eventually be refused approval for commercial growing because it is unsafe to eat. There are a number of concerns including:

The presence of Antibiotic Resistant Marker genes (ARMs)

The GM wheat contains two copies of a kanamycin resistance genes used as genetic markers. The EU phased out markers for antibiotic resistance because they may have “*adverse effects on human health and the environment*”. (EU Directive 2001/18 Article 4.3) Phasing out in the case of test sites was by December 2008.

The European Medicines Agency (2007) commented on the use of kanamycin resistant genes in GM crops, expressing concern that the aminoglycosides group of antibiotics, which includes kanamycin, could become more important in the future if antibiotic resistance to other groups of antibiotics increases. The Agency pointed out that kanamycin is currently used to treat bacterial infections, including tuberculosis, in cases where other antibiotics fail due to the development resistance in the pathogens. Kanamycin is in clinical use.

There is a clear risk that the kanamycin gene from the GM wheat could transfer horizontally into harmful bacteria rendering the pathogenic microorganisms resistant to this group of antibiotics and reducing the options for successful antibiotic treatment of serious illnesses and infections. The risk

for horizontal gene transfer is greatly enhanced due to the extensive presence of bacterial sequence homologies and the origin of replication sequences, as also acknowledged by the applicant.

The use of the kanamycin resistance gene in the GM wheat is unnecessary for the purposes of the trial. The presence of the kanamycin resistant gene would present a major barrier to the GM wheat obtaining an EU marketing approval, if it ever progresses to that point, since there is widespread concern among EU Member States.

Impacts from the genetic modification events

The applicant states:

- *“We have not analysed the position or the structure of the insertion nor sequenced the flanking genomic DNA”.* (part A paragraph 14)
- *“We have not specifically investigated genetic or phenotypic stability of these lines”.* (Part A paragraph 17)
- *“There appears to be no published toxicity or allergenicity data for EBF but at the levels expected to be generated by these plants and because they will not enter the food or feed chains, we consider the potential toxic or harmful effects to be negligible”.* (Part A paragraph 19)

Despite the substantial lack of data the applicant is happy to pronounce the GM wheat safe for human consumption. This opinion is also partly based on the expressed assumption that the GM wheat or its traits or its genetic modifications will under no circumstances end up in the food and feed chains.

This ignores the fact that there is no information on any impacts caused by the genetic modification of the two GM wheat events, for instance the effect on the gene expression of the wheat's own genes. Wheat is known to cause intolerance problems in many people (in the UK 25,000 people suffer from Coeliac disease, gluten intolerance, BMA 1990), some with serious health consequences, such as wheat-dependent exercise-induced anaphylaxis.

As wheat can have a significant health impact on a minority of people any potential changes to the composition, expression or shape of normal proteins arising from the GM events should be investigated before further development is permitted.

Unpredicted effects

The applicant states:

*“Except for the emission of EBF, all aspects of the phenotype of events 2803R6P1 and 2812R9P1 including morphology, pollination and seed-set **appear** to be identical to non-transgenic control wheat plants.”* (Part A paragraph 16)

This statement (and the statement of paragraph 19) is purely assumption and ignores the body of scientific research and evidence regarding the presence of unpredicted effects due to the genetic modification of a plant.

For example it is well recognised that the introduction of genes and genetic sequences via genetic modification commonly leads to mutations in the plant, in particular when using particle bombardment. It is also widely recognised that the interaction between the introduced genes or with the plant's own genes can give rise to unpredicted effects of both qualitative and quantitative nature, including antagonistic, additive or synergistic effects. Neither these effects nor their consequences can be predicted from the gene sequence introduced into the plant.

No data on toxicology and allergenicity

As mentioned above, the applicant states:

“There appears to be no published toxicity or allergenicity data for EBF but at the levels expected to be generated by these plants and because they will not enter the food or feed chains, we consider the potential toxic or harmful effects to be negligible.” (Part A paragraph 19)

The applicant also states, *“Some seeds from the GM and control plots will be conditioned, threshed and stored in appropriate GM seed stores,”* (part A paragraph 33) and, *“A sample of plants will be hand-harvested, conditioned and threshed to supply seeds for the following year’s trial or research purposes.”* (Part 4 paragraph 36) Clearly part of the first GM crop will be harvested and stored, and therefore human errors could result in accidental contamination of non-GM seeds.

The applicant also states that no wheat from the trial site will be consumed, although experience from other countries confirms that contamination of food and seed from GM test sites does occur. For instance in the US experimental test crops have led to unapproved GM traits entering the food chain, including Bayer’s LL601 GM long grain rice (USDA undated) found in 2006 as a contaminant in non-GM exports from the US to many countries around the world. This led to import bans, very significant financial losses for the US rice industry and a series of court actions. (GM Freeze 2010) No food safety risk assessment for the LL601 trait was available at the time of the contamination. The contamination was not detected in commercial rice crops until five years after the experimental trials were completed in 2001.

Similarities between the LL601 case and the GM wheat trials proposed by Rothamsted Research are obvious. The lack of any food safety data or risk assessment of the GM wheat could cause similar problems if contamination occurred or if any GM seed were to contaminate non-GM wheat seed lots eventually were used for commercial production.

7. Environmental Impacts

The applicant states, *“The survivability of these plants in unmanaged systems may be affected by their ability to modify the behaviour of aphids and their parasitoids or predators.”* (Part A paragraph 16)

The GM wheat might change aphid behaviour by diverting aphids in greater numbers onto neighbouring non-GM crops. This could result in use of aphicides on the non-GM crop when none would have been required otherwise because critical aphid population levels that would cause economic harm would not have been reached.

Predators and parasitoids may be drawn to the GM crop believing the presence of EBF signifies the presence of prey. This may divert them from non-GM crops where there is a significant aphid population in need of control and result in more harm to the crop than may have been caused otherwise. This type of effect may impact more on organic cereal farmers who rely on natural predators and parasitoids to keep aphids under control, but any farmer who chooses not to use GM wheat would be at risk.

Understanding of how aphids and their predators/parasitoids will react to the EBF produced by GM wheat is very limited, and the design of the experiment proposed for 2012 and 2013 does not fully address these issues or any other possible environmental impacts. There is an overwhelming case for further studies to be conducted using non-GM plants to enable the possible interactions to be studied. Such studies may also produce information on non-GM options for using EBF.

The design of the experiment proposed for 2012 and 2013 does not address these issues or any other possible environmental impacts.

Nor is there any mention in the application of any potential impact on soil-dwelling organisms caused by the release of the pheromone (eg, via the roots) or of any other genetic changes of the

wheat. One of the breakdown products of EBF is said to be acetone (part A paragraph 19), which may well impact soil organisms in the root area of the plant and change the composition of the soil food web.

In addition these plants possess the ability to tolerate glufosinate ammonium-based herbicides, which would increase their survivability in environments where these herbicides are the only ones used.

There is also a possibility that in the future the presence of the glufosinate ammonium tolerance gene could be used as an agronomic trait in a commercial variety to make it attractive to farmers wishing to control weeds in cereal crops. The results of the UK's Farm Scale Evaluations (FSE) clearly showed that GM herbicide tolerant Spring and Winter oilseed rape with tolerance to glufosinate ammonium had a significant impact on the flowering plant species in arable fields compared to the current herbicide regime used on conventional crops. This would also have a significant impact on numbers of arable weeds and insects, which forms a vital food resource for farmland wildlife and would harm many species. (Heard et al 2003a, Heard et al 2003b and Roy et al 2003) Furthermore the development of a dependence on glufosinate ammonium for weed control in cereals could lead to the development of weed resistance in major arable weeds leading to an escalation in herbicide usage and costs, as has happened in Roundup Ready crops in the US and South America. (Duke & Powles 2008 and Binimelis et al 2008)

Non-GM alternatives to control aphids

Predators and Parasites

There are many alternative approaches to managing aphid populations on cereal crops that do not involve the use of aphicides (insecticides) or genetic modification. Indeed some have been developed and trialled at Rothamsted Research. (Powell et al 2004) The key is to maintain high levels of predators and parasitic wasps, which attack aphids in arable field margins and encourage them to move into the middle of fields. The first essential step is to provide a diverse habitat rich in pollen and nectar near fields as a continuous supply of food and shelter for predators and parasitoids when no aphids are present on the crops.

Predators of aphids include ladybird adults and larvae, hoverfly larvae, lacewing larvae, spiders, ground beetles and rove beetles. Parasitoids of aphids are mainly small parasitic wasps that lay eggs in aphids and the developing larvae use them as a source of nutriment. Common aphid parasitoids can parasitize up to 500 aphids in a season (Snyder and Ives 2003), and individual ladybirds have been shown to feed on up to 33 aphids per day. (Colfer and Rosenheim 2001)

Research has shown that creating a complex landscape can increase the numbers of parasitoids because there are sources of nectar for adults to feed on before laying their eggs in aphids, but this type of mixed habitat and arable field may also provide over-wintering sites for cereal aphids. (Roschewitz et al 2005)

The Defra-supported SAPPIO LINK project 0915, CSA 5462 investigated several aspects of aphid biological control and management. As well as providing suitable habitat for predators and parasitoids to survive when there are no cereal aphids, the project also trialled the use of pheromones to attract parasitoids to the cereal field. (Powell et al 2004)

Data from a controlled experiment in Winter wheat shows the potential for effective aphid control using populations of predators and parasitoids (Schmidt 2003):

“Aphid populations were 18% higher at reduced densities of ground-dwelling predators, 70% higher when flying predators and parasitoids were removed, and 172% higher on the removal of both enemy groups”.

Conventional plant breeding

EBF occurs naturally in plants as well as being produced by aphids as a warning signal. According to the GM wheat application trace amounts are even produced by wild type wheat. (Part A paragraph 19) This opens the possibility that this trait could be bred conventionally into modern varieties of wheat using advanced techniques, such as Marker Assisted Selection, provided the necessary research was undertaken to avoid impacts of other parts of the agroecosystem or on neighbouring crops.

Manufacturing the EBF

As mentioned above it is possible to synthesise copies of pheromones. It is not clear if Rothamsted Research have tried this option for EBF, as has been done for pheromones to attract parasitoids into crops. (Powell et al 2004) If it proves possible, the pheromone could be deployed if early warnings of high aphid populations (currently an early warning system is operated by the Home Grown Cereal Authority¹) were received to divert them away from the crop. This technique could be available to all farmers. It would potentially remove any justification for genetically modifying wheat and thereby avoid major market barriers presented to cereal farmers by GM wheat.

Companion Planting

Rothamsted Research has already identified peppermint as a plant that naturally produces EBF pheromone. One technique often used in agroecological farming systems is companion planting (eg, growing a second crop alongside the main crop to produce chemical signals that push pest away from the crop). Indeed Rothamsted Research has pioneered this technique, in collaboration with colleague in Africa, to develop the push-pull technique for dealing with maize pests (Rothamsted Research undated).

Want to object?

If you wish to object the application reference number to quote is [11/R8/01](#).

Deadline for objections is 19 August 2011.

Points to make in your objection to Rothamsted Research's Application include:

- There should be a broad public debate on the use of synthetic copies animal genes in crop plants before any further research is permitted.
- There is currently no market for GM wheat in the UK, EU or elsewhere.
- More research is needed into whether the continuous production of EBF in general, and by wheat in particular, will be effective in controlling cereal aphids in the long term. Such research can and should be carried out with non-GM plants naturally producing EMF, such as peppermint.
- The GM wheat may be substantially different from its non-GM parent due to the impacts of the genetic modification, for instance there could be altered allergenicity and toxicity. There would be no point in trialing a crop that could later prove to be unsafe.
- The applicant admits having no basic data about any genetic changes arising from the GM events or any toxicity or allergenicity data of the chemicals to be produced by the wheat plant.

¹ See

www.hgca.com/cms_publications.output/2/2/Publications/Publication/Aphid%20advisory%20alerts.msp?fn=show&pubcon=6036

- The presence of the marker genes for resistance to kanamycin brings an unacceptable risk that the gene may horizontally transfer to pathogenic bacterium thereby rendering the antibiotic ineffective against some diseases. The application should be rejected for this alone in line with EU law.
- There is no proper environmental impact assessment of the potential direct and indirect or long-term impact of the aphid alarm pheromone on target and non-target organisms and on the environment, including in the soil.
- The impacts of the aphid pheromone EBA on prey and predator behaviour are not fully addressed.
- The glufosinate ammonium tolerant marker gene could, at any stage, be used as an agronomic trait in a commercial variety to allow this herbicide to be used on a growing crop to kill off weeds. This would increase the risk of indirect harm to non-target species and potentially lead to the development of resistant weeds, which would require more herbicides to control them and with that an increase on the toxic burden on the environment.
- Alternative approaches to controlling aphids which fit into an agroecological model of farming have not been fully explored despite showing considerable potential.
- Any unspent funds from the £1.28 million of public money allocated to the GM wheat should be used to research agroecological based solutions to aphid control on cereals, and no further money should be wasted on developing and testing false solutions.

Send your Objection (**stating the application reference number above, by 19 August 2011**) to:

GM Team, Department for Environment, Food and Rural Affairs
Area 8A, 9 Millbank
c/o 17 Smith Square
London SW1P 3JR

Or email: gm-regulation@defra.gsi.gov.uk

Please also send a copy to your MP and ask her/him to question Defra directly. You can find your MP and contact details at www.writetothem.com. Thank you for taking this important action.

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