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PVRO and Seeds Division
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MAFF consultation on adventitious presence of GM seeds in seed of conventional varieties

Thank you for consulting English Nature over the working paper published by the European Commission on the adventitious presence of GM seeds in seed of conventional varieties. We are replying on behalf of the British statutory nature conservation agencies - the Joint Nature Conservation Committee, English Nature, Countryside Council for Wales, and Scottish Natural Heritage.

Should you require any further information or clarification, please do not hesitate to contact us. On matters of detail, please contact myself or Dr Brian Johnson at our Taunton office. Address: Roughmoor, Bishop's Hull, Taunton, Somerset TA1 5AA. Tel: 01823 283211. E-mail: anna.hope@english-nature.org.uk or brian.johnson@english-nature.gov.uk

Yours sincerely

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MAFF consultation 16 Jan 2001

Adventitious presence of GM seeds in seed of conventional varieties

Response on behalf of the British Statutory Nature Conservation Agencies

Prepared by the Biotechnology Advisory Unit, English Nature

April 2001

The British Statutory Nature Conservation Agencies are concerned solely with the potential effects of GM crops on the natural environment, not with matters of human health and safety, or with trade issues.

Introductory note

The use in the working paper of the terms 'GM' and 'conventional' as blanket terms implies that the only aim of the proposed legislation is to prevent GM seeds from contaminating non-GM seed batches and foods. The implication is that the presence of one type of GM seed within a batch of another type of GM seed would be acceptable. Our view is that this is unacceptable on environmental protection grounds, since risks of novel combinations of transgenes arising from accidental cross-pollination between two GM crops are not assessed in EU regulatory systems, and are therefore unknown. To distinguish between transgenes which are intended to be present in a crop variety and those which are adventitious, we will refer in this document to 'transgenic impurities' rather than 'GM seed', and recommend that the working paper should be revised to adopt this terminology.

We are concerned about adventitious presence of *transgenic impurities* in seed of conventional *or other GM varieties* for the following reasons:

?? Inclusion of even small quantities of transgenic impurities in batches of non-GM seed, or GM seed containing other transgenes, could lead to stacking of transgenes in crops or crop/native hybrids
?? The agronomic and ecological impacts of cumulative transgene stacking are poorly understood, mainly because insufficient research effort has been made into this matter

Response to specific points in the working paper:

1) We strongly support the complete prohibition of *transgenic impurities* where the transgene construct is not covered by a part C authorisation. Without a full risk assessment having been conducted in the EU, the potential ecological effects of releasing such transgenes would be unknown.

2) We see the use of a specified tolerance threshold for *transgenic impurities* covered by a part C authorisation as unacceptable. This may make sense in the context of food labelling regulations, where a threshold of 1% GM material is currently permitted, but it does not make sense in the context of environmental protection, and it could undermine the effectiveness of the regulatory system.

If a threshold quantity were allowed of GM seeds that had received marketing approval, then it would be possible for the contamination" to be composed of more than one transformation. In the immediate future these could include a mixture of herbicide tolerances, but in the longer term these traits could be combined with transgenic insect, fungus and virus resistances. Growing such plants as mixtures within crops would inevitably lead to uncontrolled gene stacking emerging in volunteer populations. This has already happened in Canada, where rape tolerant to two GM and one non-GM herbicide tolerances was grown in adjacent fields, giving rise to triple tolerant volunteers in the second year. We are concerned about stacking of herbicide tolerances because this may lead to farmers using more herbicides to control volunteers, especially in wildlife-rich field margins, potentially resulting in increased damage to biodiversity. Canadian farmers are having to resort to older, more environmentally damaging herbicides such as 2,4D to control volunteers with stacked HT transgenes.

For those crops which are sexually compatible with native plant species (for example oilseed rape can hybridise with several native brassica species, and beet crops are conspecific with wild beets) there is a risk that transfer of stacked transgenes from volunteers could affect the fitness of hybrids. This could lead to disruption of native ecosystems or to the development of weediness in native species. Little research has been conducted into the impact of stacked

genes in native plant populations so quantification of such potential effects is not yet possible. Transfer of stacked genes is a potential problem which may prove intractable within the existing regulatory system, where risk assessment is conducted on a case-by-case basis and does not appear to extend to cumulative effects of gene stacking. For instance, there is no agreement within the regulatory system about the maximum number or type of herbicide tolerance transgenes that will be allowed to be released into the environment.

In the UK, the SCIMAC guidelines for management of herbicide tolerant crops attempt to set out ways in which farmers growing GMHT crops can reduce the likelihood of these problems occurring. In self-pollinating crops, and crops where seed is not saved, and volunteers are not produced, no additional measures are expected to be necessary since gene flow is likely to be negligible. However, in outcrossing crops, and those where seed is saved and volunteers are produced, the allowance of 0.3% GMHT seed in conventional oilseed rape or beet seed batches would undermine farmers ability to manage for these problems. The likely enhanced persistence of GMHT volunteers/wild relatives in and around agricultural fields would make it even more likely that these plants would be able to cross-pollinate with other GM varieties which might be grown in future years. Beet is a particular case in point: although the consumed product is not derived from cross pollination and so gene flow during production is not an issue in terms of food labelling, gene flow from crops containing transgenic impurities via bolters to weed beet populations in and around fields could lead to stacking of genes in weed beet which could eventually cause significant agronomic and perhaps ecological impacts.

A recent report by the EU Scientific Committee on Plants (see Annex 1) concludes that the presence of unauthorised transgenic material in seed batches is inevitable, especially in hybrid seed which is particularly vulnerable to cross-pollination from volunteers or neighbouring crops. For the reasons outlined above we believe it is essential that measures to restrict gene flow from transgenic crops into seed production fields are put in place before commercial production of such crops is permitted in the EU. Assuming that a level of 0.3% transgenic impurity is achieved in seed batches, Table 1 of the report shows an estimated transgenic impurity of 0.2% arising from cross pollination from neighbouring fields, and another 0.2% arising from volunteers during farm production of oilseed rape, so even before harvest, oilseed rape seed could contain transgenic impurities from at least three different sources, and at a higher level than that permitted by the seed impurity legislation. Following harvest of oilseed rape, around 30,000 seeds m^{-2} can be left on the ground. If only 0.5% of these have multiple herbicide tolerance, 150 of these plants per m^2 could become volunteers. In the following year these plants, especially those left in field margins, could interbreed causing even more transgene stacking. The SCP report suggests that such problems could be minimised by stringent weed and volunteer control strategies within the crop and in field margins. However, such strategies could undermine current MAFF biodiversity targets (in particular the Public Service Agreement on Farmland Birds) since unsprayed field margins and conservation headlands are a crucial element of agri-environment schemes such as Arable Stewardship.

Therefore, for many crops, recommended management practices (such as are described in the SCIMAC guidelines) are extremely unlikely to be sufficient to prevent gene stacking. The current generation of transgenic crops have been rather crudely designed and no attempts have been made to engineer genetic isolation mechanisms into them (such as those described in ACRE's recent "best practice" report - see Annex 2). This is technically feasible using a number of mechanisms such as seed and flower sterility genes, control of flowering and fertility and pollen incompatibility. Several research institutions are working on new methods of achieving genetic isolation and some methods are already in practicable form. Genetic isolation of GM crops may not be needed in all circumstances, but would be desirable where there is risk that transgene flow could have adverse agronomic or environmental consequences. Without such mechanisms in place, transgene stacking is inevitable in European crops. The rate of stacking would be accelerated if GM "contamination" levels were accepted as normal and protected by legislation such as that put forward in this consultation.

3) The proposed separation times between cultivation of a GM crop and seed production in the same field seem to be adequate. However, because cross-pollination could also adversely affect seed production, crops grown in previous years in neighbouring fields should also be taken into consideration. For example, oilseed rape seeds and pollen are highly mobile and volunteers in fields adjoining seed production fields could cause significant transgenic impurities, especially in hybrid seed production.

4) From the perspective of potential impacts on wildlife, *rates* of gene flow are relatively unimportant, in the sense that we would expect some cross-pollination to occur in sexually compatible species, no matter how large the separation distance. Research has shown that the frequency of cross-pollination is rather unpredictable, and is affected by stochastic factors such as weather conditions and insect activity. We therefore take the view that crossing between GM crops and non-GM varieties will occur no matter what separation distance is imposed. We are far more concerned about the outcome from cross-pollination events than the frequency of events. Where transgene stacking has the potential to occur, the level of outcrossing should be maintained at zero, and where this is not possible using spatial isolation, genetic isolation is likely to be the only answer.

5) In line with the above comments, packages of non-GM seed should be labelled "transgenic impurities not present". Packages of GM seed should likewise be labelled "genetically modified variety" other transgenic impurities not present".

Annexes

1. *Opinion of the Scientific Committee on Plants concerning the adventitious presence of GM seeds in conventional seeds. (Opinion adopted by the Committee on 7 March 2001)* Scientific Committee on Plants report SCP/GMO-SEED-CONT/002-FINAL, 13 March 2001.

2. *Guidance on Principles of Best Practice in the Design of Genetically Modified Plants.* Advisory Committee on Releases to the Environment: Sub-group on Best Practice in GM Crop Design. Department of the Environment, Transport and the Regions.