DEFRA Consultation 02/03-165

Commission proposals on thresholds for the adventitious presence of approved GMOs in seeds.

Response on behalf of the British Statutory Nature Conservation Agencies

Prepared by the Biotechnology Advisory Unit, English Nature

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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.

General comments

The use in the proposals 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 proposal is silent on regulation of the adventitious presence of one type of GM seed within a batch of another type of GM seed. We contend that this issue is as important as the presence of GMOs in conventional seeds, since risks of novel combinations of transgenes arising from accidental cross-pollination between two GM crops are in our view not fully assessed in EU regulatory systems, and may not yet be fully understood.

We are concerned about adventitious presence of transgenic impurities in seed of conventional or other GM varieties for the following main 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 put into this matter.

?? Adventitious presence of transgenic varieties may require farmers to change agricultural practice, especially when such varieties contain pesticide tolerance traits. Changes in agricultural practice (for example to control GM volunteer plants) could result in adverse impacts on farmland biodiversity and could prevent some farmers being eligible for agri-environment schemes.

Response to specific points in the proposals:

a) Presence of unapproved GMOs

We strongly support the 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, even in small numbers of plants, would be unknown.

b) Maximum thresholds

We see the proposed tolerance thresholds for transgenic impurities covered by a part C authorisation as unacceptable. These levels may be logical in the context of food labeling regulations, where a threshold of 1% GM material is currently permitted, but have not been derived from the needs of environmental protection, and could undermine the effectiveness of the regulatory system in preventing undesirable gene flow.

At the stated threshold levels of a single approved GM variety in conventional seed, farmers could unknowingly sow many thousands of GM seeds in each field. For oilseed rape sown at 8kg/ha we calculate that, at the allowable limit of 0.3% adventitious presence, up to 10,000 GM seeds per hectare could be inadvertently sown. Neighbouring farmers might also sow either the same or different transgenic seed without knowing either how many GM seeds are present or which transformation is in the seed batch. Volunteer plants containing single or multiple transgenes could be produced in this realistic situation. If the transgenic varieties were herbicide tolerant then farmers may be unable to use specific herbicides such as glyphosate and glufosinate for pre-emergence weed and volunteer control and may be forced to use older and less environmentally benign substances such as paraquat (which is toxic to hares) and 2,4 D.

If a threshold quantity were allowed of GM seeds that had received marketing approval, then, under these proposals, it would be possible in future (assuming that several GM varieties of a crop receive marketing consent) for the transgenic impurities to be composed of more than one transformation. In the near 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 and perhaps quality traits or pharmaceuticals. Inadvertently growing such plants as mixtures within conventional (or GM) 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 has been grown in adjacent fields, giving rise to triple tolerant volunteers in the second year. These stacked gene volunteer plants are now widespread on the Canadian prairies. 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 sea and weed beets) there is a risk that transfer of stacked transgenes from volunteers could affect the fitness of hybrids with wild plants. This could lead to disruption of native ecosystems or to the gradual 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 that may prove somewhat intractable within the existing regulatory system, where risk assessment is conducted on a case-by-case basis and does not yet extend to cumulative effects of gene stacking. For instance, there is no overt agreement within the regulatory system about the maximum number or type of herbicide tolerance transgenes that may be released into the environment.

We recommend that the UK aims for levels of transgenic impurities in conventional seed that are near zero. We realize that at present (in the absence of genetic isolation mechanisms being built into GM crops) this is probably unattainable, but the levels set in the Commission's proposals are far too high. According to paragraph 5 of the preamble of the draft, they are derived solely from the target levels in food with no obvious regard to the implications for environmental and agricultural impact. We strongly recommend that the UK government responds to the Commission with proposals for lower thresholds, set at levels that would be attainable during seed production. With effective separation in time and space, we believe that seed producers could attain levels of transgenic impurities an order of magnitude lower than those proposed, without incurring prohibitive costs. Setting stringent but attainable targets would have the additional benefit of encouraging the development of genetic isolation mechanisms in crops used for seed production. We also recommend that the transgenic content of all seed batches, whether within or outside thresholds, is clearly identified and labeled. This would ensure that growers would be able to plan environmental and agronomic management in advance of sowing.

c) Codes of good practice

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 the problems outlined above 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 could 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. We are not confident that 'codes of good practice' either for cultivation of transgenic varieties or for the avoidance of adventitious presence of GM seed in conventional seed production as outlined in these proposals would be effective. In our experience all evidence points to farmers largely ignoring such codes in the past (for example for straw burning and safe pesticide use), leading eventually to the need for primary legislation.

A recent report by the EU Scientific Committee on Plants[1] concludes that the presence of unauthorised transgenic material in seed batches is inevitable, especially during hybrid seed production, which is especially vulnerable to cross-pollination from volunteers or neighbouring crops. For the reasons outlined above we believe it is essential that legislative measures aimed at setting standards to minimise 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, up to 30,000 seeds m^{-2} can be left on the ground, of which a significant proportion could in future have multiple herbicide tolerance. 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 DEFRA 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. If stringent volunteer control becomes essential in the future, then farmers would find compliance with agri-environment schemes increasingly difficult.

In our view, for many crops, recommended management practices (such as are described in the SCIMAC guidelines) are very unlikely to be sufficient to prevent gene stacking, although there could be some reduction. The present generation of transgenic crops has 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 [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 significant risk that transgene flow could have adverse agronomic or environmental consequences. Without such mechanisms in place, under these proposals from the Commission, transgene stacking is inevitable in European crops. The rate of stacking would be accelerated if GM threshold levels were accepted as normal, protected by legislation such as that put forward in this consultation.

We recommend that any codes of good practice applied to seed production should be embodied in law and contain provisions to encourage genetic isolation mechanisms at the molecular level where appropriate.

d) Separation of GM and conventional crops during seed production

In the original working draft there were specific separation times between cultivation of a GM crop and seed production in the same field, and specific separation distances specified between conventional and GM crops for seed production. These appear to have been replaced by a general requirement for 'good practice', which is not defined. For the reasons stated above, we are not convinced that this general requirement will work in practice to deliver the threshold objectives set out in the proposals. We strongly recommend that separation times and distances are reinstated to help define basic good practice within each relevant Directive affected by this proposal.

References

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.