The Prime Minister's Strategy Unit –
The Costs and Benefits of Genetically Modified (GM) Crops
A submission by the Agricultural Biotechnology Council

The Agricultural Biotechnology Council (abc) was formed from the companies involved with the development of agricultural biotechnology, namely Bayer CropScience; BASF; Dow AgroSciences; DuPont; Monsanto, and Syngenta, to extend its information and education activities through a new knowledge and resource service.

The industry recognises that the introduction of crops and foods made with biotechnology has raised concerns in the UK. The industry is committed to safe and responsible development of this technology. We also recognise that the success of any new technology needs to be based on respect for public interest, opinions and any concerns.

Its objectives are thus:

- To promote a reasoned and balanced debate about the use of agricultural biotechnology in the UK.
- To work with all interested stakeholders to provide a source of information and learning on agricultural biotechnology.
- To play an active role in the public debate, providing information, taking on board opinions and addressing any concerns.
- To encourage and share more research to ensure a better understanding of the benefits that agricultural biotechnology can offer the UK.

abc welcomes the balanced approach that the Strategy Unit is adopting and believes that full assessment of all scenarios regarding the impact of biotechnology crops on 'industry and science', 'environment and human health', 'developing countries' and the 'product supply chain' will provide a very positive contribution to the overall debate on GM crops.

With this in mind please find enclosed the four abc submissions on each of the topics requested by the Strategy Unit.

Regards

Paul Rylott Acting Chairman, Agricultural Biotechnology Council.

Background Working Paper for the Analysis of the Costs and Benefits to Industry and Science

A submission by the Agricultural Biotechnology Council

abc believe that by supporting the commercialisation of agricultural biotechnology, the UK Government would send a clear message to both industry and the rest of the world that, along with 16 other developed and developing countries which have been using agricultural biotechnology, some for over seven years, the UK recognises the benefits to sustainable agriculture of agricultural biotechnology. It would also underline the continuing suitability of the UK for the location of, and investment in, cutting edge science and research-based industries.

While supportive of the background document and supportive of the Strategy Unit's balanced approach there are some specific issues that this document raises that we would like to address.

1. Regarding motives of biotechnology companies, many of the major companies involved in agricultural biotechnology are also major producers of agricultural chemicals. As such, we provide a range of solutions to agronomic problems from which farmers select on the basis of effectiveness, safety, price, ease of use, etc. We believe that the availability of GM varieties will increase the choice for farmers since they offer an opportunity to produce a safe, high quality crop with good yields in a more environmentally friendly way than some current farming practices. As with all market forces, it is the primary customers, in this case farmers, who will decide whether or not to buy a GM variety, as they would with any product. This decision will similarly be based on the value of the product and the market environment in which the farmers operate.

2. Evidence is clear from those areas where farmers have the choice to grow GM crops, that they choose to grow them in increasing volume, with double digit increases year after year (James, 2003). This does not happen if there is not a real benefit to the farmers' businesses, or a market for their produce. A continuing survey of the attitude of UK farmers towards the use of agricultural biotechnology by the National Farm Research Unit has shown that around two thirds of farmers are in favour of the technology, with only 8% against ('Farmers see a GM future for British Agriculture", http://www.cropgen.org/databases/cropgen2.nsf/?Open).

Whilst it may be true that some further integration will occur among major players on the agricultural biotechnology and seeds market, much as is the case in many industries, the report appears not to acknowledge a significant amount of research and development in GM is carried out by food and food processing companies: For example Unilever's work on lycopene and vitamin-enriched tomatoes (Muir 2002).

3. We recognise that quantifying public sector research on genetic modification is difficult but an additional method of recognising public research on GM would be the number of relevant intellectual property / patent rights held by universities and institutes, generally perceived to be about 40% of total. The John Innes Institute, for example, has developed peas resistant to aphid-mediated, seed-born mosaic virus, as conveyed by Prof Chris Lamb at the recent Royal Society meeting on GM crops and the Environment. A number of other BBSRC institutes (http://www.bbsrc.ac.uk/) and Universities have intellectual property relating to GM developments, including enabling technologies.

4. Annex 1 gives examples of potential crops in various stages of development; this Annex does not cross-reference with data supplied in Table 1 of the developing countries document, which in itself needs updating. Whilst realising the difficulty in getting accurate figures for crops and traits in development is difficult, we feel that some products listed 'as commercial' are not actually commercial to our knowledge. A good source of crops and traits that are available, especially those that are commercial, is the Agbios GM database (http://www.agbios.com/dbase.php). Unfortunately this database has a weakness in listing GM crops in China. Data for China is difficult to gather but is obviously extensive with 31 GM plants approved for commercialisation between 1997 and 2000 (Huang et al, 2002). Additionally the EU database of current proposed field trials (http://gmoinfo.jrc.it/gmp_browse_geninf.asp), and the US field trials database (http://www.nbiap.vt.edu/cfdocs/fieldtests1.cfm) indicates Annex 1 omits nutritional and industrial improvements to potato, fungal resistance and yield increase to apple trees, and seedless varieties of both tomato and strawberry.

5. We would agree that estimating the potential impact on the number of students choosing to study biology in its broadest sense is very difficult. It is clear, however, that a decision to not proceed with the commercialisation of GM in this country on grounds other than sound science, coupled with the continued demonisation of such

technology, would have a strong negative effect on the uptake of this subject by students interested in a science career, not just in agriculture but in all areas of biotechnology. In addition, it is clear that the number of students enrolling for agricultural degrees is declining. Whilst this may be to a lack of confidence in the profitability and future for farming in the UK, denying access to new technologies can only exacerbate the situation.

6. Regarding sustainability it is important to realise that agricultural biotechnology does not operate in a vacuum and adoption of the technology has wider applications outside the field of direct agricultural production. The production of plant-based pharmaceuticals, the development of renewable industrial feedstock and the potential of biofuels to help the UK meet its targets of CO_2 emission reduction are tangible examples.

7. To support the Strategy Unit's call for reviews of published data, we would draw their attention to two recent papers. Anthony Conner, Jan-Peter Nap and colleagues (Conner et. al., 2003; Nap et al 2003) performed an extensive review of over 300 scientific publications that address issues regarding the release of GM crops into the environment. They concluded that many of the concerns with prominent media attention do not stand up to scientific scrutiny. Another excellent and constantly updated source of literature is the online and/or CD version of Agbios' bibliography database (http://www.agbios.com/main.php). Although slightly dated now in this rapidly expanding field the International Life Sciences Institute (ILSI) produced an extensive "Plant Biotechnology-related Bibliography" in 2002 (http://www.ilsi.org/).

8. Finally, as a point of interest, abc remain unaware that Hirudin is being produced commercially in GM oil seed rape in Canada as claimed on page 20, we would be most interested to gain substantiating evidence of this.

In conclusion abc believes that a flourishing environment for research and development into, as well as the ability to cultivate GM crops, would be good for UK agriculture, good for the UK environment, the public, and good for the broader science and biotechnology economy in the UK. Furthermore, a decision to support commercialisation would send a clear message to industry and other countries, that the UK was an appropriate location for, and worthy of investment in, science-based industries. Moreover, it would also indicate to those developing countries that are

holding back, among other issues, that a major player, following a thorough review of all evidence, is now prepared to join the rest of the biotech global community.

Finally, abc would like to reiterate its support of this process and stress its desire to take a full and active part in the production of all papers. It will strive to continue to supply the Strategy Unit with factual based information to help build their reports.

Appendix 1 References:

Conner, A., Glare, T., Nap, J. 2003. The Release Of Genetically Modified Crops Into The Environment. Part II - Overview Of Ecological Risk Assessment. The Plant Journal. 33: 19-46.

Huang, J., Rozelle, S., Pray, C., Wang, Q. 2002. Plant Biotechnology in China. Science. 295: 674-677.

Muir. S. R., Collins. G. J., Robinson. S., Hughes. S., Bovy. A., Ric De Vos. C.H., van Tunen. A. J., Verhoeyen. M. E. (2002) Overexpression of petunia chalcone isomerase in tomato results in fruit containing increased levels of flavonols, Nature Biotechnology 19: 470-474

Nap, J., Metz, P., Escaler, M., Conner, A. 2003. The Release Of Genetically Modified Crops Into The Environment. Part I - Overview Of Ecological Risk Assessment. The Plant Journal. 33: 19-46.