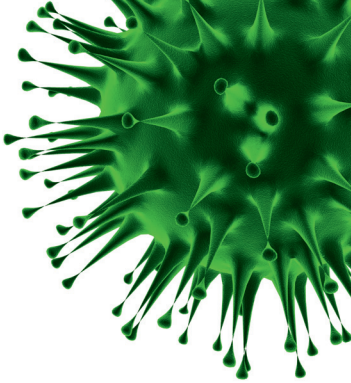

Genetically Modified Crops, Feed and Food

A Biochemical Society position statement | August 2011

Biochemical Society
Advancing Molecular Bioscience

All our current crop plants, and domestic and farm animals, are the result of deliberate cross breeding, which leads to genetic reshuffling, followed by selection of desirable characteristics.

Although breeders have successfully practised these activities for thousands of years, it was only during the past century that we have gained a detailed understanding of the genetic and biochemical changes, which make these new breeds both genotypically and phenotypically very different from their ancestral forms.

Plant breeding, together with agrochemicals, irrigation and mechanisation, has led to dramatic increase in crop yields, which have kept pace with the burgeoning increase in global population in recent years. However, we now realise that this 'Green Revolution' put unprecedented pressure on the environment and on biodiversity. To ensure food security and adequate nutrition for a population of 9 billion by 2050[i] – with most of them living in the developing world – in a sustainable and environmentally friendly manner, we will need to double productivity on essentially the same area of land. At the same time, we need to address concerns about modern high input agriculture, regionally declining water availability and to adapt to man-made climate change[ii].

During the past few decades, the world has seen a revolution in our understanding of how living organisms function at the molecular, biochemical and physiological levels, culminating in the complete genome sequences of an ever increasing range of organisms, from viruses to man. This information is a vital resource for addressing many challenges: combating disease, improving human health and well-being, and enhancing food supply.

As part of this revolution, we have seen the development of plant genetic modification (GM) which allows the transfer of desirable genetic properties from one plant species – or from other organisms – into another plant species. All GM crops are subject to extensive selection testing and characterisation mandated by an elaborate regulatory regime in order to exclude any potential adverse health and "environmental" consequences before they are licensed to be grown commercially.

The majority of GM crops currently grown have been modified to provide resistance to insect pests or tolerance to benign herbicides. This enables a more targeted and efficient use of agrochemicals together with the associated benefit of 'conservation tillage'. Other GM traits that are currently being developed for regulatory approval include further improvements in resistance to pest and disease; improving the efficiency of nutrient use; tolerance to temperature extremes, drought and flooding; and biofortified crops with enhanced

micronutrients to combat nutritional deficiencies, which have a dramatic effect on the health of women and children in the developing world, and are a major cause of death and disease.

The Biochemical Society recognises that GM crops are not a magic bullet that will feed the whole world or eliminate poverty. However, the application of molecular biology will allow more targeted, precise, predictable and controllable improvement of crops, and can be used in two major ways: marker-assisted breeding to develop new varieties faster and GM to introduce new traits into crop plants. These technologies must not only be applied to improve food production in major crops but also to orphan crops (those of minor economic significance, and so perhaps overlooked in commercial developments, but nevertheless of great importance for specific populations, often very poor ones in the developing world (e.g. Cassava, Sorghum), which are a vital resource for farmers in the developing world. As a scientific society, we have a responsibility for fully evaluating and deploying these technologies where appropriate, and thus contributing to the security of future generations; unfortunately, time is not on our side.

The Biochemical Society supports the view that, while it is indeed proper to maintain a reasonable level of regulatory control, a wealth of experience and experimental data from national academies, governments and regulatory authorities has shown that the use of GM techniques presents no particular or novel hazards beyond those already encountered in agriculture. This view has just been clearly endorsed in an EU report[iii]: "According to the projects' results, there is, as of today, no scientific evidence associating GMOs with higher risks for the environment or for food and feed safety than conventional plants and organisms".

The Biochemical Society wishes to thank Chris Leaver CBE FRS FRSE Emeritus Professor of Plant Science and Emeritus Fellow of St Johns College, Oxford for his work in producing this position statement.

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[i] United Nations (Economic and Social Affairs) 2004 'World Population to 2300' http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf

[ii] Royal Society October 2009 'Reaping the Benefits: Science and the sustainable intensification of global agriculture' http://royalsociety.org/Reapingthebenefits/'

[iii] Europa December 2010 'Commission publishes compendium of results of EU-funded research on genetically modified crops' http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1688&format=HTML&aged=0&language=EN&guiLanguage=en
The Government Office for Science, London 'Foresight 2011: The Future of Food and Farming (2011) Final Project Report.' http://www.bis.gov.uk/assets/bispartners/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf

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