

GM SPECIAL ISSUE

Introduction to the Special Issues on Plant GM Technology

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All of us in the plant research community are fully aware of the integral role played by molecular genetics in recent years. Without molecular tools such as transgenic plants, we would have little of the current awareness of gene function which now forms the foundation of our science.

Genetic manipulation/modification of organisms is a technology we use every day in the laboratory. It is a technology that drives many applications in yeast, bacterial and fungal industrial fermentation. Moving genes between microbial organisms, and designing new, genetically modified (GM) microbes that express genes from eukaryotic species, are acceptable technologies – whether for the industry concerned, or in the eyes of the general public. The use of GM organisms (GMOs) *per se* does not necessarily raise alarm. But there is considerable concern when plants are the organisms that are modified, directed both at the effects of GM plants on the environment, and at the use of GM plants and their products in food. Alarm is also raised at the ethics of industrial involvement in the development and sale of GMOs, particularly when developing countries are either the source of the genes or the users of the technology.

There is no doubt that the entire subject of GMOs and GM technology is a minefield, with polarized opinions, considerable frustrations, and a growing sense of concern globally. In such a climate, we believe it is essential that there is an independent, authoritative, in-depth resource providing the facts and detailed information for the reader to access whenever possible, in order to ensure an informed debate.

In the year 2000, more than 40 million hectares of cultivated land worldwide were planted with transgenic seeds (James, 2000). There is no doubt that the cultivation of GM plants in our world is here to stay, and is likely to increase as developing countries assess the benefits versus the risks. While food production is not a problem for the developed world, the need for increasing yields is an urgent issue for many developing countries around the world.

Considerable advances have been made by traditional plant-breeding methods, such as those leading to new rice varieties developed at the International Rice Research Institute and other publicly funded research institutes. Nevertheless, there are already some 800 million people who do not have access to sufficient food to meet their

needs (Pinstrup-Anderson, 2000). Malnutrition plays a significant role in half the nearly 12 million deaths each year in developing countries of children aged under 5 (UNICEF, 1998). Changes in the patterns of global climate and alterations in land use are expected to exacerbate the problems of food production on the planet. A recent report based on the recommendations of seven of the world's Academies of Science and prepared under the auspices of the Royal Society of London (<http://www.royalsoc.ac.uk/policy/reports.htm>) concluded that:

'Steps must be taken to meet the urgent need for sustainable practices in world agriculture if the demands of an expanding world population are to be met without destroying the environment or natural resource base. In particular, GM technology, coupled with important developments in other areas, should be used to increase the production of main food staples, improve the efficiency of production, reduce the environmental impact of agriculture, and provide access to food for small-scale farmers'.

If we accept that there is an urgent need across the world to increase food production and access to food, and that the impact of climate change will only amplify the problems humanity already faces, then new, sustainable farming systems must be developed in order to produce the crops that will survive in these conditions and deliver yields sufficiently high to support the growing population of the world.

We in the developed countries may have opinions – but should we stand in the way of technologies that can potentially improve the survival and quality of life for billions of people in developing countries? This makes it all the more essential to characterize fully the technologies on offer in an independent, scientific analysis. We must assess the benefits and risks, while learning from experiences gained over the years that GM technologies have been developed and used in the field.

Science is not about opinion. Science is about the correct design and interpretation of valid experiments that increase our understanding of the world around us. As scientists, we have a responsibility to respond to society's concerns, and to explain the facts that emerge from our research in a way that society can understand and appreciate. Effectively, we scientists must ensure the debate on GM crops addresses facts, not opinions.

This issue is the first of *The Plant Journal's* continuing series of articles on GM crop plants. These articles also are freely available on our website (<http://www.blackwell-science.com/tpj/gm>), together with links to other reviews and resources that we hope will provide useful information. Our aim in inviting and presenting these analyses is to establish a forum for the publication of in-depth review articles and case studies on all aspects of plant GM technology and its applications. Since our first decision to celebrate the 10 years of publication of *The Plant Journal* with an issue on this subject, it has become increasingly apparent that GM technology has particular potential benefits to developing nations and the problems they face in the 21st century. We realize that increased food production is only one component of the solution, and must be combined with income generation and more effective distribution of food stocks. We believe that we can provide science-based resources to inform the GM debate impartially and in a constructive manner. Thus, many of the case studies that will be published this year directly address issues and experiences associated with less-developed nations.

We see this venture as interactive: we hope the articles will promote discussion, and we invite suggestions of

further subjects for review and analysis. All the submissions that appear in the special issues of the journal have gone through our standard review process of independent assessment. We hope the issues will be useful, and look forward to continuing our involvement as the debate on GMOs continues to evolve over the coming years.

References

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