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Editorial

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The OECD sponsored conference "Decision Making and Science—The Balancing of Risk Based Decisions that Influence Sustainability of Agricultural Production" took place in Berlin 7–8 October 2010. We invited 18 leading researchers and recognised policy makers from the EU, USA, Canada, Australia and New Zealand. Altogether 65 participants attended the meeting.

From the outset, we recognised and accepted that current levels of human population and use of natural resources are without precedent. New technologies have transformed everyday life and enabled the development of a closely coupled global economy. However, in this brave new world, many political and economic decisions are still made in ignorance of the tight coupling between the economy, society and the biophysical world and policies framed with the best of intentions often have unintended consequences. In the next few years, if we are to have sensible policy responses aimed at delivering sustainable agricultural production, this situation must improve. We need to understand at a much deeper level than we do now how science knowledge and understanding, societal values, economic drivers and political ideologies interface to influence decision making. In many regards decision making is done in the context of an understanding of risk, either directly measured and assessed or perceived. In many instances the information content is a variable quality and reliability and influenced by the context in which it is provided and the motivations and biases of various proponents. Our aim was to explore this by considering the role of science in policy making through the lens of risk-based decision making and then focus on the specific case issue of genetically modified (GM) crops. This technology provides us with an excellent opportunity to consider the role of science in a decision making process that is strongly influenced by a range of perceptions and competing agendas. In addressing these we considered them in the context of the lessons learned from other areas such as invasive species, species conservation and the broader considerations biosecurity research at the conference. As a case study, the conference considered new crops that are tolerant to herbicides. Herbicide tolerance in crops can be achieved both by conventional mutation techniques as well as the generation of GM crops. Although the phenotype and environmental interaction of these crops seem to be similar, GM crops are facing extraordinary societal concerns by consumers in some OECD member countries. Scientific risk assessment and risk management of herbicide tolerant GM and non-GM crops include:

- weed resistance development
- impacts on wider biodiversity
- indirect effects on biological control

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- residues of plant protection products
- metabolic interaction of herbicides in GM plants
- management measures for sustainable use of herbicide tolerant plants
- environmental monitoring
- cost-benefit analysis.

Mankind is facing serious problems producing healthy food for an increasing human population and part of the solution will rely of the adoption on new technologies such as herbicide tolerant GM and non-GM crops. However, all potential solutions pose risks. Balancing these risks involves not only the underpining science, but also economic considerations and societal values. This raises considerable challenges because they are not only not consistent across the globe, but the weightings attributed to them vary considerably. As Aristotle explains succinctly "There is nothing so unequal as the equal treatment of unequals". The challenge for policy makers, decision makers and researchers is to describe and explain the 'unequals' and through this deliver more effective decisions. The conference delivered insights into how to more effectively analyse and communicate risks associated with new technologies promising a more sustainable agricultural production future to decision makers.

The papers presented spanned a number of aspects in understanding of how risk is assessed, managed, and communicated. In particular, the conference covered

- reality and perception of risks
- information content needed for risk assessment
- choosing between competing priorities
- elicitation of expert opinion
- management of risk and uncertainty
- risk communication

Broad experience was presented based on EU and US knowledge with pesticide registration, invasive species, and GMO cultivation. Further key success factors were the presentations from non-European and non-US sources. Assessment and management of risk in Australia, Canada and New Zealand promoted a more integrated approach. This enabled regulatory processes to cross jurisdictional boundaries more easily which in turn facilitated and accelerated the process of decision making, reduced duplication and allowed for the more proactive establishment of protocols aimed at mitigating adverse outcomes such as herbicide resistance development in weeds in GMO cultivation. The following key issues/policies were identified to improve decision making:

- An unambiguous notion of sustainability
- Transparency of connections between proponents, regulators and users
- Direct engagement of researchers in policy discussions
- Clear consideration of spatial and temporal scales in risk assessment
- Use of regulatory (check-) lists if it makes sense and has a scientific basis
- Correct treatment of available data, sample sizes, comparisons and controls to support advice and direct regulators
- Improvement in expert opinion elicitation enabling higher quality advice and the identification of wrong answers and biases
- Distinguishing between failure of a new technique or system and a low risk eventuating
- Application of management measures that are followed correctly
- Application of proactive risk mitigation measures such as monitoring with a clear link between data collection and regulatory response
- Use of unambiguous language in directives
- Avoidance of double counting if social and environmental values are incorporated; avoidance of duplications in decision making
- Communication across (scientific, political, geographical) boundaries to facilitate decision making
- Comparable regulatory treatment of herbicide tolerant crops (GM or non-GM origin)

We believe this specific issue of JVL will provide the reader with an improved insight into the interface between science and decision making and we encourage the reader to draw from this to better enable decisions based on science.

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