

Recommendations

- Taking into account that women in many countries are important stakeholders and are in charge of crops and livestock production, women should be included in all processes that involve GMO market introduction and public acceptance.
- Since women and men have different knowledge, concerns and needs, efforts should be made to provide more opportunities for women's involvement in science and biotechnological processes.
- Women's and men's differing traditional knowledge and intellectual property should be recognized, valued and protected in the design and introduction of GMOs in any country.
- In the process of developing GMOs, women's and men's different needs and vulnerabilities should be considered. This will ensure that the results contribute to the improvement of their welfare.
- Information, training and educational materials related to GMOs should be targeted towards women. Women should also be involved in decision-making processes related to GMOs.
- Gender should be mainstreamed in the Cartagena Protocol and the National Biosafety Action Plans.
- Gender should be mainstreamed in any process that involves promoting public awareness, education, and increased participation in the biotechnological process, handling, and use of living modified organisms.
- Associated Parties to the Cartagena Protocol should promote equitable representation of men and women in national biosafety institutions and strengthen institutional capacities to link biosafety and gender. This can provide an opportunity to include a gender perspective in the technical process and the development of risk assessments and management plans.
- Gender awareness and capacity should be created among the Parties under the Cartagena Protocol to recognize the gender differences in the value of biological biodiversity. These differences should be considered when implementing the Protocol and evaluating the socio-economic impacts that can arise from GMO introduction on the conservation and sustainable use of biodiversity.

- More gender-differentiated data about the value that biodiversity has for men and women and the potential effects of GMOs is needed. Parties should encourage both men and women, from indigenous and local communities, to participate in data gathering.

This fact sheet was prepared by Andrea Quesada-Aguilar under the technical supervision of Lorena Aguilar, IUCN Senior Gender Adviser.

References

- Arnaud, J.-F., Viard, F., Delescluse, M. and Cuguen, J. (2003). "Evidence for Gene Flow via Seed Dispersal from Crop to Wild Relatives in *Beta vulgaris* (Chenopodiaceae): Consequences for the Release of Genetically Modified Crop Species with Weedy Lineages". *Proceedings: Biological Sciences* 270(1524): 1565–1571.
- FAO. (2001). "Women – users, preservers and managers of agrobiodiversity". Italy: Food and Agriculture Organization of the United Nations.
- FAO. (2003). "Biosecurity in food and Agriculture". *Proceedings of the Seventeenth Session of the Committee on Agriculture*. Retrieved from the World Wide Web: <ftp://ftp.fao.org/unfao/bodies/coag/coag17/Y8453e.doc>
- Graham, J.W. and Smith, S.A. (2005). "Gender differences in employment and earnings in science and engineering in the US". *Economics of Education Review* 24: 341–354.
- Haas, J.D., Beard, J.L., Murray-Kolb, L.E., del Mundo, A.M., Felix, A. and Gregorio, G.B. (2005). "Iron-Biofortified Rice Improves the Iron Stores of Nonanemic Filipino Women". *The Journal of Nutrition* 135: 2823–2830.
- Howard, P. (2003). *The Major Importance of 'Minor' Resources: Women and Plant Biodiversity*. Gatekeeper Series No. 112. UK: IIED.
- Huyer, S., Oldham, G., Jeenah, M. and Naim, T. (2004). *Understanding the Gender Dimensions of Biotechnology Research and Development – Consultative Expert Workshops: Final Technical Report*: Gender Advisory Board, United Nations Commission on Science and Technology for Development, University of Pretoria, and Pakistan National Commission on Biotechnology.
- Huyer, S. (2006). GAB Meeting Report: Gender, Science and Technology for Sustainable Development: Looking Ahead to the Next 10 Years. Paris: The Gender Advisory Board.
- IUCN. (2007). *Current knowledge of the impacts of genetically modified organisms on biodiversity and human health – an information paper*.
- Moerbeek, H. and Casimir, G. (2005). "Gender differences in consumers' acceptance of genetically modified foods". *International Journal of Consumer Studies* 29(4): 308–318.
- Rochon, A. (2000). Biotechnology and the New Genetics: What it Means for Women's Health: Working Group on Women, Health and the New Genetics.
- Schatz, G. (1998). "The Swiss Vote on Gene Technology". *Science* 281(5384): 1810–1811.
- Secretariat of the Convention on Biological Diversity. (2000). *Cartagena Protocol on Biosafety to the Convention on Biological Diversity: text and annexes*. Montreal: Secretariat of the Convention on Biological Diversity.
- Secretariat of the Convention on Biological Diversity and United Nations Environment Programme. (2003). *Biosafety and the environment: an introduction to the Cartagena Protocol on Biosafety*. France: SCBD-UNEP.
- The Women's Biotechnology Park in Tamil Nadu, India. (2007). Retrieved from the World Wide Web: <http://www.biotechpark.com/aboutus.html>
- Watrud, L.S., Lee, E.H., Fairbrother, A., Burdick, C., Reichman, J.R., Bollman, M., Storm, M., King, G. and Van de Water, P.K. (2004). "Evidence for landscape-level, pollen-mediated gene flow from genetically modified creeping bentgrass with CP4 EPSPS as a marker". *Proceedings of the National Academy of Sciences* 101(40): 14533–14538.

Gender and Biosafety



Photo: Paz Bossio

Biotechnology is the application of technology to biological systems (IUCN, 2007). Humans have been modifying organisms for centuries, however recent techniques that involve genetic modification have raised concerns in the international community due to the effect that modified organisms might have on the environment and on human health.

The Convention for Biological Diversity (CBD) has addressed these concerns and formulated the Cartagena Protocol on Biosafety (2000). The Cartagena Protocol promotes an adequate level of protection in the field of transfer, handling and use of living modified organisms (LMO) obtained using biotechnological techniques. The main purpose of the protocol is to diminish the potential adverse effects on the conservation

KEY TERMINOLOGY

- **Biotechnology**: any application of technology to biological systems. Modern applications include genetic modification, biomimicry and nanotechnology (IUCN, 2007).
- **Biosafety**: a range of measures, policies and procedures for minimizing potential risks that biotechnology may pose to the environment and human health (SCBD-UNEP, 2003).
- **Biosecurity**: strategic and integrated approach that encompasses the policies and regulatory frameworks that analyze and manage risks in the sectors of food safety, animal life and health, and plant life and health, including associated environmental risk (FAO, 2007a).
- **Genetic modification (GM)**: the application of: a) in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (rDNA) and direct injection of nucleic acid into cells or organelles; or b) fusion of cells beyond the taxonomic family that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection (SCBD, 2000).
- **Genetically modified organism (GMO) or living modified organism (LMO)**: any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology (SCBD, 2000).
- **LMO FFP**: living modified organisms for direct use as food or feed or for processing (FAO, 2007a).
- **Gene flow**: the introduction of genetic material from one population to another. Populations can be of the same species or different species.

and sustainable use of biological diversity. The protocol also takes into account risks to human health, and focuses specifically on the movement of organisms across boundaries (Secretariat of the Convention on Biological Diversity, 2000).

The Cartagena Protocol promotes the Precautionary approach. This approach proposes that *“lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision, as appropriate, with regard to the import of that living modified organism intended for direct use as food or feed, or for processing, in order to avoid or minimize such potential adverse effects”*.

The Protocol, however, does not address gender issues specifically. It is important that the Protocol recognizes that the impact of introducing GMOs could be gender-differentiated because men and women have different knowledges, needs and vulnerabilities. Women worldwide, and specially women from indigenous groups and local communities, need to have access to information, skills, equipment, regulatory frameworks, and procedures. This will allow them to understand the issues, make informed decisions, manage, or avoid any potential risks associated to GMOs, have the capacity to implement the Protocol, and have an arena where their needs and concerns are heard and valued.

- Worldwide women play a crucial role in agriculture. They produce nearly 80% of all crops in sub-Saharan Africa, 70–80% in South Asia and 50% in Latin America and the Caribbean (Huyer *et al.*, 2004). As major stakeholders, women producers must be informed in relation to GMOs. If women decide to use them they should be properly trained in how to handle them, so the potential risks to their health and their environment are minimized.
- Much of the information related to GMOs has a high level of technicality. Even in developed countries, men seem to have greater knowledge of biotechnological processes and genetically modified organisms (GMO) than women (Moerbeek and Casimir, 2005). Therefore, special efforts should be made for women to receive appropriate information so they can decide if they want to consume these products or use them on their land.
- Most of the GMOs developed tend to benefit farmers that have the resources to take full advantage of this technology (IUCN, 2007). Given that women account for the majority of poor farmers, and have limited assets, they may not be able to access and implement this new technology. GM seeds are not only more expensive, but in some cases these plants do not produce fertile seeds (Rochon



Ford, 2000). Up to 90% of the crops grown by poor farmers come from seeds and planting material that they store (FAO, 2001).

- GMOs might have unforeseen effects on human health. For example, in 2004, 100 people living near a GM cornfield experienced a toxic reaction to pollen of Bt maize; research is still being carried out to determine these negative effects of the Bt pollen (IUCN, 2007). Since women are the primary carers for sick family members, the introduction of a GMO with possible negative health effects could increase their workload.
- Some GMOs can easily hybridize with other plants in forest communities or have seeds that can disperse from fields to forests which could affect forest communities (Arnaud *et al.*, 2003). Changes in forests could have a serious impact on the 60–70% of poor women from local communities that obtain food, medicines, and other traditional non-timber products from these ecosystems. A recent study has shown that gene flow can occur from GM bentgrass plants, traditionally used in golf courses, to wild plants up to 14km away (Watrud *et al.*, 2004). The US Forest Service has complained that this GM creeping bentgrass, which is resistant to herbicide, could have adverse effects on the forests.
- GMO cultivation can promote land-use change, for example, the introduction of GM soybean in Argentina in the 1990s stimulated a further increase in deforestation (IUCN, 2007). Rural women, particularly from developing countries, depend highly on natural resources. The increased degradation of natural ecosystems

due to agricultural expansion, promoted by GMO introduction, could limit their access to resources that guarantee their survival and that of their families.

- Women and men have different preferences when selecting the characteristics of food crops. In the Andes, women choose plant characteristics that reflect their cooking requirements (Howard, 2003). The diversity of crop characteristics could potentially be diminished if the genes from the GMO escape to non-GMO fields and confer on hybrids a selective advantage.
- Women tend to be more cautious when selecting food and health products since their families' health is one of their main priorities. Data from Eurobarometer surveys indicate that there are gender differences in the acceptance of genetically modified (GM) foods in Europe: women show a tendency to accept less GMO foods than men (Moerbeek and Casimir, 2005). In Switzerland more men than women rejected *The Gene Protection Initiative* which demanded that the government outlaw the generation, purchase and distribution of transgenic animals; the release of genetically altered organisms; and the patenting of transgenic organisms, their components, and processes (Schatz, 1998).
- Encouraging women to become scientists would be key in the production and introduction of GMOs. Unfortunately, women are not encouraged to do so; a smaller proportion of girls receive training in science and technology (Huyer, 2006); college-educated women are less than half as likely to be employed in science and technology; and women employed in these fields earn 20% less than men (Graham and Smith, 2005).
- Women's involvement in the biotechnological field is crucial given their different needs and concerns about GMOs. Women's capabilities in the biotechnological field have been recognized in India where the Golden Jubilee Biotech Park for Women Society provided opportunities for professional women to get involved in friendly biotechnological enterprises and develop technology and products that reflect their needs (The Women's Biotechnology Park in Tamil Nadu, India, 2007).
- Women are more prone to nutritional deficiencies because of their unique nutritional needs, especially when they are pregnant or breastfeeding, and some cultures have household food hierarchies. For example, in South and Southeast Asia 45–60% of women of reproductive age are underweight and 80% of pregnant women have iron deficiencies. GMOs could potentially help reduce their malnutrition problems. For example, a study in the Philippines showed that women feed with iron-biofortified rice had an increase in body iron (Haas *et al.*, 2005). Very few GMO bio-fortified crops have been developed.