FAO International Symposium on "The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition", 15-17 February 2016, Rome, Italy[1]

Frequently Asked Questions

1. Why is FAO holding the symposium?

Almost 800 million people worldwide are chronically undernourished. As a consequence of climate change, the increasing frequencies of erratic extreme weather events, such as drought and flooding, are damaging the livelihoods of farmers, fishers and forest-dependent people who are already vulnerable and food insecure. Additionally, the finite natural resources upon which agriculture depends (such as arable land and water) are being degraded and depleted at alarming rates due to climate change, agricultural practices, demographic pressures and other socio-economic drivers. It is also estimated that about 60% more food might be needed by the year 2050 when the global population is expected to have risen to over 9 billion people. This significant food increase, which must be attained despite the above constraints, implies that the world and its food production systems face unprecedented challenges.

All potential options that can help countries to meet these challenges should be explored and supported. FAO believes that application of science and technology is one option that can play a substantial role in providing solutions to these unprecedented challenges. The set of technologies available to producers for this purpose should be as broad as possible, including all of the conventional technologies, such as those used to improve water management in irrigated and rainfed agriculture, as well as the wide range of agricultural biotechnologies. This symposium focuses on the role of agricultural biotechnologies, specifically on the role that they can play in moving towards sustainable food systems that produce more food that is also of greater nutritional value, with less environmental damage and doing this in the face of climate change.

2. What are agricultural biotechnologies?

FAO traditionally uses a broad definition for biotechnology, based on Article 2 of the Convention on Biological Diversity, which states that it is "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use". The term 'agricultural biotechnologies' used in the symposium's title, therefore, covers a broad range of technologies used in food and agriculture.

These biotechnologies encompass a broad range, from low-tech approaches involving artificial insemination, fermentation techniques, biofertilizers etc. to high-tech approaches involving advanced DNA-based methodologies.

They are used for the genetic improvement of plant varieties and animal populations to increase their yields or efficiency; the characterization and conservation of genetic resources for food and agriculture; plant or animal disease diagnosis; vaccine development and a number of other purposes. Some of these technologies may be applied to all the food and agricultural sectors, such as the use of molecular markers or genetic modification, while others are more sector-specific, such as tissue culture (in crops and forest trees), embryo transfer (livestock) or sex-reversal (fish). Note, the term agriculture includes crop, livestock, fish and forestry products, so the term 'agricultural biotechnologies' encompasses their use in any of these sectors.

Whereas other agricultural biotechnologies have been little discussed outside of academic and research circles, a major and polarized debate about genetic modification and genetically modified organisms (GMOs) has been underway since the 1990s. This debate revolves around the potential

[1] http://www.fao.org/about/meetings/agribiotechs-symposium/en/

implications of GMOs for food security, the environment, biodiversity, human and animal health, control of the global food system and other issues. One unfortunate consequence of this long-running debate is that the other biotechnologies have been overshadowed, with the result that too little focus has been given to their potential merits and the role that they can play for food security and sustainable development.

3. What is the scope and focus of the symposium?

The symposium will explore the application of biotechnologies for the benefit of smallholders in developing sustainable food systems and improving nutrition in the context of climate change. When considering the contributions of biotechnologies to sustainable food systems, the symposium will aim to examine the entire food and value chain, from producers all the way to consumers. The symposium takes a multisectoral approach, covering the crop, livestock, forestry and fishery sectors, and it also encompasses the use of microorganisms within these sectors. The main focus of the symposium is on agricultural biotechnologies and products that are currently available and ready for use by small scale producers.

4. Can agricultural biotechnologies help smallholder farmers in developing countries?

Yes, and this is illustrated by many case studies provided in the background documents prepared by FAO for ABDC-10[2]. For example, New Rice for Africa (NERICA) varieties were developed using biotechnologies that enable two species of cultivated rice, African rice and Asian rice, to be crossed. These NERICA varieties combine the high yields from the Asian rice with the ability of the African rice to thrive in harsh environments and are now widely distributed in sub-Saharan Africa.

This is also illustrated by a recent FAO book documenting an extensive series of case studies where agricultural biotechnologies have been applied to serve the needs of smallholders in developing countries[3]. For example, one of the case studies was from India and involved pearl millet, a crop that is grown largely for its ability to produce grain under hot, dry conditions on infertile soils of low water-holding capacity, where other crops generally fail. It is grown as a subsistence crop for local consumption and has generally received little attention from commercial breeders. In the case study, an approach called ‘marker-assisted selection' was used, where desirable genes are "marked" or tagged by molecular markers so they can be selected, to develop a new hybrid called HHB 67 Improved with resistance to downy mildew disease, the most devastating disease affecting this crop. In 2011, the new hybrid was grown on about 900 000 hectares and it brought greater food security to an estimated two million people.

Another case study in the book described the use of DNA-based pathogen detection methods in shrimp farming, which is the largest export-oriented aquaculture production sector in India. The majority of shrimp farming in India is carried out by low-income small farmers. Intensification of shrimp farming has caused many shrimp diseases of epidemic proportions over the last two decades, particularly viral diseases. Such viral infections spread rapidly and cause massive losses, directly impacting the income of small farmers. The case study described how the use of DNA-based pathogen detection methods had become an important health management tool in preventing viral disease outbreaks.

[2] FAO. 2011. Biotechnologies for agricultural development: Proceedings of the FAO international technical conference on ‘Agricultural biotechnologies in developing countries: Options and opportunities in crops, forestry, livestock, fisheries and agro-industry to face the challenges of food insecurity and climate change’ (ABDC-10). http://www.fao.org/docrep/014/i2300e/i2300e00.htm

[3] FAO. 2013. Biotechnologies at work for smallholders: Case studies from developing countries in crops, livestock and fish. By J. Ruane, J.D. Dargie, C. Mba, P. Boettcher, H.P.S. Makkar, D.M. Bartley and A. Sonnino (eds.). http://www.fao.org/docrep/018/i3403e/i3403e00.htm

Many of the book's case studies described small-scale applications of biotechnologies for smallholders. Although adopted on a small-scale, their benefits were nevertheless important for the farming communities concerned. For example, one of them described a community-based foundation in Bangladesh which provides production-related veterinary services, including artificial insemination, to around 3 000 smallholder dairy cattle farmers. The initiative increased milk production and farmer incomes and generated rural employment in a country where rural unemployment is a major problem.

The book also described the case in northern Cameroon, where the use of DNA-based diagnostic tools in the field allowed veterinary authorities to quickly diagnose outbreaks of Peste des Petits Ruminants, a highly contagious viral disease affecting goats and sheep. Rapid and accurate disease diagnosis meant that the authorities could stamp out these outbreaks and stop the spread of the fatal disease to other flocks. Without this rapid response, thousands of sheep and goats would likely have succumbed to the disease, leading to substantial economic losses for the small farmers.

However, it must be underlined that no biotechnology is a silver bullet and successful results will not be achieved unless there is an appropriate 'enabling environment' around it to make it possible. The ability of agricultural biotechnologies to help smallholder farmers, therefore, also depends on a range of other factors such as government policies and access of the farmers to extension services, agricultural inputs, credit and markets. The absence of some or all of these 'enabling' factors often explains why many potentially useful agricultural biotechnologies, as well as conventional technologies, are not used by smallholders.

5. Who will participate in the symposium?

The people who participate in the symposium will be representatives of governments, United Nations bodies and specialized agencies, intergovernmental organizations and of non-state actors. This last group includes representatives of civil society organizations; private sector entities (including philanthropic foundations); academia and research institutions; and cooperatives and producer organizations. Experts and key stakeholders will be invited to make presentations and to participate in panel discussions. Overall, about 400 participants are expected.

6. What will be the output of the symposium?

The output will be symposium proceedings, including a compilation of key presentations and other information materials.

7. Is the symposium focused on GMOs?

No, the symposium is not focused on genetically modified organisms (GMOs). The symposium is about agricultural biotechnologies in general, which is a wide range of technologies used in food and agriculture. One of these technologies is genetic modification and it is used to produce GMOs, which are organisms in which one or more genes have been introduced into their genetic material from another organism using recombinant DNA technology (a set of techniques for manipulating DNA, including the identification and cloning of genes; the study of the expression of cloned genes; and the production of large quantities of gene product). The genes that are introduced may be from a different kingdom (e.g. a bacterial gene introduced into plant genetic material), a different species within the same kingdom or even from the same species. For example, so-called "Bt crops" are crops containing genes derived from the soil bacterium *Bacillus thuriengensis* coding for proteins that are toxic to insect pests that feed on the crops

8. What is FAO's position on GMOs?

FAO recognizes that genetic modification can help in some circumstances to increase production and productivity and thus contribute to food security. It also recognizes that, given climate change and the

tremendous global challenges ahead, the widest range of potential options should be available to producers in the future and that this portfolio of options should include agricultural biotechnologies, encompassing genetic modification as well as the many other biotechnologies.

However, FAO is also aware of the concerns about the potential risks that GMOs pose regarding the effects on human and animal health and the environment. FAO underlines the need to carefully evaluate on a case-by-case basis the potential benefits and risks associated with the application of modern technologies to increase plant and animal productivity and production.

It is nevertheless important to underline that the responsibility for formulating policies and making decisions regarding GMOs rests with the countries themselves and that FAO does not interfere in their policies or decisions, including those related to GMOs. Consequently, it has no position regarding the development, testing or commercial release of GMOs in any specific country. Similarly, it has no position regarding a specific country's decision not to develop or release GMOs.

9. How does FAO assist its member countries in the area of agricultural biotechnologies?

Advice to governments: On request, FAO provides legal and technical advice to governments on areas such as development of national biotechnology strategies and development of biosafety[4] frameworks. For example, FAO has assisted countries such as Bangladesh, Paraguay, Sri Lanka and Swaziland to develop their national biotechnology policies and strategies. At the request of governments, FAO also advises on project development. For example, in the fisheries sector it has developed a number of projects that use agricultural biotechnologies, such as on disease prevention and diagnosis in Southeast Asia.

Capacity development: FAO assists its member countries to develop their capacities in agricultural biotechnologies and related issues through technical cooperation and training, implemented at the national, subregional, regional and global levels. For these activities, FAO collaborates with a range of partners, including other UN agencies and the research centres of the Consultative Group on International Agricultural Research (CGIAR)

Information: FAO has been at the forefront in recent years in providing high-quality, updated, balanced science-based information about agricultural biotechnologies to its member countries and in providing a neutral platform for them to exchange information on this subject. This has been done using the multi-lingual FAO Biotechnology website[5], e-mail conferences and newsletters as well as hard-copy and electronic publications.

A meeting place for nations: FAO facilitates development of international standards and helps frame international conventions and agreements as well as hosting major conferences, technical meetings and expert consultations. The Secretariats of several intergovernmental bodies/treaties dealing with some biotechnology-related issues are based in FAO Headquarters, including the Commission on Genetic Resources for Food and Agriculture (CGRFA), the International Plant Protection Convention (IPPC), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the Joint FAO/WHO Codex Alimentarius Commission. For example, in 2010 the Codex Alimentarius Commission adopted guidelines on methods for detection, identification and quantification of specific DNA sequences and proteins in foods.

[4] Biosafety is a general term used to describe frameworks encompassing policy, regulation and management to control potential risks associated with the experimentation, release, use and transboundary movement of GMOs.
[5] http://www.fao.org/biotech/en/