Food and Agriculture Organization of the United Nations

FAO Regional Meeting on Agricultural Biotechnologies in Sustainable Food Systems and Nutrition in Asia-Pacific, to be held in Kuala Lumpur, Malaysia from 11-13 September 2017

Frequently Asked Questions

1. Why is FAO holding a regional meeting on agricultural biotechnologies in Asia-Pacific?

FAO convened the international symposium on *The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition*[1] on 15-17 February 2016 at FAO Headquarters, Rome. During the symposium, the importance of bringing the dialogue from the global to the regional level was highlighted by participants. In closing the symposium, the FAO Director-General therefore concluded: "Now FAO has to move forward. We intend to bring the debate to a regional perspective. We want to hear from governments, farmers and researchers of all regions about their needs and concerns regarding biotechnology". FAO is therefore planning to organize four regional meetings in 2017-2018. The first is this regional meeting for Asia-Pacific.

2. What was the background to the convening of the 2016 international symposium on agricultural biotechnologies?

The background to the convening of the international symposium is that, worldwide, it is currently estimated that almost 800 million people are chronically undernourished, over two billion people suffer from micronutrient deficiencies (also known as hidden hunger) while, on the other side, over 1.9 billion adults are overweight, including 600 million who are obese.

Looking to the future, there are considerable challenges ahead which can exacerbate this already difficult situation. The world's population is projected to increase from 7.3 billion in 2015 to 8.5 billion by 2030 and 9.7 billion in 2050, and nearly all of this increase will occur in developing countries. Incomes are also expected to rise in developing counties, resulting in dietary changes where the proportion of grains and other staple crops in diets will decline, while the proportion of vegetables, fruits, edible oil, meat, fish, and dairy products will increase. With this larger, more urban and, on average, richer population, the demand for food is expected to increase substantially in future years.

Three other major issues need also to be considered. First, the agriculture sector, including forestry and fisheries, is expected to produce more non-food products, including feed, bioenergy and bio-based materials and chemicals, in the future. Second, the natural resources upon which agriculture depends, such as land, water and soil, are increasingly threatened by environmental degradation and climate change. Third, as a consequence of climate change, erratic extreme weather events, such as drought and flooding, occur with increasing frequency which damages the livelihoods of farmers, fishers and forest-dependent people who are already vulnerable and food insecure.

In consideration of the above factors, it is imperative that there be a substantial shift towards sustainable food systems that produce more food, of greater nutritional value, and that manage natural resources in a way that maintains ecosystem functions to support current as well as future human needs.

To meet these tremendous challenges, we must count on a broad portfolio of tools and approaches to eradicate hunger and malnutrition and achieve sustainable agriculture in the context of climate change. As a neutral forum, FAO has been promoting debates, dialogues and exchange of information in order

[1] The symposium website is at http://www.fao.org/about/meetings/agribiotechs-symposium/en/ and the symposium proceedings at http://www.fao.org/documents/card/en/c/66e9a36c-19b2-407a-83c9-5b767e233417/

to enhance our knowledge of these tools and approaches. Use of agricultural biotechnologies represents one of these approaches and the international symposium in February 2016 was held as part of these initiatives. This regional meeting on agricultural biotechnologies in Asia-Pacific allows the dialogue and information exchange that began in the international symposium to continue and to be placed firmly in the regional setting.

3. What will be the outputs of the regional meeting in Asia-Pacific?

The expected outputs of the regional meetings include:
- Identification of key elements of a comprehensive regional action plan and road map, including capacity development initiatives;
- Identification of priority themes and possible partners for South-South cooperation mechanisms to enable countries in the region to benefit from the expertise and experience of their neighbours, mutually support each other and develop harmonized and synergetic approaches; and
– Identification of regional research and development themes which address important constraints for improving food security and nutrition in the region.

A meeting report, as well as presentations from the regional meeting, will also be made available online.

4. When and where will the regional meeting on agricultural biotechnologies in Asia-Pacific be held?

The regional meeting on agricultural biotechnologies in Asia-Pacific will be held from 11-13 September 2017 in the Kuala Lumpur Convention Centre (KLCC), Malaysia. This FAO meeting will be hosted and co-organised by the Government of Malaysia, involving the Ministry of Agriculture and Agro-Based Industry (MOA) and the Ministry of Science, Technology and Innovation (MOSTI).

5. 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’ therefore covers a broad range of technologies used in food and agriculture.

These biotechnologies 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 many different purposes, such as the genetic improvement of plants and animals to increase their yields or efficiency; the characterization and conservation of genetic resources for food and agriculture; plant and animal disease diagnosis; vaccine development; and the production of fermented foods. 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 crops, livestock, fisheries and forestry, 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 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.

6. What were the outcomes and key messages from the 2016 FAO international symposium on agricultural biotechnologies?[2]

The FAO International Symposium on "The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition" was held from 15 to 17 February 2016 at FAO Headquarters, Rome, Italy. The objective of the international symposium was to explore the application of biotechnologies for the benefit of smallholders and family farmers in developing sustainable food systems and improving nutrition in the context of unprecedented challenges such as climate change. The symposium brought together over 400 people, including 230 delegates from 75 member countries and the European Union, as well as representatives of intergovernmental organizations, private sector entities, civil society organizations, academia/research organizations and producer organizations/cooperatives.

The **international** symposium took a **multisectoral approach**, encompassing the crop, livestock, forestry and fishery sectors, as well as the use of micro-organisms within these sectors. It also covered a **broad range of biotechnologies**, including low-tech approaches, such as those involving artificial insemination, microbial fermentation and biofertilizers, as well as high-tech approaches, such as those involving advanced DNA-based methodologies and genetically modified organisms (GMOs).

The symposium **successfully broadened the discussions** beyond the narrow and polarised debate on GMOs which is hindering the development and use of the full range of biotechnologies. Biotechnology is much more than GMOs. Discussion about agricultural biotechnology needs to encompass the full range of low- and high-tech non-GMO biotechnologies that are available or will be in the near future.

The symposium highlighted **numerous examples of the successful application of agricultural biotechnologies** that meet the needs of family farmers in the crop, forestry, fishery and livestock sectors. The enormous potential of new gene editing technologies was acknowledged and the need to closely follow advancements in this area was agreed.

FAO successfully reinforced its role as a neutral forum by bringing together stakeholders from widely diverse backgrounds to engage in a discussion of agricultural biotechnologies in an open and constructive dialogue. In his closing statement, the FAO Director-General underlined that "*FAO is very proud to have fulfilled its role as a neutral forum for frank and open dialogue among all stakeholders*". While there is controversy because consensus is lacking on some issues in this dialogue, he emphasized that: "*FAO will not shy away from any issue that is relevant to our mandate of ending hunger and improving nutrition, as well as promoting a shift towards sustainable agriculture development.*"

Agricultural biotechnologies and agroecology should be seen as complementary approaches to attaining sustainable food systems and improving nutrition. For example, biotechnologies and their products can be used in production systems, based on agroecological principles, to enhance productivity while ensuring sustainability, conservation of genetic resources and use of indigenous knowledge.

Participants highlighted the **important contribution of agricultural biotechnologies to achieving the Sustainable Development Goals (SDGs)** and to meeting challenges such as climate change that may prevent member countries from attaining sustainable food systems and improved nutrition. In working to address these challenges all available approaches and every possible solution, including agroecology and agricultural biotechnologies, should be considered.

The FAO Director-General recalled in his closing statement: "*tools and approaches must be useful and accessible for farmers, in particular family farmers*". **Agricultural biotechnologies cannot be considered in isolation**; their successful development and application for the benefit of smallholders and family farmers requires well-functioning research institutions, rural advisory services, markets, farmer organizations and other components of the wider agricultural innovation system.

[2] From the 4-page symposium summary report, available in English, French and Spanish at http://www.fao.org/3/a-bl623e.pdf, http://www.fao.org/3/a-bl623f.pdf and http://www.fao.org/3/a-bl623s.pdf respectively.

There are concerns about **intellectual property rights** and patents related to agricultural biotechnologies and their implications with respect to the development of sustainable food systems and nutrition.

The importance of **building awareness and communication** on agricultural biotechnologies was a common theme throughout the symposium as was the view that all stakeholders, including smallholders and family farmers, should be engaged in this process.

The engagement of **students** in the symposium was successful and was considered especially important, as they will be the future farmers and leaders.

7. What is the scope and focus of the regional meeting in Asia-Pacific?

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

The meeting will provide a neutral forum for representatives of governments, intergovernmental organizations and non-state actors, including civil society, private sector, research/academic institutions and cooperatives/producer organizations, to dialogue and exchange their knowledge and experiences in plenary as well as in parallel sessions. Ample time will be allotted for discussion, consultations and consensus building.

8. Can agricultural biotechnologies help smallholder farmers in developing countries in Asia-Pacific?

Yes, they can. FAO recently compiled a series of case studies[3] where biotechnologies were applied to the needs of smallholders. The case studies demonstrated that, despite the complexities of smallholder farmer production systems, agricultural biotechnologies can indeed represent powerful tools to benefit smallholder farmers given the appropriate conditions and enabling environment.

One case study from India 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.

In another case study, researchers used their knowledge of DNA markers to develop a flood-tolerant rice variety in India with a potential yield of 1-3 tons per hectare more than previously used varieties, under flood conditions. After being released in 2009, the new variety, Swarna-Sub1, spread rapidly and was used by three million farmers in 2012.

In China, the Jian carp was developed using within-family genetic selection and gynogenesis (a reproductive technology resulting in all-female offspring that have only received genes from their

[3] FAO. 2013. Biotechnologies at Work for Smallholders: Case Studies from Developing Countries in Crops, Livestock and Fish. http://www.fao.org/docrep/018/i3403e/i3403e00.htm

mother). The fast-growing Jian carp is now grown on about 160,000 fish farms and makes up over 50 percent of common carp production in China.

Another case study looked at 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.

Many of the case studies involved 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 the case studies 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.

However, although these case studies show that agricultural biotechnologies can benefit smallholder farmers, 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'. For agricultural biotechnologies to help smallholder farmers, various factors are required, including strong commitment from governments to smallholders; strong national and/or international partnerships; long-term investments in science and technology human capital and infrastructure; complementation of advanced research with solid knowledge of more traditional agricultural skills (such as plant and animal breeding); and the full participation of the smallholders themselves. It is important to have well-functioning and sustainably-funded agricultural innovation systems, where the different components of the system (such as research, extension and the farmers themselves) work well and there are good linkages between them. Improving the linkages and cooperation between the research and extension systems and farmers makes it easier both for farmers to access, and benefit from, the work of researchers and for researchers to learn from, and build upon, farmers' knowledge and innovations.

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.

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

Advice to governments: FAO assists its member countries in establishing priorities for biotechnology within the broad context of their agricultural research needs and policies or in identifying appropriate biotechnologies, taking into account all possible negative impacts, and providing guidance on their use. On request, FAO provides legal and technical advice to governments on areas such as development of national biotechnology strategies and development of biosafety 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: Upon request, FAO provides technical assistance directly to its member countries in areas such as building or strengthening national biotechnology and biosafety capacities, including development and implementation of regulations, training of scientists and personnel of regulatory bodies in risk analysis of GMOs, communication and public participation in biosafety-related decision-making, upgrading of laboratory capacities, and establishing effective linkages among all relevant stakeholders. 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, e-mail conferences and newsletters as well as hard-copy and electronic publications. The website provides information on FAO's work and international developments regarding biotechnology techniques and products, as well as on related policy and regulatory issues surrounding research and deployment of agricultural biotechnologies. The website also enables access to national biotechnology policy documents of FAO Members as well as access to about 200 articles, books, meeting reports, proceedings and studies published by FAO or prepared in collaboration with FAO on biotechnology in food and agriculture.

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. FAO provides member countries with a neutral forum to discuss policy and technical issues related to agricultural biotechnologies. For example, in February 2016, FAO organized the international symposium on "The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition" in Rome, bringing together over 400 participants from 75 countries, including a High-level Ministerial Session. To move the dialogue from the global to the regional level, FAO is planning to follow up by organizing four regional meetings on agricultural biotechnologies in 2017-2018.

FAO also hosts the Secretariats of a number of intergovernmental bodies and treaties that deal with some biotechnology-related issues, 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.

10. Who will participate in the regional meeting for Asia-Pacific?

All FAO member countries in Asia and the Pacific will be invited to take part in the meeting. The following countries in the region are members of FAO. Asia: Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, DPR Korea, India, Indonesia, Iran, Japan, Kazakhstan, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, Timor-Leste, Uzbekistan, Viet Nam. Pacific: Australia, Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.

The people who participate in the meeting will be representatives of governments, intergovernmental organizations and 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 250 participants are expected.

11. Is the regional meeting in Asia-Pacific focused on GMOs?

No, the regional meeting is not focused on genetically modified organisms (GMOs). The meeting 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.

12. 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.

13. Will there be other regional meetings on agricultural biotechnologies?

Yes; FAO is planning to organize four regional meetings in 2017-18. In 2017, in addition to this one in Asia-Pacific, there will be one in Sub-Saharan Africa, which will take place in Addis Ababa, Ethiopia, on 22-24 November. In 2018, it is planned that they will take place in Latin America and the Caribbean and in North Africa and the Near East.