# INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)

**Geneva, Switzerland**
**25-26 October 2022**

Contribution by FAO and IAEA

to the CSTD 2022-2023 priority theme on "Technology and innovation for cleaner and more productive and competitive production"

**PRIORITY THEME 1:** Technology and innovation for cleaner and more productive and competitive production

## United Nations Commission on Science and Technology for Development (CSTD)

To Whom it May Concern,

As you are aware, the CSTD 25th annual session selected "Technology and innovation for cleaner and more productive and competitive production" as one of the priority themes for its 26th session (2022-23 period). This priority theme is directly relevant to SDG 9 on industry, innovation and infrastructure.

As highlighted by the Technology and Innovation Report 2021, we live in a time of rapid technological change, at the height of the digital transformation and the early stages of the Industry 4.0 revolution. These technological waves have great potential to bring about the transformations needed to achieve the SDGs, reduce poverty, tackle climate change and put the world on a sustainable path. They also offer a window of opportunity for developing countries to catch up technologically and narrow global divides. Critical areas for innovation in this new technological revolution are renewable energy technologies and frontier technologies for sustainable production and consumption. Innovation in these areas could help diversify economies and create higher-wage jobs while protecting the planet.

This priority theme will examine national strategies and policies related to green technology and green innovation, and the role of international cooperation, including triangular and South-South cooperation, in supporting developing countries to benefit from windows of opportunity for developing, using, adopting and adapting these frontier technologies in production processes for catching up economically and technologically.

Questions to be addressed include: What countries should do to take advantage of this window of opportunity? How could the international community support developing countries in this regard?

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting from 25 to 27 October 2022. In this context, we would like to solicit input from the CSTD members on this theme. We would be grateful if you could kindly answer the following questions based on your experience in your country or region.

1. **What are some specific examples (from the public and private sectors) of green technology and innovation for cleaner and more productive and competitive production in your member countries? Please include contact, website, link to reports and any other relevant information concerning these projects and initiatives.**

The **Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture** supports Member States in developing more sustainable agricultural production and consumption, including in plant breeding and genetics, animal production and health, insect pest control, soil and water management and food safety and control. Nuclear and nuclear-derived green technologies provide competitive and often unique solutions to help fight hunger and malnutrition, improve environmental sustainability and ensure that food is safe. Some specific examples – from the seed to the consumer – where nuclear technologies, an areas for rearch and innovation itself, meet digital technologies:

A. Nuclear techniques are used both to induce genetic variation (and thus produce desired traits in crops), and to accelerate the **breeding of varieties** that have higher yields, improved resistance to disease and tolerance to environmental stresses such as drought and high salinity. Digital information and machine learning based on high-throughput genotyping and phenotyping are important components of selection in plant breeding for precise and accelerated selection of improved plants. During the current genomic era, large amounts of genomic data and the application in molecular breeding and genomic selection are key to accelerating the breeding process.

B. Combined Artificial Intelligence (AI) and nuclear techniques have been used in soil management to optimise **remediation of radioactively contaminated land** help to improve analytical prediction based on traditional chemometrics (e.g., infrared spectroscopy, nuclear magnetic resonance), or by supporting calibration of analytical equipment.

C. In the field of **insect pest control**, we use digital advances to improve the implementation of the sterile insect technique, a method that helps us to control the outbreak of insect pests and diseases vectors that affect plant, animals and human-beings, while reducing the need to use pesticides that harm the environment. For instance, digital technologies help us to automate the mass-rearing of insects, develop smart traps to automatically monitor fruit flies or using drones to release sterile insects to the field.

D. The Animal Production and Health Section of the Joint Centre runs and maintains an information platform in cooperation with the FAO, called **iVetNet.** Launched in 2021, iVetNet brings together laboratories across the globe, enhancing knowledge exchange and learning to improve the prevention and control of transboundary animal and zoonotic diseases for improved animal health and food security. iVetNet contains data related to laboratory infrastructure and facilities, and compiles, disseminates and harmonizes techniques for the detection and characterization of transboundary animal and zoonotic pathogens.

E. The Joint Centre also provides technical support and guidance on post-harvest applications of **food irradiation** techniques to help maintain food quality, reduce the risk of foodborne illness and invasive pests, and support the implementation of appropriate sanitary or phytosanitary controls.Irradiation is environmentally-friendly and safe.

F. Digital technologies are also important to detect **food fraud**. Food fraud to industry and consumers has been estimated at about 50 billion US Dollars every year. When food is traded, its traceability and authenticity is linked to a label and certificate, nowadays typically using a blockchain system. Together with the stable isotope techniques that the Joint Centre is using to detect food fraud, digital technologies such as Big Data/large databases can help to fight these criminal undertakings. Being able to access and confirm digitized authenticity data against a suspect sample will make it possible to quickly and efficiently check that food is what it says it is on the label.

2. **What are the national strategies, policies, and laws concerning green technology and innovation for cleaner and more productive and competitive production in your member countries or region?**

The Food and Agriculture Organization has 194 Member Nations, one Member Organization, and two Associate Members, while the IAEA counts 175 Member States.

National strategies, concerning nuclear-derived green technology and innovation are reflected in so-called Country Programme Frameworks (CPF). Prepared by a Member State in collaboration with the IAEA Secretariat, it defines mutually agreed priority development needs and interests to be supported through technical cooperation activities. A CPF reflects national development plans and priorities, country specific analyses and lessons learned from past cooperation, and also takes into consideration the Sustainable Development Goals, as appropriate. This ensures that the application of nuclear technologies is integrated with existing development initiatives and plans, and supports the identification of areas where such technologies might be usefully deployed. A CPF generally covers a period of four to six years.

CPFs are characterized by:

- A close dialogue between Member States and the IAEA as partners, ensuring greater ownership of the programme.
- The linking of the project selection process to well defined national development objectives and priorities to ensure the relevance of IAEA's support and the sustainability and impact of technical cooperation activities.
- Great emphasis on national competencies and capabilities in order to optimize the role and participation of Member States in the programme.
- Opportunities to contribute to the global development agenda and build partnerships between the IAEA, national and regional institutions, the UN and other international organizations.

Examples of CPFs can be found here for Zimbabwe or here for Mongolia.

**3. What are the key industries that are pioneering green innovation in your member countries or region? List the key actors in the national ecosystem of innovation related to green innovation in your member countries or region (firms, universities, financial institutions, regulators)? What are the key networks of the ecosystem in your region (including online networks, innovation hubs, forums, etc.)?**

**A. Key Industries**

**B. Key Actors**

The Joint FAO/IAEA Centre and National Nuclear Research Institutions.

**C. Key Networks**

The Joint FAO/IAEA Centre facilitates laboratory networks and cooperation centres to strengthen technical cooperation and partnerships. These instruments allow stakeholders to increase their technical cooperation in science and innovation . With its unique laboratory networks, the Joint Centre prompts the coordinated R&D activities on nuclear science and applications, disseminates the use of nuclear techniques for food and agriculture and facilitates international cooperation in nuclear applications, including South–South and Triangular partnerships.

For instance, VETLAB is an association of national veterinary laboratories in African and Asian countries; its expansion into Central and Eastern Europe, the Caribbean and Latin America is planned. The VETLAB network assists Member States to improve national laboratory capacities to early detect and control transboundary animal and zoonotic diseases threatening livestock and public health, including among others peste des petits ruminants, African swine fever, highly pathogenic avian influenza, Ebola, Rift Valley fever and lumpy skin disease.

The Red de Latino America y el Caribe (RALACA) network brings together analytical laboratories in Latin America and the Caribbean to enhance regional capabilities to target food safety and environmental sustainability. Its objective is to strengthen the technical capabilities of the laboratories in the region, to promote scientific cooperation among member countries and to foster communication between relevant stakeholders, including decision makers. It is organized by a managing board, administration secretaries, technical committees and independent advisory scientists. In 2020, RALACA achieved the status of an independent legal entity, thereby enhancing its sustainability and reinforcing the ownership of the member institutes and countries.

The African Food Safety Network (AFoSaN) brings together food safety and food control institutions in Africa. It includes food and veterinary laboratories, food inspectorates and other stakeholders, uniting to strengthen food safety control systems. Participants collaborate and share information on food matters and on analytical techniques. Analytical methods, such as Standard Operating Procedures, are shared through its web platform and other mechanisms. Dedicated activities include mutual training, the administration of regional proficiency tests on pesticide residues, mycotoxins and veterinary drug residues, support to internationally recognized laboratory accreditation and the organization of conferences.

The Food Safety Asia (FSA) network brings together food safety institutions in the Asia, Pacific and Middle East regions. It shares information, knowledge and expertise in laboratory work, provides training and supports accreditation and the improvement of analytical capabilities in the analysis of pesticide and veterinary drug residues, mycotoxins and other hazards, also through its web platform and other mechanisms. It contributes methods of analysis in the form of standard operation procedures (SOPs), and shares experience with instrumentation, its maintenance, troubleshooting and effective use.

The Mutation Breeding Network (MBN) currently operates as a pilot network in the Asia Pacific region with plans to extend globally based on expression of interest and identified modes of successful operation within the pilot. The Asia Pacific region currently reports the largest number of crop varieties released through mutation breeding in the Mutant Variety Database of the Joint FAO/IAEA Centre. The MBN, which held its first workshop in 2019, aims to enhance crop improvement through induced genetic diversity in the region by the exchange of technology,

exchange of germplasm with bilateral national arrangements, training and capacity building, and other related aspects.

4. **What are the challenges that governments in your region (or from your member countries) have faced or may face in promoting green technology and innovation in your country to contribute to national development priorities and accelerate the progress towards the SDGs?**

   The Food and Agriculture Organization has 194 Member Nations, one Member Organization, and two Associate Members, while the IAEA counts 175 Member States. Challenges concerning green technologies and innovation in these countries are manifold, and depend on case by case.

5. **What should governments, the private sector, organized civil society, and other stakeholders do so that developing countries can benefit from these technologies?What are some examples of international cooperation mechanisms, projects, programmes or strategies, including triangular and South-South cooperation, in green technology and innovation that your organization contribute or is part of?**

   See Answer C to Question 3

6. **What actions can the international community, including the CSTD, take to help developing countries take advantage of green technology and innovation for cleaner and more productive and competitive production?**

   The delivery mechanisms of the Joint FAO/IAEA Centre and its Member States are a good example of how the international community can help developing countries take advantage of green technology and innovation.

   The Joint Centre advances and supports the safe and appropriate use by FAO and IAEA Member States of nuclear and related technologies in food and agriculture, aiming to contribute to global food security and sustainable agricultural development worldwide. It does so through:

   A. **adaptive research and development** at its own laboratories in Seibersdorf as well as
   B. through annual support and coordination of more than 25 **coordinated research projects** involving some 400 research institutions and experimental stations
   C. **technical cooperation projects** providing capacity-building and technology transfer to over 200 national and regional technical cooperation projects; and
   D. **networks for South-South Cooperation** for technical and policy advice to policymakers.

7. **Could you suggest some contact persons of the nodal agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further input or invite some of them as speakers for the CSTD inter-sessional panel and annual session.**

   Please direct all your queries to the Director of the Joint FAO/IAEA Centre LIANG, Qu Q.Liang@iaea.org and CJN-Director CJN-Director@fao.org; in copy a.bogdanski@iaea.org

8. **Do you have any documentation, references, technological assessments, future studies or reports on the priority theme in your country or region?**

   See hyperlinks in the answers above.