

**24– 07 – 2024**

**News: Nuclear Technologies and Food Safety**

- Recently, an International Symposium on "Safe Food for a Better Life", jointly organised by the Food and Agriculture Organisation (FAO) and the International Atomic Energy Agency (IAEA) emphasised the importance of nuclear technologies for measuring, managing and controlling food safety.

## **Nuclear Technology in Food Safety**

### **Complementary to One Health Approach**

- The One Health approach recognises the interconnectedness of human, animal, and environmental health; nuclear techniques can be used to detect and monitor contaminants, pathogens, and toxins in food and the environment.
- Polymerase Chain Reaction (PCR) tests is a molecular nuclear technique, to rapidly detect animal diseases in less than a day.

## **Food Irradiation**

- Food irradiation is a process of exposing food to ionising radiation to eliminate harmful bacteria, pathogens, and pests; nuclear technology helps to extend the shelf life of food products and ensure their safety for consumption.
- Stable isotope analysis is a nuclear technique that is used to determine the origin and authenticity of food products and this helps to detect adulteration and verify labelling claims.

## **Improved Soil and Water Management**

- Past nuclear fallouts are actually helping scientists when it comes to measuring and assessing soil erosion, radioactive nuclides left behind after nuclear events can help scientists determine the health of soils and rate of erosion.

## **Pest Control**

- Nuclear techniques, such as the Sterile Insect Technique (SIT), are used for pest control in agricultural production systems.
- This technique limits reproduction and suppresses insects and pests, thereby reducing the need for chemical pesticides, which can negatively impact food safety.

## **Plant Breeding and Genetics**

- Nuclear technology applied in crop breeding facilitates the development of enhanced varieties capable of adapting to climate change.
- By subjecting seeds to irradiation by gamma rays, X-rays, ions, or electron beams, genetic alterations are initiated, expanding the genetic diversity available for breeding purposes.

## **Need for Tech-Related Advancements in Food Security**

### **Climate Change**

- Climate-induced challenges such as droughts, floods, and temperature fluctuations, can adversely affect crop production and food availability so climate-smart agriculture (CSA) needs to be promoted.

### **Food Waste**

- According to the FAO, roughly 1/3<sup>rd</sup> of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year and approximately 3.1 billion people could not afford a healthy diet in 2020 (FAO, 2022).

## **Increasing Population**

- The world's population is projected to reach 9.7 billion by 2050 (UN World Population Prospects, 2019), putting immense pressure on food production systems, thereby technological advancement is required.

## **Limited Resources**

- With limited arable land and freshwater resources, technology can help maximise productivity through vertical farming, hydroponics, and efficient irrigation systems.

## **Food and Agriculture Organization (FAO)**

- The Food and Agriculture Organization of the United Nations (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger and improve nutrition and food security.
- The FAO is composed of 197 member states. India is a founding member.
- It is headquartered in Rome, Italy, and maintains regional and field offices around the world, operating in over 130 countries.
- FAO also acts as the secretariat of Global Alliance for Climate-Smart Agriculture (GACSA) and that of Codex Alimentarius Commission (CAC).

- It helps governments and development agencies coordinate their activities to improve and develop agriculture, forestry, fisheries, and land and water resources. It also conducts research, provides technical assistance to projects, operates educational and training programs, and collects data on agricultural output, production, and development.
- The FAO is governed by a biennial conference representing each member country and the European Union, which elects a 49-member executive council.
- State of World's Forest is a biennial flagship report published by FAO.
- India has released a 75 rupee coin in 2020 in commemoration with the 75<sup>th</sup> year of FAO with the theme "A country will shine if the nutrition is correct".
- The Country Program Framework prepared by FAO India in collaboration with Ministry of Agriculture and Farmers Welfare, Government of India is aligned with our national priorities and has a much required multi sectoral approach.
- Flagship publications of FAO include State of World Fisheries and Aquaculture (SOFIA), State of World's Forests (SOFO).
- The Food Price Index is a measure of the monthly change in the international prices of a basket of food commodities. It is published by the UN's Food and Agriculture Organization (FAO).
- Codex Alimentarius Commission (CAC) is the joint collaboration of FAO and WHO.

## Days Implemented by FAO

- The International Day of Forests (21<sup>st</sup> March every year) is implemented by Secretariat of UN Forum on Forests & Food and Agriculture Organization (FAO).
- Food and Agricultural Organisation (FAO) in partnership with World Health Organisation (WHO), implements the World Food Safety Day on June 7<sup>th</sup> of every year on behalf of UNGA.
- World Food Day is celebrated to commemorate the establishment of the United Nation's Food and Agriculture Organisation (FAO) on 16<sup>th</sup> October 1945.
- Food and Agricultural Organisation implements the World Soil Day (5<sup>th</sup> December every year) on behalf of UNGA.
- GloLitter Partnerships Project is launched by the International Maritime Organization (IMO) and the Food and Agriculture Organization of the United Nations (FAO) with initial funding from the Government of Norway.
- Recently, FAO along with Arbor Day Foundation has awarded Hyderabad with Tree City of the world. (Current Affairs)

FAO has identified 5 key priority areas:

- Help eliminate hunger, food insecurity and malnutrition

- Make agriculture, forestry, and fisheries more productive and sustainable
- Reduce rural poverty
- Enable inclusive and efficient agricultural and food systems
- Increase the resilience of livelihoods to threats and crises

## **FAO in India**

- **Strengthening Institutional Capacities for Sustainable Mountain Development in the Indian Himalayan Region.**
- Promoting **Nutrition Education and Communication** in India.
- Strengthening Agriculture and Allied Sector Contributions to **India's National Biodiversity Action Plan (NBAP) 2008** and the **National Biodiversity Targets (NBTs)**.
- Technical Assistance to Farmer Water School Programme and Agricultural Activities under the **Uttar Pradesh Water Sector Restructuring Project (UPWSRP), Phase- II.**
- Support to the implementation of **Indian Ocean Tuna Commission Regional Observer Scheme.**
- Implementing the **Monitoring and Analyzing Food and Agricultural Policies (MAFAP) Programme** in India.

## International Atomic Energy Agency (IAEA)

- Widely known as the world's “Atoms for Peace and Development” organization within the United Nations family, the IAEA is the international centre for cooperation in the nuclear field.
- The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful use of nuclear technologies.
- The IAEA was created in 1957 in response to the deep fears and expectations generated by the discoveries and diverse uses of nuclear technology.
- IAEA's headquarters is in Vienna, Austria.
- It is an independent international organization that reports annually to the UN General Assembly and Security Council.
- The IAEA has 173 member states (including India) as of April 2021.
- Most UN members and the Holy See are Member States of the IAEA.
- There are thirty five countries including India in the world which generate electricity from nuclear energy.
- According to the data published in March 2017, by Power Reactor Information System (PRIS) of International Atomic Energy Agency (IAEA), India is ranked at 13<sup>th</sup> position in terms of power generation. However, it stood at 7<sup>th</sup> position in terms of number of reactors in operation country- wise, globally.



- The current installed nuclear power capacity is 6780 MWe.
- As India is not a party to Nuclear Non Proliferation Treaty (NNPT), it has classified its nuclear facilities into two types under Separation Plan;
- Unsafeguarded—where domestic uranium can be used anywhere India wants; and safeguarded—where imported uranium would be used for civilian nuclear energy.
- Since India's use of domestic uranium could not anyway be restricted, this was seen as a balance between the benefits of nuclear energy in emission reduction and the risks of increasing India's military capability.
- 26 of Indian nuclear facilities are under the IAEA safeguards.
- IAEA safeguards are a set of technical measures applied by the IAEA on nuclear material and activities, through which the agency seeks to independently verify that nuclear facilities are not misused and nuclear materials, are not diverted from peaceful purposes.
- Indian nuclear reactors that use purchased nuclear input from foreign countries are subject to those standards.
- India currently imports uranium from Russia, Kazakhstan and Canada. Plans are also afoot to procure the fuel from Uzbekistan and Australia.

- India has joined the **IAEA Response and Assistance Network (RANET)** in January 2020. RANET is **a group of countries that provide assistance to reduce the consequence of nuclear or radiological emergencies.**