Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

Nuclear techniques for climate-smart agriculture


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The Joint Food and Agriculture Organization of the United Nations/ International Atomic Energy Agency (FAO/IAEA) Division of Nuclear Techniques in Food and Agriculture optimizes and strengthens the capacities of member countries in using nuclear and isotopic techniques to improve agricultural resilience and the adaptation to climate change. The impact of climate change is assessed to enhance agricultural productivity, better adapt and build agricultural and food security systems resilience to climate change impact and reduce greenhouse gas (GHG) emissions in agriculture, for food security and sustainable agricultural development.


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What FAO does

Nuclear and related techniques are used to develop climate smart agricultural practices and technology packages to enhance resource use efficiency, improve soil fertility, curtail farming costs and increase crop and livestock productivity in a sustainable manner. The Joint Division supports member countries in targeting their R&D and implementing national regulations that address their climate vulnerabilities, focusing on climate-smart agriculture.

Resilience and adaptation to climate change

- Mutation breeding for drought, salinity and pest tolerance of agricultural crops;
- Insect sterilization for area-wide integrated pest management;
- Identification of sources of land degradation in agricultural landscapes;
- Optimization of livestock reproduction, breeding and local feed utilization.

Greenhouse gas reduction

- Identification of sources of nitrous oxide production for emission reduction;
- Evaluation of soil quality and carbon sequestration;
- Optimization of animal feeding practices and manure management.

Development of climate smart agricultural practices

- Assessing land degradation, soil erosion and carbon, water and nutrient movement dynamics;
- Determining uptake and utilization of rumen microbial protein;
- Optimizing animal breeding programmes.

Assessing impact of climate change

- Assessing impacts of climate change on land degradation and sediment redistribution;
- Identifying sources of nitrous oxide production;
- Tracking migratory bird movement to ascertain risks of disease transmission;
- Monitoring agrochemical inputs to reveal application efficiency of climate-smart agricultural practices.

Contributes to FAO's Strategic Objectives 2, 4 and 5

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

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Understanding the context

Rising temperatures and extreme weather events are increasingly affecting food security, with severe impacts on crops, livestock, forestry, fisheries and aquaculture productivity. The changing climate also influences the emergence and re-emergence of vector-borne diseases. The management of agricultural systems and natural resources needs to be urgently improved to ensure that farming communities and practices are sufficiently resilient and sustainable to cope with the impacts of climate change. Increasing global temperatures and changes in climate also affect ecosystems and the benefits they provide to society. Crop and livestock production, agricultural soil and water resources, and food security are increasingly being affected. Agriculture is both a victim as well as a producer of greenhouse gas, which contributes greatly to global warming and climate change.

Agriculture contributes over 20% of the global release of GHG emissions, trapping heat in the Earth's atmosphere by absorbing thermal radiation from the Earth, which in turn increases the Earth's temperature. Isotopes of carbon and nitrogen are being used to measure and track how and when these GHG are being formed, released and absorbed under different soil and environmental conditions and farm management practices.

The following are some of the successes on the use of nuclear and isotopic techniques for climate-smart agriculture.

In Sudan, nuclear technology helped hundreds of poor, malnourished women farmers in Kassala in the eastern Sudan, who have been living constrained lives with few opportunities and limited food resources. This project has helped them to move out of poverty by introducing a fertigation system to grow vegetables. The amount of water and nitrogen fertilizer needed by the crops was optimized using nuclear and isotopic techniques.

In Burkina Faso, researchers have determined both the nutritional value of several local available feeds and the nutritional requirements of sheep and goats, and the team developed a programme to produce 'multi-nutrient mineral blocks" (MMBs) – lick blocks that contain urea, minerals along with local crop residues that can cover part of the animal requirements. The farmer's cooperative are now making and selling the blocks to farmers on a full-cost recovery basis.

CONTACT US

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MORE INFORMATION

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