

From farm to fork

The nuclear techniques involved in putting food on our tables

Did you know that nuclear techniques play a crucial role in putting food on our tables? From enhancing crop production to ensuring food safety, nuclear science is integral to sustainable agriculture.

This visual guide explores the nuclear techniques that protect our food supply and help make every bite safe and nutritious.



PLANT BREEDING

Using nuclear techniques, the IAEA, through the Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture (Joint FAO/IAEA Centre), builds national capacities in plant breeding to develop crops that are more resistant to diseases, pests and environmental stressors.

By inducing mutations with radiation, scientists create new plant varieties that improve product quality, have higher yields and yield stability and are more resilient to climate change and more tolerant to environmental stressors, contributing to a more robust and sustainable food supply.



The FAO/IAEA Mutant Variety Database is a repository for information on plant varieties developed using mutation breeding techniques.

It contains information on 3433 varieties from 75 countries, for more than 238 different crop types.



INSECT PEST CONTROL



The IAEA, through the Joint FAO/IAEA Centre, leads global efforts to implement and further develop the sterile insect technique (SIT), which uses radiation to sterilize male pests.

Sterilized males are released to mate with wild females, reducing pest populations. This eco-friendly method controls agricultural pests, reduces the need for chemical pesticides and protects crops and the environment.



Up to 40% of global crop production is lost to plant pests and diseases.

ANIMAL HEALTH



The IAEA, through the Joint FAO/IAEA Centre, utilizes nuclear and related techniques to monitor and control animal diseases, which in turn improves livestock health and productivity.

This allows countries to ensure a steady supply of safe and nutritious animal products, supports sustainable agricultural practices, and protects public health through early disease detection and vaccination programmes.



The Veterinary Diagnostic Laboratory Network (VETLAB Network), supported and coordinated by the IAEA, is a network of 46 veterinary laboratories in Africa and 19 in Asia.

Support is provided through the procurement of laboratory reagents and equipment and the provision of training courses to strengthen the proficiency of designated national veterinary laboratories in deploying diagnostic tests for transboundary animal and zoonotic diseases, and vaccine quality assurance.

CLIMATE-SMART AGRICULTURE

Climate-smart agriculture is a set of agricultural practices and technologies that can be used to sustainably increase agricultural productivity. The IAEA strengthens the capacities of countries in using nuclear and isotopic techniques to sustainably

increase agricultural productivity, adapt and build the resilience of agricultural and food security systems to climate change, and reduce greenhouse gas emissions from agriculture.



146 countries work with the IAEA on **technical cooperation projects** that address climate change adaptation.



LAND AND WATER MANAGEMENT

Nuclear techniques contribute to optimized land and water management by tracing soil and water movement. The IAEA assists countries to develop and apply sustainable farming practices, improve

water use efficiency and combat soil degradation, thus contributing to increased global agricultural production and food security while conserving natural resources.

Agriculture consumes more than 70% of the world's water, mainly for irrigation, but water use efficiency is less than 40%.



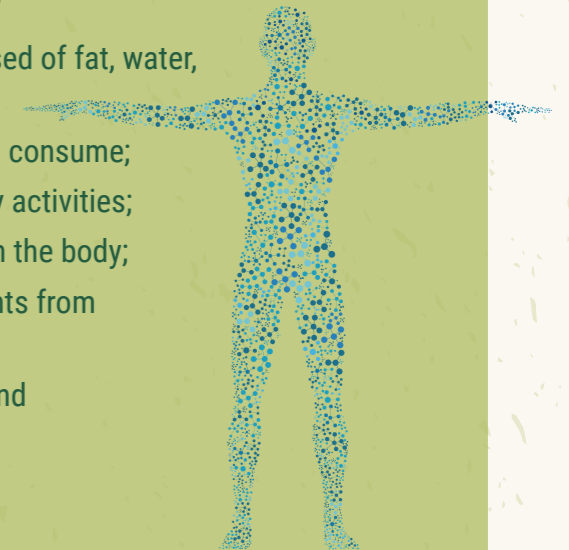
NUTRITION

Proper nutrition is fundamental to health. The IAEA provides countries with the equipment and training necessary to use nuclear techniques to understand

nutritional problems, so that nutrition and health professionals can develop and evaluate nutrition actions to combat all forms of malnutrition.

Nuclear techniques can assess:

- how much of the body is composed of fat, water, muscle or bone;
- the amount of breast milk babies consume;
- the energy we expend in our daily activities;
- the amount of vitamin A stored in the body;
- how well the body utilizes nutrients from different foods;
- the true protein value of foods; and
- bone density and bone health.



FOOD SAFETY

The IAEA, through the Joint FAO/IAEA Centre, assists countries in employing nuclear methods to detect contaminants and residues in food, verify the origins and authenticity of food, and meet international standards.

Countries are also supported in the use of ionizing radiation. Techniques such as irradiation eliminate harmful bacteria and pests, extend shelf life and reduce food waste. These measures ensure that food is safe and nutritious and foster international trade.

In 2023, 417 scientists from more than 43 countries were trained by the IAEA in these techniques and technologies.

