IAEA
Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

VIET NAM
Food irradiation

Until recently, few consumers in western markets knew very much about the exotic and nutritious cactus known as dragonfruit – so named because its colour and shape are similar to the red eyes illustrators give to dragons. Native to Central America, it is now widely cultivated in Asia, especially Viet Nam. From very modest beginnings of around 100 tonnes in 2008, Viet Nam increased its dragonfruit exports to the US to 1 300 tonnes in 2013, an increase made possible because the fruit went through an irradiation process to keep insect pests from stowing away in the shipment, allowing it to be certified as irradiated, which enabled it to pass strict US import regulations. The Joint FAO/IAEA Division works throughout the world with countries such as Viet Nam, to help them to develop their own irradiation facilities, or to access others, in order to control pests and facilitate trade and, at the same time, reduce the need for potentially harmful chemical insecticides.

Preventing insects from hitch-hiking to new pastures

Irradiation opens markets and protects the environment

Irradiation has been used in the food industry for decades to control bacterial growth and food-borne illnesses and to prevent spoilage. With the proliferation of regulations necessary to deal with the exponential increase in global food trade, irradiation is being increasingly adopted to combat the spread of insect pests that can hide in fresh fruits and vegetables destined for export markets. In addition to controlling pathogens and slowing down the spoilage, light doses of irradiation can also keep insect pests from invading new territory where they could establish and breed with potentially devastating consequences for the environment and agricultural production.

The Joint FAO/IAEA Division has actively supported the development of irradiation as a safe and cost effective phytosanitary measure for fruits and vegetables, an effort that has begun to pay dividends. Irradiation is now being used on a commercial basis as a treatment that has minimal effect on fresh produce but maximum effect on the breeding potential of invasive insects. In addition to facilitating international food trade, it offers economic and environmental benefits by replacing costly and potentially harmful chemicals that can also impact ecosystems.

Increasing understanding of the irradiation process

The first commercial food irradiation, back in the 1950s, was limited to dried herbs and spices. Few foods were treated. This continued until the 1980s when the process was officially recognized as safe by the Joint Division and the World Health Organization (WHO). Once declared safe, proponents expected it to be adopted immediately by commercial interests, but that did not happen. People misunderstood the term ‘irradiation’, equating it with radioactivity, even though, in reality, food irradiation uses photons, electrons or x-rays, in a process similar to security screening methods used at airports, but using higher intensity beams. The food never comes into contact with radioactive material; the beams do the work without significantly changing the food’s temperature or affecting its nutritional value. Irradiation maintains the quality and increases the safety of the food. Other methods used to control pests, such as cold treatments, vapor heat or chemical fumigants, can change the texture or taste of the food, or leave chemical residues. That does not happen with low intensity irradiation.

The prescription for the appropriate irradiation dose – how strong, how long – must be exact. This means determining which doses work best for which foods and which insects. For example, the International Plant Protection Convention has a series of 14 irradiation standards, backed by scientific evidence gathered by the Joint Division, that prescribe the safe use of irradiation for addressing specific insect pests.

Building from this base, the Joint Division began in 2010 to work on developing a generic one-fits-all irradiation application that could apply to a host of different insects, particularly those that are of quarantine importance. It also worked with 17 countries in Asia to develop guidelines for good irradiation practices which are now publicly available for use.

Irradiation facilities for exporters and importers

In addition to establishing dose levels and strategies for irradiating fruits and vegetables against regulated pests, the Joint Division supports exporting countries in setting up their own irradiation facilities. For example, Viet Nam was previously unable to export dragonfruit to lucrative western markets due to insect pests, but now the country is equipped to use radiation treatment to eliminate the pests without affecting the fruit's safety or nutritional quality.

The Division also links exporters in poor countries that have no facilities to irradiation operations in importing countries, making it possible for them to irradiate their shipments on arrival. This means that though, for example, Pakistani mango growers do not have access to an irradiation facility in their country, they are still able to export their globally-appreciated mangoes to countries like the United States, where the importing country irradiates the mangoes upon arrival.

With the support of the Joint Division, over 60 countries have approved irradiation for more than 60 types of food products. Each year, some 500 000 tonnes of spices, grains, chicken, beef, seafood, fruits and vegetables are treated in 180 gamma irradiation facilities worldwide. For high-end consumers, this means year-round access to exotic fruits from around the world, but for local farmers and exporters in developing countries, this means a chance to compete in international trade, an opportunity they would be unlikely to have otherwise.

Partners:

Atomic Energy Commission of Syria

Centre for the Application of Isotopes and Radiation Technology, Indonesia

Centro de Energia Nuclear na Agricultura, Universidade de Sao Paulo, Brazil

Chinese Academy of Inspection and Quarantine (CAIQ)

Citrus Research International Ltd, South Africa

Department of Entomology and Nematology, University of Florida, USA

Estación Experimental Agroindustrial Obispo Colombres in collaboration with Comisión Nacional de Energia Atomica, Departamento Procesos por radiación, Argentina

Food and Environment Research Agency, Department for Environment Food and Rural Affairs, United Kingdom

Irradiation Department (Programa MOSCAMED), Mexico Fruit Fly Program

National Center for Electron Beam Research, Texas A&M University, USA

Nuclear Energy Department, Federal University of Pernambuco, Brazil

Nuclear Institute for Food and Agriculture, Pakistan Atomic Energy Commission

Research and Development Center for Radiation Technology, Viet Nam Atomic Energy Institute

Stored Product Insect Research Unit Centre for Grain and Animal Health Research, Kansas, USA

Technological Laboratory of Uruguay Irradiator, Laboratorio Tecnológico del Uruguay (LATU)

Tropical Phytosanitary Solutions, Australia

Turkish Atomic Energy Authority

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For further information

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