FOOD IRRADIATION FACILITIES IN IRAN

H. Shakiba – M. Haji-saeid
Atomic Energy Organization of Iran

Abstract:

In Iran, like many developing countries, we have big losses of foods, sometimes up to 40% of production. These losses are mainly during storage, handling, and unsuitable preservation techniques. The study of food irradiation process as an alternative to traditional methods has been started more than 20 years ago by a small research Cobalt Irradiator in the Atomic Energy Organization of Iran (AEOI). Till 1982, the research and investigation was in basic science only. After installation of a Gamma Irradiator, the research on many food products such as pistachio-nuts, dates, onion, spices, and grain became more serious and finally spices was selected for irradiation in the Gamma facility. The availability of sufficiently powerful irradiator was an important factor to carry out the feasibility of practical irradiation for preservation and decontamination of food.

In 1998, AEOI installed a powerful 100KW Electron Accelerator in central part of Iran, Yazd. This Accelerator is a Rhodotron* type with two outputs on 5MeV and 10MeV, both in horizontal and vertical directions, equipped with X-ray targets and 2500 square meters storage area to give flexibility for all kind of industrial and food irradiation. The accelerator is capable of producing high-energy high power beams for industrial irradiation. It is practically suitable for applications which need high-energy radiation processing combined with high product throughput and product flexibility.

Rhodotron operates on the basic principal that electrons gain energy when they cross a cavity where an axial electric field exists. The electrons are generated in a vacuum environment, which is called electron gun and located at the outer wall of cavity. The electrons are then drawn away an accelerated by radial electric field which transmits energy to them. The accelerated beam is then bent by external magnets for more
accelerating cycles. At the exit of the accelerator, the cylindrical shaped beam of high-energy electrons is guided through beam lines to radiation vault. Finally the beam expands back and forth across a conveyor system carrying the product to be irradiated.

This machine also has been linked with 120Cm-width Conveyor system that supplies the products with a velocity control mechanism to achieve the proper radiation dose. Quality control and checking systems has also been established with high precision equipment’s, such as a dosimetry laboratories for the measurements of absorbed dose in the products for all ranges of irradiation condition.

Most common type of dosimeters such as FWT, CTA, B3&B4 films, Perspex and Ferike, calorimeters and Aluminum wedge are some examples of our routine dosimetry which help us through this procedure. A very well equipped microbiology laboratory is one of the most important parts of our system, for dose setting and controlling the contamination of products.

The polymer laboratories are also one of the best in the Country, not only for polymer research and industrial application, but also it is useful for quality control of material packaging.

After introducing the irradiation facilities to some industries, presently we are irradiating a large quantity of Henna which is a very important herb in Iran and due to it's traditional way of processing it is highly contaminated and Irradiation with around 8Kgy dose is the only solution.

We are also finalizing the irradiation of chicken food in the near future. Within the governmental project, negotiation and investigations of radiation technology for insect control of Pistachio and Dates are also carried out in the past few month and these product of Iran in several thousands tons are the most important for the export and domestic consumption. Although the research has been carried out for proper dose and especially for Dates, to substitute Methyl Bromide, The producers and manufacturers are worrying about international trade of such a product.

Therefore, we come to the point that, Harmonization of regulations, especially within the developed Countries will pay a key role in the future success of this technology.