GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
LOK SABHA
UNSTARRED QUESTION NO.6050
TO BE ANSWERED ON 04.04.2018

USE OF RADIATION TECHNOLOGY FOR FRUITS AND VEGETABLES

6050. SHRI RAMSINH RATHWA:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government proposes to use nuclear radiation technology developed by Bhabha Atomic Research Centre (BARC) for increasing the shelf life of fruits and vegetables, especially that of onions and potatoes and if so, the details thereof;

(b) the details of radiation plants established by the Government so far along with the details of the fruits and vegetables whose shelf life have been increased; and

(c) whether the Government has conducted any study to ascertain the safety of technology approved by the Atomic Energy Regulatory Commission and if so, the details and the outcome thereof?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND PRIME MINISTER'S OFFICE (Dr. JITENDRA SINGH) :

(a) Radiation processing technology is already being used for processing of agricultural/food products. Radiation processing has potential to control post-harvest losses of foods including the perishable produce like onions and potatoes. Bhabha Atomic Research Centre (BARC) has been engaged in R&D work on the technology of preservation and hygienisation of food and agri-products by radiation processing. Extension of shelf life of horticultural produces is very much depended on the produce, variety and storage conditions. For many fresh agricultural produce subjected to irradiation and proper storage, substantial shelf life extension can be achieved. Radiation technology can delay ripening of certain fruits such as mango and banana. It can also delay the senescence (natural decay) process of many fruits and vegetables. It can control post-harvest sprouting in case of potato, onion, ginger and garlic. By all these effects, shelf life of many fruits and vegetables can be substantially extended. Besides, quarantine of fruits, flowers and vegetables can be achieved with irradiation which is a requirement for exporting the agricultural produce to many countries. Some fruits and leafy vegetables need to be stored under refrigerated conditions (4-6°C) after irradiation. In general, about 7-10 days enhanced shelf life extension has been observed for the irradiated vegetables with respect to non-irradiated ones. BARC has done extensive studies on shelf-life extension of potato and onion, and phytosanitary treatments of fruits like Mango, Pomegranate etc. Sprouting during storage is the main reason for loss of quality, reduced shelf life and nutritional values. In onions, the effectiveness of irradiation for satisfactory sprout control is very much dependent on the habitat, pre-harvest

growing conditions, cropping season, state of dormancy of the onion bulb at the time of irradiation, the radiation doses employed, and post-irradiation storage environment particularly the temperature and humidity. With potatoes regardless of cultivar and post-irradiation storage temperature inhibits sprouting irreversibly. In general, best results are obtained when good quality tubers harvested with minimal injuries and cured sufficiently to heal the bruises and wounds, are irradiated. Depending upon the varieties, the shelf-life of onion and potato can be extended for 4-6 months while storage at 12-15 °C.

Food irradiation facilities have been deployed in several sectors in Indian Agri market and are contributing considerably for the preservation of intended food commodities. This technology has shown potential to address quarantine barrier for export of Indian mangoes to USA. Other fruits (pomegranate and grapes) are also under consideration for the same purpose as well as shelf life enhancement. A large quantity of Indian spices is commercially being irradiated since long time both for domestic and international markets. Processing also brings benefits to consumers in terms of availability, storage life, distribution, and improved hygiene of food. Irradiation can have a stabilizing effect on market price of commodities by reducing storage losses resulting in increased availability of produce. Government of India has already issued a notification dated June 26, 2012 under Atomic Energy Act, 1962 with a title "Atomic Energy (Radiation Processing of Food and Allied Products) Rule, 2012" in which 8 categories of products have been approved for Radiation Processing including onions and potatoes.

(b) Government of India (Department of Atomic Energy) has set up two radiation technology demonstration units, one commissioned in the year 2000 for high dose irradiation at Vashi, Navi Mumbai, and another in 2002, for low dose irradiation, i.e. Krushi Utpadan Sanrakshan Kendra (KRUSHAK) facility at Lasalgaon near Nashik. The facilities are being operated by the Board of Radiation & Isotope Technology (BRIT). Two plants are also set up one each by Maharashtra government and Gujarat government. Currently, 15 irradiation plants including those in Private Sector (Annexure 1) are functional in the country. These facilities are being used extensively for radiation processing of agricultural produce such as onion, potato, mango, grains and other products such as onion powder, garlic powder, spices, ayurvedic products, animal feed etc. Mango irradiation started since the year 2007 and around 1150 tons of mangos are processed annually at these facilities for export to USA. Annually, about 20,000 MT of food and allied products are being irradiated in the country.

(c) The irradiation process involves passing of food through a radiation field allowing the food to absorb desired radiation energy but the food itself never comes in contact with the radioactive material and hence the irradiation process does not make food radioactive. The energy of the radiation is much below the threshold limit to induce radioactivity in atoms and molecules. Irradiation produces very little chemical changes in food. Physical properties of food were also not found to be affected by the radiation treatment. The majority of changes due to radiation processing of food are similar to those by other preservation methods like heat. The radiolytic products and free radicals produced in irradiated food are identical to those present in foods subjected to treatment such as cooking and canning. None of the changes known to

occur have been found to be harmful. Highly sensitive scientific tests carried out during the past 50 years in India as well as abroad have failed to detect any new chemical product in radiation processed foods. The safety and wholesomeness of the technology was endorsed in 1981 by international bodies like World Health Organization (WHO), Food & Agricultural Organization (FAO), International Atomic Energy Agency (IAEA), and in 1983 by the Codex Alimentarius Commission (CAC). Recently, the harmonization of food irradiation rules with the international regulation through adaptation of class wise clearance of irradiated food items by the Food Safety and Standards Authority of India (FSSAI) has taken place with the issue of [Food Safety and Standards (Food Products Standards and Food Additives) Sixth Amendment Regulations, 2016] for large scale deployment of this technology.

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Annexure-1.

RADIATION PROCESSING PLANTS IN INDIA

Sr. No.	Name of Facility	Purpose	Status/Commissioned
	Government Sector		
1	Radiation Processing Plant, Vashi, Navi Mumbai, Maharashtra(by BRIT, DAE)	Food and allied products	Commissioned in 2000
2	KRUSHAK, Lassalgaon, Nashik, Maharashtra (by BARC, DAE)	Food Products	Commissioned in 2002
3	M/s. Gujarat Agro Industries Corpn. Ltd, Bavla, Ahmedabad, Gujarat	Food Products	Commissioned in 2014
4	Maharashtra State Agricultural Mktg. Board, Navi Mumbai, Maharashtra	Food Products	Commissioned in 2015
	Private Sector		
5	M/s. Organic Green Foods Ltd., Dankuni, Kolkata, West Bengal	Food, Packaging & Medical Products	Commissioned in 2004
6	M/s. A.V. Processors Pvt. Ltd., Ambernath (E), Thane, Maharashtra	Food & Medical Products	Commissioned in 2005
7	M/s. Universal Medicap Ltd., Vadodara, Gujarat	Food & Medical Products	Commissioned in 2005.
8	M/s. Microtrol, Bangalore, Karnataka	Food & Medical Products	Commissioned in 2006
9	M/s. Agrosurg Irradiators, Vasai, Thane, Maharashtra	Food, Packaging & Medical Products	Commissioned in 2008.
10	M/s. Gamma Agro Medical Processing, Hyderabad, Telangana	Food & Medical Products	Commissioned in 2008.
11	M/s. Jhunsons Chemicals Pvt Ltd., Bhiwadi, Rajasthan	Agro, Medical & Packaging Products	Commissioned in 2010
12	M/s. Innova Agri Bio Park Ltd., Malur, Dist. Kolar, Karnataka	Food & Medical Products	Commissioned in 2011
13	M/s. Hindustan Agro Co-Operative Ltd., Rahuri, Ahmednagar, Maharashtra	Onion & Other Agricultural Produces	Commissioned in 2012
14	M/s. Impartial Agro Tech (P) Ltd., Unnao, Lucknow, Uttar Pradesh	Food & Medical Products	Commissioned in 2014
15	M/s. Aligned Industries, Dharuhera, Rewari, Haryana	Food Products	Commissioned in 2015