

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJYASABHA
UNSTARRED QUESTION NO.1601
ANSWERED ON 13/03/2025

DAE'S CONTRIBUTIONS TO AGRICULTURE

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Will the PRIME MINISTER be pleased to state:-

- (a) whether Department of Atomic Energy (DAE) is contributing in the field of Agriculture;
and
(b) if so, what are the DAE's achievements in the field of agriculture?

ANSWER

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

- (a) & (b) Yes, Department of Atomic Energy (DAE) has contributed significantly to the field of agriculture through its research and development in deployment of radiation technology. Radiation technologies are used in agricultural research to develop improved crop varieties, to manage insects/pests, to study fertilizer use efficiency & plant micronutrient uptake and also to preserve agricultural produce. The details of the achievements in the field of agriculture are mentioned below:

1. **Development of High-Yielding Crop Varieties:**

Using radiation induced mutagenesis along with cross breeding, Bhabha Atomic Research Centre (BARC) a constituent Unit of DAE, has developed 70 (seventy) crop varieties of pulses (tur dal, urdbean, mungbean, pigeonpea, cowpea), oilseeds (mustard, groundnut, sunflower, soybean, sesame), and cereals (wheat, rice, barley, jowar, bajra, maize) etc. which have been Gazette notified and released for commercial cultivation in the country. These crop varieties have desirable traits such as high yield, disease resistance, early

maturity, climate resilience, biotic & abiotic stress tolerance etc. and thus benefited farmers in drought-prone and low-fertility regions.

2. **Radiation-Based Food Preservation (Food Irradiation):**

Radiation technology developed by BARC is used to extend the shelf life of perishable food products, mitigate post harvesting and storage losses of agriculture produce enhancing food security. Standard Operating Procedures (SOPs) have been developed involving gamma irradiation and subsequent storage in controlled environment for shelf-life extension of onion and potatoes up to 7.5 months and 8 months respectively while retaining the quality attributes. Large-scale trials have been carried out for the same. SOPs involving radiation technology has been successfully demonstrated to extend the shelf life of mangoes to facilitate export through sea route. SOPs for shelf-life extension of cereals, wheat, spices, mushroom, fruits and vegetables such as green tomato, broccoli have also been developed.

Food preservation technologies for jamun product, sprouts & sweet corn kernels and ready-to-eat (RTE) intermediate moisture (IM) fruits cubes were developed and technologies were transferred to different firms for commercial deployment. These technologies are also published on BARC website for technology transfer on non-exclusive basis at nominal cost.

Till date twenty-eight (28) irradiation plants based on BARC developed technology have been set-up in the country.

3. Litchi Treatment plant based upon BARC technology was set-up at National Research Centre on Litchi, ICAR located at Mushahari, Muzaffarpur, Bihar. An Indian patent has been awarded to this technology which increases the shelf-life of litchi up to 60 days.

4. **Soil & Water Management:**

Radioisotope techniques developed by BARC helps in efficient water resource management, soil fertility improvement, and groundwater conservation. Nuclear techniques improve fertilizer use efficiency, reduce excessive usage of chemical fertilizers and pollution.

5. **Pest Control through Nuclear Techniques:**

Radiation-based sterile insect technique (SIT) has been developed at BARC, Mumbai, for the management of insect pests like red palm weevil of coconut and other palms, potato tuber moth of potato crop.

6. **“SHIVAY”- Sheetal Vahak Yantra :**

Raja Ramanna Centre for Advanced Technology (RRCAT) a constituent Unit of DAE has developed a technology named “SHIVAY”- Sheetal Vahak Yantra for transportation of perishable fruits and vegetables under combination of controlled temperature, humidity and inert atmosphere to maintain freshness during transportation. The system is successfully tested for about 4000 km of road trials. This technology uses Liquid Nitrogen for cooling which is a by-product of Oxygen plants. India has an excess capacity of production of 35 Lac ltr./day of Liquid Nitrogen. Farmers can access far off markets even 1000 km away with same freshness at a very low refrigeration cost of Rs.1/kg. The technology is 100% eco-friendly with no consumption of Diesel or Electricity for cooling, resulting no carbon footprint.

7. RRCAT has developed 10 MeV electron linac and electron beam processing facility at Indore. This facility is useful in providing irradiation dose for carrying out experiments on agricultural produce and seed crop samples. RRCAT has provided electron beam irradiation and dosimetry services for mutation breeding experiments on large number of crop seed varieties to ICAR institutes and BARC, Mumbai. The irradiated seed samples included rice, ground nut, gram, millet, cowpea, lobia, pigeon pea(tuar), mungbean, uridbean pulses, soybean, garden pea and garlic cloves. RRCAT has also provided electron beam processing services for experiments on phytosanitary applications on rice and millet samples.

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