O.I.H.

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION

LOK SABHA
UNSTARRED QUESTION NO. 1293
TO BE ANSWERED ON 18/12/2018

MECHANICAL AND TECHNOLOGICAL INTERVENTION IN AGRICULTURE

1293. SHRI SHARAD TRIPATHI:

Will the Minister of AGRICULTURE AND FARMERS WELFARE कृषि और किसान कल्याण मंत्री be pleased to state:

(a) whether in order to face the challenges of growing population by the year 2020, mechanical and technological intervention is highly required in agriculture sector;

(b) if so, the details thereof;

(c) the details of estimated demand of foodgrains during the above said period;

(d) whether the Government launched the research missions for integrated agricultural work to increase the production and productivity of foodgrains in the country; and

(e) if so, the details along with the outcome thereof?

A N S W E R

MINISTER OF STATE IN THE MINISTRY OF AGRICULTURE AND FARMERS WELFARE
कृषि और किसान कल्याण मंत्रालय में राज्य मंत्री
(SHRI PARSHOTTAM RUPALA)

(a) Yes, the mechanical and technological interventions in agriculture sector are a must to face the challenges of growing population, to meet the requirement of food and fibre. These interventions are also required to reduce the post-harvest losses.

(b) The major areas of mechanical and technological interventions are as follows:-

(i) Genetic enhancement of plants / animals / fish for higher productivity under increased intensity of biotic and abiotic stresses

Genetic enhancement is considered to be a major option to bridge the demand and supply gap under normal situations as well under projected scenarios of increased frequency and intensity of stresses. In agriculture,

biotechnology has enabled the genetic alteration of crops, improved soil productivity, and enhanced natural weed and pest control. It should, however, be understood that genetically modified organisms (GMOs) may help solve some very difficult problems such as salinity or drought, but they do not present a miracle solution; and they are not automatically synonymous with sustainable foods. Emphasis is needed on green biotechnologies (concerning plants and their growing) as well as on the white biotechnologies (primarily focusing on use of biological organisms to produce or manipulate things).

In the livestock and fishery sectors, research can be utilized in the frontier areas like stem cells, pharmacokinetics and nutrigenomics, transgenic animals, proteome analysis, siRNA technology, bio-sensor applications, targeted nano-delivery of drugs; IVF-ETT, etc. can be gainfully utilized for strengthening system efficiency. Some important issues for investigation are: livestock genetic improvement using phenomics, genomics and bioinformatics tools; breeding transgenic animals capable of producing tailor-made milk/meat to cater to the specific needs; understanding of the basis of genetic resistance in domestic species of livestock with DNA markers for disease-resistant genes and the ability to diagnose specific genotypic markers that correlate with susceptible and resistant phenotypes; regenerative medicine, micro- electro- mechanical systems (Bio-MEMS), pharmacy-on-chip, implanted body regulator, gene-based preventive medicine and bio-electronics; efficient nutrient delivery in animals through application of nano-technology; and development and strengthening of bio-safety capabilities. Cytogenetics and genotoxicity of fish and shellfish; extraction and characterization of bio-molecules having therapeutic and industrial significance; identification of biosynthetic gene clusters in aquatic bacteria for production of novel bioactive compounds are some other frontier areas for research.

Automation of fish culture system, multitier culture systems, Re-circulatory Aquaculture System (RAS), Renewable energy for fishing and processing industry are needed in the fisheries sector.

(ii) Productivity enhancement through mechanization of agriculture and food system

The end objective of farm mechanization is to enhance the overall productivity to save labour and automate field operations for lowering the cost of production through improved timeliness of operations and precision in the application of inputs; producing high quality and value- added products; and developing and saving energy. Intelligent sensing and monitoring systems equipped with crop and bioinformatics will be the new innovations in machines used for different operations. Machines for large-scale precision farming green fishing vessels' will have to be developed. In the post-field state, logistics, large-scale processing, and supply chain management are the key factors. Information technology in association with GIS and automation are set to make a major difference at different stages. Optimization of production systems and farm work sites with vehicle and machine systems that can sense and

control; systems that are capable of collecting, storing, and transferring information about the crop, field, and machine state at the time of field operation are needed.

(iii) Enhancing value, safety and income through food processing

Globally, India is a major producer of fruits, vegetables, milk, meat and fish, which are all perishable in nature. But the level of processing in India is rather low, and exists in unorganized form with high losses in supply chain. The focus is on increasing secondary, tertiary and quaternary processing levels to at least 50 per cent in the near future.

(iv) Energy development and management

Energy is central to the economic growth in all the sectors including agriculture. In view of the dwindling and limited availability of fossil fuels, plants which exist through photosynthesis are a renewable source of carbon. Bio-fuels, therefore, appear to be part of the solution to the problem of energy shortage, but the development of more efficient bio-fuels remains a crucial issue. The agricultural fuel resources include animal manure and crop residues, derived primarily from maize, corn, small grains and seeds of oil-bearing plants (e.g. Jatropha). In India, bio-fuels would largely be based on nonfood crops and unused crop materials containing lignocellulose (stems and leaves). Therefore, development of engineering plants of different capacities, using waste material with lignocelluloses, is a priority. Researches in solar energy, aiming at increased capture of solar radiations are opening vast opportunities for increasing availability of nonpolluting energy at low cost. In future, decentralized solar power for agricultural applications like pumping water, drying of grain and fruits, chilling of milk, will be financially attractive propositions. The adoption of these technological interventions has potential to benefit the masses.

(v) Computational initiatives in agricultural research

Agricultural research is becoming highly quantitative and computational. Therefore, high performance computing (HPC) is becoming a requirement for manipulation of very large data sets, particularly related to agricultural genomics, proteomics, geo-informatics and climate change. An 'Integrated National Agricultural Resources Information System' (INARIS) and 'Knowledge Management of Agricultural Research and Technologies' (KMART) portals have been established. But, as the demand for national agricultural portal on bio informatics grid (NABG) grows, creation of higher super-computing framework is required.

(vi) Innovations in technology transfer system

There have been continuing efforts to evolve innovative pathways for disseminating breakthroughs in technology to farmers and the industry such as Agricultural Technology Management Agency (ATMA), Agri-clinics, Agri-

business centres, Krishi Vigyan Kendras, E-chaupals, etc. The rapidly extending mobile telephone network is facilitating the shift from kiosk based information dissemination to mobile-based communication. The bundling of services approach such as insurance and credit agencies participating in agro technologies and weather advisory service, which has been successful abroad, has good prospects. Information and communication technology (ICT) with 3G and 4G technologies which are capable of delivering detailed text and pictures through the mobile phones, are expected to revolutionalize the technology dissemination process.

(c) The details of estimated household demand of food grains during the year 2020 is as under:-

Commodity	**Estimated demand (in million metric tons per annum)**
Rice	118.93
Wheat	92.37
Other cereals	15.57
Pulses	19.53
Total Food grains	**246.40**

Ref: http://www.planningcommission.nic.in/reports/genrep/bkpap2020/16_bg2020.pdf (Food Nutrition and Security: Vision 2020 by ***R. Radhakrishna and K. Venkata Reddy*****)**

(d) The Indian Council of Agricultural Research, Department of Agricultural Research and Education, under the Ministry of Agriculture and Farmers Welfare, Government of India is mandated to (i) Plan, Undertake, Coordinate and Promote Research and Technology Development for Sustainable Agriculture, (ii) Aid, Impart and Coordinate Agricultural Education to enable Quality Human Resource Development (iii) conduct Frontline Extension for technology application, adoption, knowledge management and capacity development for agri-based rural development and (iv) provide Policy, Cooperation and Consultancy in Agricultural Research, Education & Extension.

(e) The Indian Council of Agricultural Research is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With 101 ICAR institutes and **71 agricultural universities** spread across the country this is one of the largest national agricultural systems in the world. The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of **foodgrains by 5.4 times, horticultural crops by 10.1 times, fish by 15.2 times, milk 9.7 times and eggs 48.1 times since 1951 to 2017**, thus making a visible impact on the national food and nutritional security. It has played a major role in promoting excellence in higher education in agriculture. It is engaged in cutting edge areas of science and technology development and its scientists are internationally acknowledged in their fields.

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