

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

**LOK SABHA**  
**UNSTARRED QUESTION NO. 4417**  
TO BE ANSWERED ON 08/01/2019

**CONTRIBUTION OF AGRICULTURAL RESEARCH INSTITUTES**

4417. SHRI LAXMI NARAYAN YADAV:

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

- (a) whether agricultural research and development institutes are functioning for the development of agriculture in Madhya Pradesh;
- (b) if so, the details thereof, location-wise; and
- (c) the details of the works carried out by the said institutes for the development of agriculture during the last three years?

**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 GAJENDRA SINGH SHEKHAWAT)**

**(a) & (b):** There are a number of centrally funded ICAR institutes working in Madhya Pradesh, viz., Indian Institute of Soybean Research, Indore; Indian Institute of Soil Science, Bhopal; Central Institute of Agricultural Engineering, Bhopal; National Institute of High Security Animal Diseases, Bhopal and Directorate of Weed Science Research, Jabalpur. Besides, Agricultural Technology Application Research Institute (ATARI) formerly known as Zonal Coordinating Unit (ZCU) at Jawaharlal Nehru Krishi Vishwa Vidyalaya, campus Jabalpur. The ATARI coordinates and monitors technology application and Frontline Extension Education Programs in 52 KVKs in Madhya Pradesh by strengthening agricultural extension research and knowledge management. ATARI is involved in assessment, refinement and demonstration of technologies are carried out by the KVKs with technological backstopping from SAUs and ICAR Institutes in partnership with farmers and other stakeholders the Government also provides partial funding support to various state agricultural universities working in Madhya Pradesh

include Jawaharlal Nehru Krishi Vishwavidyala, Jabalpur; Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior; Nanaji Deshmukh Veterinary Science University, Jabalpur. Besides these, 9 All India Coordinated Research Projects/Network Projects and several other centers of different AICRPs/NPs working under commodity based ICAR Research Institutes and State Agricultural Universities based in Madhya Pradesh are engaged in varietal/ technology development activities in various agricultural crops/ commodities. The National Agricultural Research System under DARE/ICAR during last 4.5 years has developed a total of 898 stress tolerant, high yielding, improved quality, agro-climatic zone specific varieties. For the state of Madhya Pradesh, 155 varieties of various field crops have been developed since May, 2014 which include 76 of cereals, 23 of oilseeds, 19 of pulses, 19 of fibre crops, 15 of forage crops and 3 of sugarcane.

(c) The details of the salient achievements of the ICAR Research Institutes during the last 3 years are given in **Annexure-I**.

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The details of the major works carried out by institutes during the last three years

**1) ICAR- Directorate of Weed Research, Jabalpur:**

Engaged in identification of weeds under different crops/cropping systems and developed Integrated weed management practices & biocontrol measures for controlling various weed species including aquatic and invasive weeds for Maximizing the Economic, Environmental and Societal Benefits for the People of India.

- The Directorate conducted survey and surveillance for collecting information on the spread and occurrence of weeds, and identified those causing serious problem. Developed National database on weeds in two volumes of Weed Atlas covering the dominant crop-field weeds of 435 districts and 19 states of the country; Developed a Weed Seed Atlas; Developed a weed seed repository of about 100 species.
- Developed e-modules on identification of weed seeds, weed seedling and weed plants. These modules are very useful for effective and economic management of weeds. All these modules are uploaded on the Directorate website for end users.
- Conclusively proved the presence of high morphological diversity amongst the Echinochloa germplasm of the country, and so far identified 15 taxa of species and intra-specific ranks under 11 species.
- Studied the possible effect of climate change on crop-weed competition and herbicide efficacy. Predicted increasing competitive ability of Phalaris minor compared to wheat and wild oat due to global warming.
- Made herbicide recommendations for various crops and cropping systems based on the multi-disciplinary and multi-location trials conducted in different agro-climatic zones; Recommended alternative chemical weed control methods to counter weed flora shift caused by continuous use of some herbicides; Developed weed management technologies for conservation agriculture systems.
- Several weeding tools were improved from different parts of the country for more efficient weeding; developed a wick applicator for application of non-selective herbicides in standing crops like mustard and soybean.
- Utilization of weeds like Parthenium and water hyacinth biomass for making compost/vermi-compost with nutrient contents equivalent to FYM and also utilized Parthenium biomass for making paper and particle boards.

**2) ICAR- Indian Institute of Soil Science, Bhopal:**

Institute is working to **provide scientific basis for enhancing and sustaining productivity of soil resource with minimal environmental degradation** along with its AICRPs on Soil Test Crop Response (STCR), Micro- and Secondary Nutrients and Pollutant Elements (MSNP) in soils and Plants, Long Term Fertilizer Experiments (LTFE) and Network Project on Soil Biodiversity- Bio-fertilizers are providing technological backstopping to various schemes related to soil fertility and fertilizer use in the country including Madhya Pradesh. The ICAR imparts training, organises Front Line Demonstrations (FLDs) to educate farmers

on soil test based balanced and integrated nutrient management through conjunctive use of both inorganic and organic sources (FYM, compost, bio-fertilizers etc.) of plant nutrients to improve soil fertility.

- Developed portable soil test kit/mini lab (*Mridaparikshak*) to supplement soil testing service in the country. The kit is capable of measuring all the twelve parameters of National Mission on Soil Health Card. The Kit is useful for rapid analysis of soil samples for generating soil health cards alongwith the fertilizer recommendations, monitoring of soil fertility and preparation of geo-referenced soil fertility maps at block/village level.
- Developed in-situ and ex-situ rapid composting technology using microbial consortia.
- Developed family net vessel vermi-composting technology.

### 3) **ICAR-Central Institute of Agricultural Engineering, Bhopal:**

Institute is working to develop and promote appropriate technologies for land development, farm mechanization, irrigation, processing of agro-produce, utilizing renewable, animate and mechanical power sources in India. The main aim is to modernize Indian agriculture, increase productivity and promote agri-business to enhance income and generate employment in rural sector through the network of research centres established all over to the country. Some of the most notable farm machinery/ equipment/products/processes developed by the institute during the last 4 years are given below.

- Pre-emergence herbicide strip applicator-cum-planter
- Seed-cum-ferti drill with two stage fertilizer placement system
- Rotary assisted broad bed former-cum-seeder
- Small seed planters
- Multi millet thresher
- SPAD meter
- Manually operated single and two row hand held vegetable transplanters
- Animal lifting device
- Tractor drawn three-row automatic vegetable transplanter for potted seedlings
- Tractor drawn three-row automatic vegetable transplanter for plug type seedlings
- High clearance multipurpose vehicle
- Mechanical intra and inter row weeder for wide spaced field crops
- Tractor mounted ginger planter
- Tractor operated cassava stake cutter-cum-planter
- Mechanization system for effective sett/ bud treatment for sugarcane
- Self-propelled site-specific fertilizer applicator
- Cassava harvester
- Site-specific fertilizer applicator for top dressing in wide spaced crops
- Tractor operated straw rake
- Tractor front mounted cotton stalk puller
- Pigeon pea transplanter
- Subsurface lateral laying machine
- Portable briquetting machine for paddy straw
- Reactor for bio char production and its characterization
- Lab scale fast pyrolysis for bio oil production
- Solar powered cold storage system
- Package of equipment for minimal processing of banana central core
- Mechanization package for rope making from outer sheath of banana pseudo stem
- Post harvest mechanization package for garcena cambogia
- Improved millet mill
- Ripening chamber

- Moringa leaf stripper
- Automated packing line for spherical horticultural produce
- Pilot plant for minimal processing of cut vegetables
- Pilot plant for fermented millet flakes
- Pilot scale modified atmosphere storage system for fruits and vegetables
- Starch/ PLA based biodegradable films for packaging of fresh produce
- Grape debuncher
- Value added products from kodo & sorghum
- Value added products from flax seed
- Soy and multigrain based functional foods
- Protein rich soy fortified compressed food bars for undernourished children
- Pilot scale set-up for production of ready to eat complimentary food spread
- Onion descaler
- Cashew apple slicer
- Quinoa pearler

#### 4). **ICAR- Indian Institute of Soybean Research, Indore:**

The institute is mandated to work on basic, strategic and adaptive research on soybean for improving productivity and quality; provide access to information, knowledge and genetic material to develop improved technology and enhance soybean production; coordination of applied research to develop location specific varieties and technologies and dissemination of technology and capacity building.

- NRC 142, free from Kunitz trypsin inhibitor as well as lipoxygenase 2, has been developed from a triple cross JS 97-52 x PI 596540 x PI 542044, through marker assisted forward breeding.
- First Kunitz Trypsin Inhibitor free Soybean Variety NRC 127 identified for release to farmers in MP, Bundelkhand, Rajasthan, Gujarat, Marathwada and Vidarbha region of Maharashtra. Development of high yielding soybean varieties NRC 2, NRC 12, NRC 7, NRC 37 and NRC 86. Out of these, NRC 7, NRC 37 and NRC 86 are under seed chain.
- Development and commercialization of trypsin inhibitor free soybean genotypes NRC 101 and NRC 102. These genotypes need not to be boiled before mixing with wheat for preparing soy fortified flour. Kunitz trypsin inhibitor genotype in the background of JS 97-52 and NRC 7 have also been developed.
- Identification and commercialization of IC 210, a high oleic acid genotype with 42% oleic acid content against that of 24% found in regular soybean.
- Soybean genotypes with null lipoxygenase-2 (the principal contributor to off-flavour) have been developed.
- Collection, maintenance, evaluation and conservation of soybean germplasm. Presently, we maintain a collection of 4591 accessions and supply to users.
- Identification of germplasm accessions for high oil content, high oleic acid content, high protein, rust resistance, YMV tolerance, photo-insensitivity, long juvenility, drought tolerance, rhizoctonia root rot resistance, girdle beetle, defoliators.
- Identification of molecular markers linked to YMV resistance in *Glycine max* as well as *Glycine soja*.
- Identification of QTLs for 100 seed weight, pods per plant and seed yield per plant.
- Development of Multi parent Advanced Generation Intercross (MAGIC) and Nested Association Mapping (NAM) populations.
- Development of infectious clones for screening of soybean varieties through agroinfection.
- Standardization of thin layer polymer coating for effective delivery of fungicides, insecticides and other growth promoting chemicals.
- Identified three new potential novel bacterial strains e.g., *Paenibacillus mucilaginosus* and *Bradyrhizobium daqingense* and *B. liaoningense* were isolated and identified from root nodules of three drought tolerant lines e.g., EC 538805, PK472 and EC 538828 respectively. These strains are being evaluated for abiotic stress tolerance traits for further evaluation on soybean.
- Identified *Glomus intraradices* (*Rhizophagus irregulariae*) as most predominant AM species harbouring in the rhizosphere of soybean, wheat and maize crops from a long-term soybean-based cropping system.
- Optimized a method for extraction and enhanced recovery of glomalin (glycoprotein secreted by AM fungi) which is crucial part in plant growth, nutrient uptake, soil carbon sequestration and carbon mitigation.
- Identified and evaluated three bacterial strains i.e. *Bacillus aryabhattai* MDSR 14 (JF792521) *Acinetobacter calcoaceticus* BK-5 (JF792523) and *Pseudomonas moselli* DKH-3 (JQ773432) capable of solubilizing zinc and phosphorus and mineralizing phytate; enhancing zinc

accumulation in seeds up to 34% higher compared to without inoculation. Also solubilizes inorganic phosphates and mineralizes phytate.

- Development of computer softwares to facilitate soybean research (Germplasm information system, Varietal identification system, Data management systems for breeding and agronomy multi-location AICRPS data and Disease diagnosis system).

#### **5) National Institute of High Security Animal Diseases, Bhopal:**

It is a premier institute of India for research on exotic and emerging pathogens of animals. The Institute is ISO 9001:2015 certified and has Bio-engineering components, Bio-containment Laboratory, containment animal wing for experimentation, Surface Plasmon Resonance and Electron Microscopy Unit. It works in bio-risk management and capacity building in the areas of biosafety, biosecurity and bio-containment for handling high risk pathogens. The Institute is working in exotic and emerging diseases like Avian Influenza, Crimean-Congo hemorrhagic fever, Porcine reproductive and respiratory syndrome, Bovine disease, Malignant Catarrhal Fever, Swine flu etc.

#### **6) Agricultural Technology Application Research Institute (ATARI), Jabalpur:**

Coordinates, plans, monitors and evaluates the technological interventions and frontline extension programmes of 52 Krishi Vigyan Kendras in Madhya Pradesh.

In various extension programs of KVKs, men farmers and women farmers are considered equally and encouraged to participate. During the year 2015-16 to 2017-18, 18626 on- farm trials and 37348 front line demonstrations were conducted. To update the knowledge and skills on modern agricultural technologies 3.37 lakh farmers were trained. 46.49 lakh farmers participated in various extension activities. In addition, 32.71 tones seeds, 66.92 lakh planting materials and 19.16 lakh live-stock strains and finger lings were produced and distributed among farmers. Further, 2.83 lakh soil, water, plant, manures samples were tested, and 16.54 lakh Mobile agro-advisory were provided to farmers.

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