



ICAR RCER

at a glance



ICAR Research Complex for Eastern Region

(Indian Council of Agricultural Research)

ICAR Parisar, Patna - 800 014, Bihar, India

2010

ICAR RCER



Historical Perspective of ICAR RCER

- ◆ Established on 22nd February, 2001
- ◆ Created by merging Directorate of Water Management Research (DWMR), Patna; Centre for Horticultural Experimental Station (CHES), Ranchi and Central Tobacco Research Station (CTRS).
- ◆ NRC-Makhana Darbhanga was brought under its control on 12th December, 2003
- ◆ Krishi Vigyan Kendra was established on 23rd December, 2007 at Lalganj, Buxar (Bihar)
- ◆ Presently, ICAR RCER is a broad based institute to carryout multi-disciplinary and multi-commodity farming systems research

Uniqueness of Eastern Region

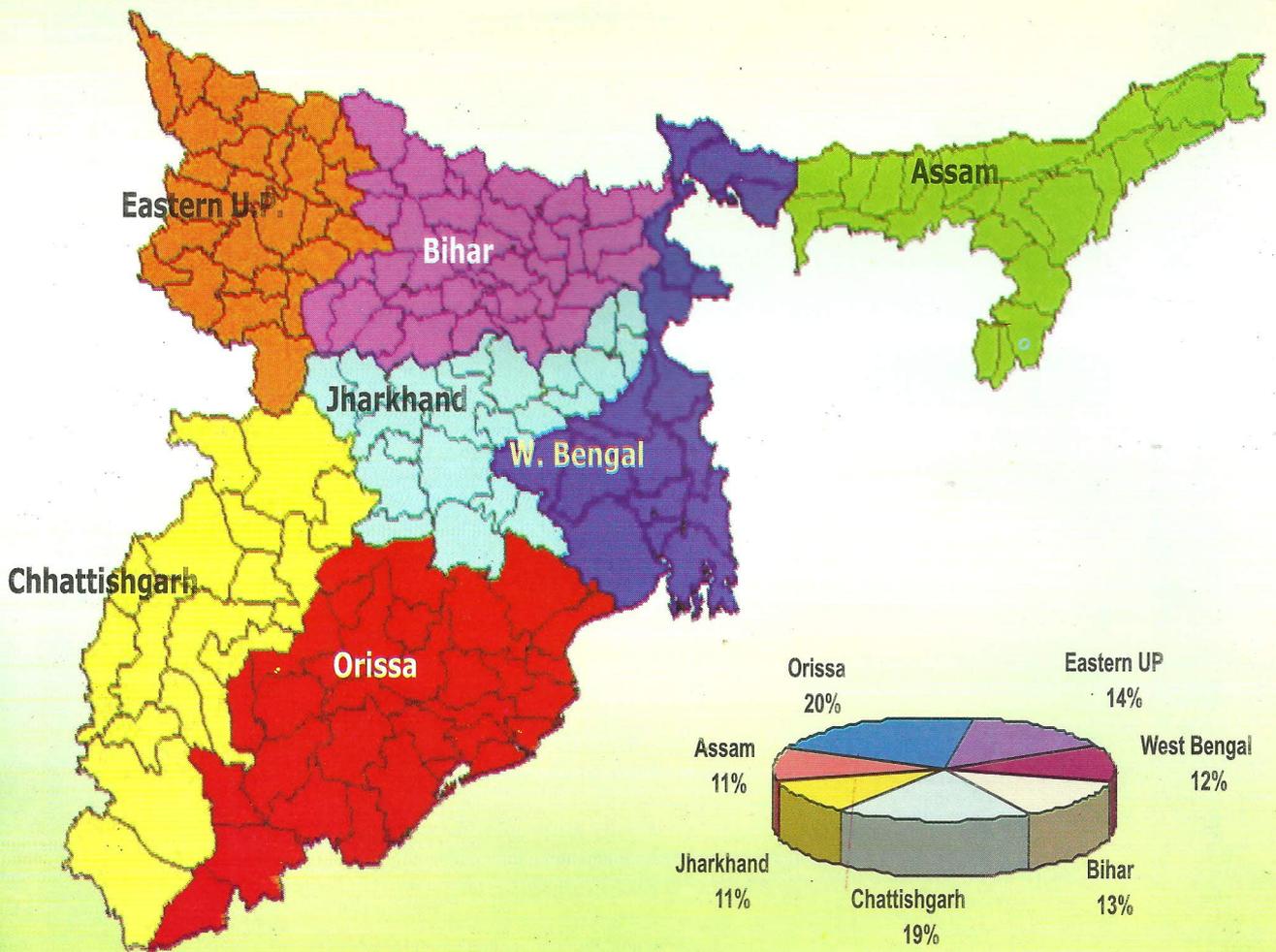
- ◆ Total geographical area : 75 M ha (22.5 %)
- ◆ Physiographical units : Plains, Hilly and Plateau and Coastal Plains
- ◆ Agro-climatic zones : Eastern Himalayas, Lower and Middle Gangetic Plains and Eastern Coast and Hills
- ◆ Cropping intensity : 140 %
- ◆ Population density : 470 / Km²
- ◆ Population below poverty line : 27-47 %
- ◆ Rainfall : 1000-2000 mm
- ◆ Inhabited population : 35% of Country's Population

The eastern region comprises eastern Uttar Pradesh, Bihar, Jharkhand, West Bengal, Assam, Orissa and Chhattisgarh. It occupies about 22.5% geographical area, 35% population and 28% live-stock of India. Eastern region is endowed with natural resources but so far its potential could not be harnessed. Potentially, it is a highly resource rich region. It is occupied by resource poor people with small land-human ratio in terms of improving agricultural productivity and livelihood. The production levels of agriculture, livestock and fisheries have remained low due to lack of location-specific production technologies, dissemination of scientific farming knowledge, natural calamities like floods, water logging, droughts and social conflicts. Even though this region is rich in rain, surface and ground water resources but it is grossly underutilized. As a result, larger proportion of cultivated area does not receive water for irrigation. Mostly farmers depend on vagaries of monsoon for crop production. Owing to poor utilization of water resources, cropping intensity of this region is low. Therefore, a large gap between potential and productivity of major agricultural and horticultural crops, fisheries etc. have been observed. Thus, this region has immense potential to usher in ever green revolution.

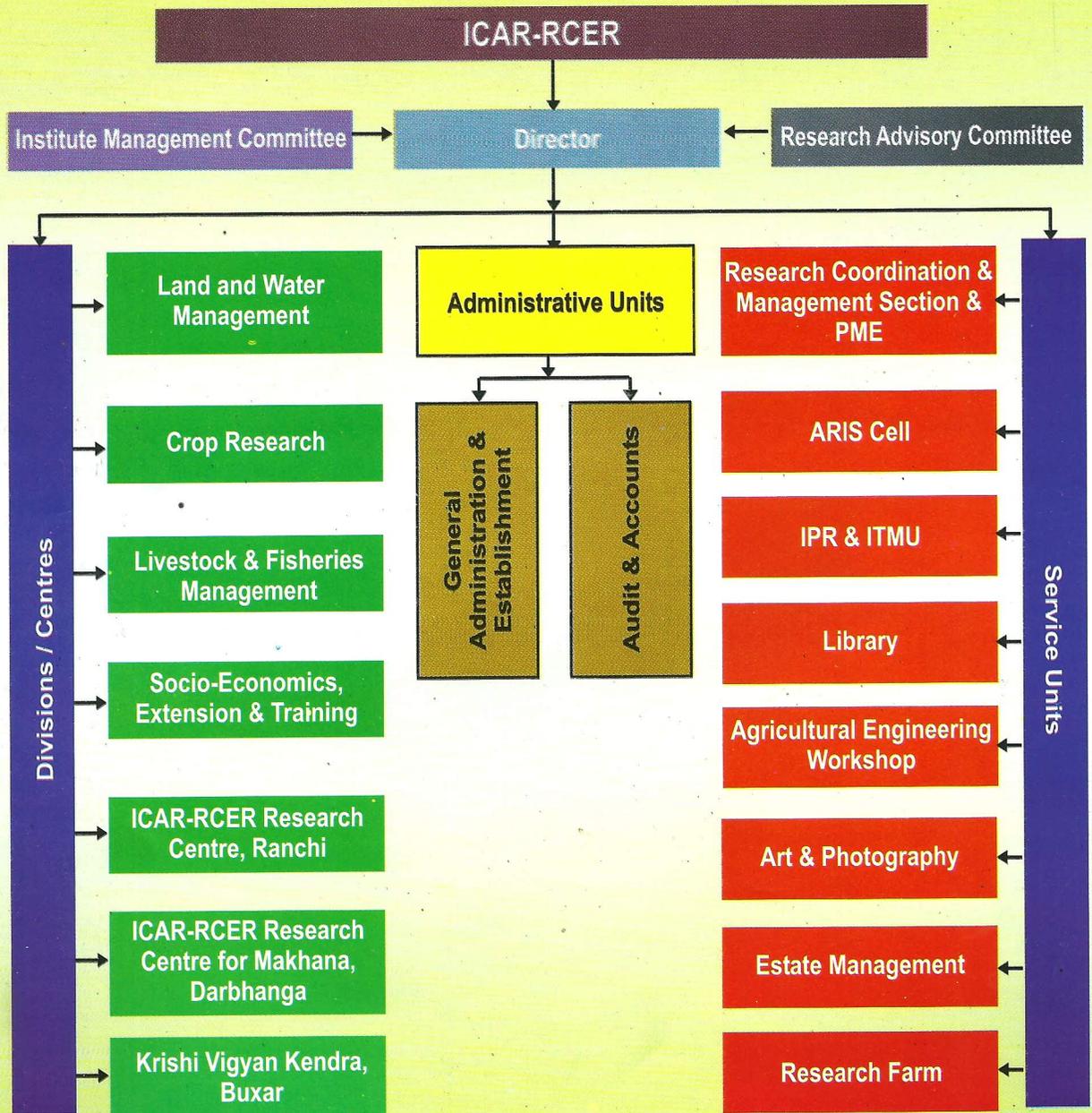
ICAR Research Complex for Eastern Region, Patna came into existence on 22nd February 2001 after merger of Directorate of Water Management Research, Patna with the complex. On the 1st April, Central Horticultural Experimental Station, Ranchi and Central Tobacco Research Station, Pusa were merged in the complex. The present form of the institute was dedicated to the Indian farming community on 16th October 2006 at its new complex in the sweet memory of Sh. Babu Jagjivan Ram. ICAR-RCER, Patna would address the diverse issues related to resources management, crop husbandry, horticulture, aquatic crops, fishery, live-stock, poultry, processing and socio-economic aspects in a holistic manner for enhancing research capability. The ICAR RCER is a multi-commodity and multi-disciplinary institutional framework to address the research issues. The complex is mandated for developing the adoptable technologies relevant to the prevailing bio-physical and socio-economic environment of eastern region for sustainability and overall livelihood security of rural population

Geographical Spread of Eastern Region

Area: 74 Mha **Numbers of districts :** 175



Organizational Chart



Research Centers and Priorities

Research Centers (Establishment year)	Objectives / Priorities
Patna : 2001 Research farm : 37 ha Annual Rainfall : 1150 mm	<ul style="list-style-type: none"> ◆ To undertake strategic and adaptive research for efficient integrated management of natural resources to enhance the productivity of agricultural production systems comprising of field and horticultural crops, aquatic crops like Makhana, Agro-forestry, Livestock, Avian and Fisheries in different agro-ecological zones of eastern region.
Ranchi : 2001 Research farm : 218.8 ha Annual Rainfall : 1300 mm	<ul style="list-style-type: none"> ◆ Collection, characterization and evaluating of germplasm lines of fruits, vegetables and ornamental plants to develop high yielding varieties resistant to biotic and abiotic stresses. ◆ Development of crop varieties and their popularization among farmers for its adoption. ◆ Identification of stable, high yielding and promising varieties. ◆ Rejuvenation and management of orchards
Darbhanga : 2003 Research farm : 10 ha Annual Rainfall : 1100 mm	<ul style="list-style-type: none"> ◆ To conduct basic, strategic, applied and adaptive research for increasing productivity of Makhana crops. ◆ To develop and standardization of post-harvest, processing and value adding technologies. ◆ To serve as repository of the agro-bio-aqua diversity and scientific information for Makhana growers. ◆ Collection and exploration of Makhana germplasm.
Buxar : 2007 Research farm : 10 ha Annual Rainfall : 1100 mm	<ul style="list-style-type: none"> ◆ To organize long-term vocational training for rural youths for generating self employment ◆ To organize training of farmers and extension functionaries ◆ To organize front-line demonstrations to generate production data and feedback data, and ◆ To collaborate with subject matter specialist of agricultural universities in on-farm testing, refining and documenting the technologies.

Research Achievements



Low Energy Water Application (LEWA) Device Developed:

- ◆ LEWA device operates at 0.4 kg / cm² pressure and suitable for irrigating close growing crops.
- ◆ Saving of water by 50 % & 15 % over surface and sprinkler irrigation system, respectively.
- ◆ Saving of energy by 50 % & 55 % over surface and sprinkler irrigation, respectively



Secondary reservoir system

Multiple Water Use Systems Developed:

Three Multiple Water Use Systems developed for water-logged areas.

(i) Integrated Agriculture and Aquaculture in Secondary Reservoir System:

- ◆ Rice-Wheat system is integrated with fish in secondary reservoir and fruits and vegetable crops on bunds. Duckery, poultry and vermicompost are also integrated for complementary benefits.
- ◆ A net income is ₹ 1.32 lakhs / ha with B: C ratio of 1:2.3.



Trenches and bed system

(ii) Trenches-cum-raised Bed System for Fishery and Horticulture

- ◆ System is used in deep waterlogged areas by making alternate strips of trenches and beds.
- ◆ Water collected in the trenches is used for fisheries and duckery etc. and beds are used for raising vegetables and horticultural crops.
- ◆ An average net income is ₹ 0.81 lakhs / ha with B: C ratio of 1: 2.33.



Rice-wheat-fish system

(iii) Rice-Fish Culture in Lowland Rice-Wheat System

- ◆ System is recommended for lowlands and shallow waterlogged areas.
- ◆ Creation of a shallow central refuge occupying approximately 10 % area due to which fish may get extended growth period during succeeding wheat crop after rice, thus increasing fish yield.
- ◆ An average net income is ₹ 30000 / ha.

Raising Bund Height for Efficient Utilization of Rain Water:

- ◆ Raising bund height from 7.5 cm to 20-25 cm around rice fields show better results.
- ◆ Suitable for in-situ water conservation, around 90 % rain water can be stored in fields
- ◆ Saving of 1 to 2 irrigation in rice crop and 15-20 % gain in yield



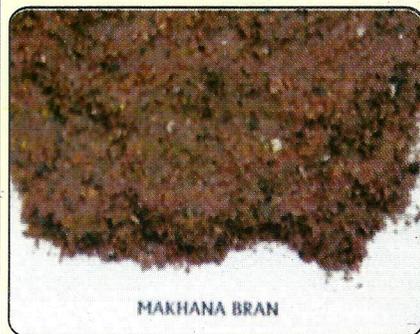
Optimization of Rice Transplanting Date:

- ◆ Optimization facilitated the conjunctive use of water.
- ◆ Advancement of rice transplanting date by 15-20 days (last week of June to middle of July) by raising nursery with ground water market in the last week of May to middle of June.
- ◆ Registered more than 100 % increase in rice yield.



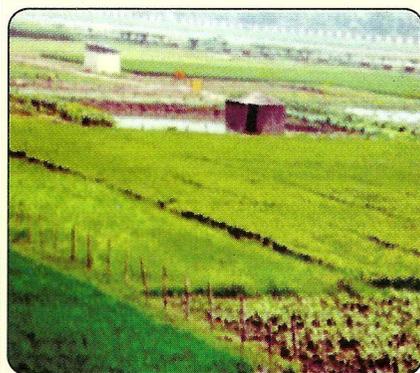
Evaluation of Makhana Bran as Livestock Ration:

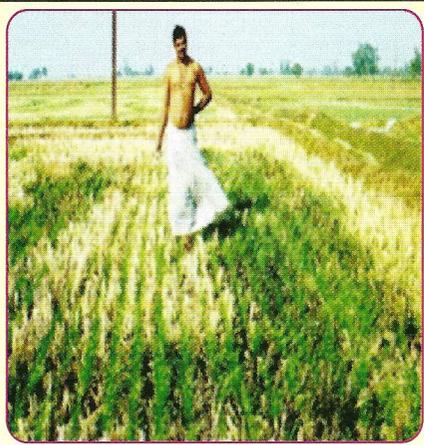
- ◆ Makhana by-product was evaluated for its utilization as poultry and goat rations.
- ◆ The major constituents of Makhana bran are: protein 7.10 %, fat <1 %, fiber 20.20 % and organic matter 94.35 %.
- ◆ Makhana bran replaces rice bran.
- ◆ It saves feed cost by 5 %.
- ◆ Saving of cost for meat production by 4 %.



Integrated Farming System Models Developed:

- ◆ Location specific and need-based one acre (Irrigated upland) and two acres (Irrigated low land) integrated farming system models were developed for small and marginal farmers for improving their livelihood.
- ◆ The annual average net income from 2 acre and 1 acre integrated farming systems is ₹ 1,60,000 & ₹ 1, 08, 000/-, respectively.
- ◆ The B: C ratio for 2 acre and 1 acre integrated farming systems are 1:2.7 and 1:3, respectively





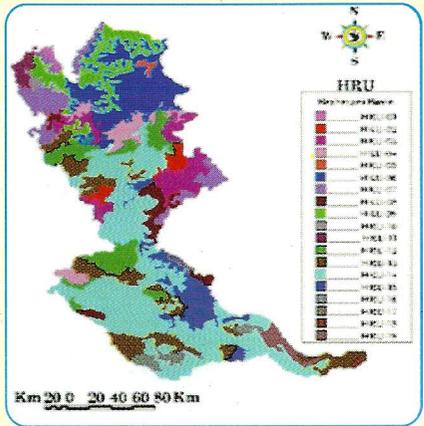
Resource Conservation Technologies:

- ◆ Resource Conserving Technologies has been revitalized for higher production and inputs saving.
- ◆ The net saving from puddle rice is ₹ 6800 / ha. over conventional method.
- ◆ Since year 2000, zero-tillage technology has been accelerated in 22 districts of Bihar covering about 6000 ha. land with 7200 farm families.
- ◆ Since 2004, second generation RCTs like bed planter, laser leveling, residue management etc. are popularized.



Doba Technology Developed:

- ◆ Doba (Jalkund) technology developed to provide the life saving irrigation to the fruit orchards.
- ◆ Doba is a small storage tank of size 3.0 x 1.5 x 1.0 m, lined with 200 micron black polythene.
- ◆ Water from direct rainfall is collected and no runoff is allowed.
- ◆ A doba costs about ₹ 800/-, can stores about 4500 lit of water, sufficient for providing life saving irrigation to 10 plants.
- ◆ 100 % plant survival and better plants growth.



Hydrological Modeling for Climate Change Impact Assessment:

- ◆ Simulation studies using HadCM3 model predicted an increase in annual stream flow by 43, 30 and 64 % during 2010, 2050 and 2080, respectively in Brahmani basin.
- ◆ Sensitivity analysis indicated 4.8 % decrease in annual stream flow with 4 °C increase in temperature and no change in rainfall; and 22.5 % decrease in annual stream flow with 10 % decrease in precipitation and no change in temperature.

Watershed Management:

- ◆ Developed two models of watersheds in Pogro and Amagara in Purulia district of West Bengal in participatory mode.
- ◆ Agronomic packages for mustard, wheat and several vegetable crops successfully implemented using recycling of harvested water

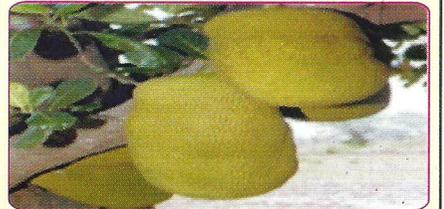


Varieties Released

Swarna Manohar and Swarna Poorti:

- ◆ Developed through seedling selection.
- ◆ Swarn Manohar is suitable for table purpose whereas
- ◆ Swarn Poorti is suitable for culinary purposes.
- ◆ Both the varieties are recommended for cultivation in Jharkhand and adjoining areas.

Jack fruit



Swarna Shakti and Swarna Ajay:

- ◆ Developed through heterosis breeding.

Swarna Shyamli:

- ◆ Developed through pure line selection from lines collected from Ranchi, Jharkhand.
- ◆ Recommended for cultivation in Jharkhand, Bihar, UP and other nearby areas.

Brinjal



Swarna Samridhi, Swarna Sampada and Swarna Baibhav:

- ◆ Developed through heterosis breeding, and recommended for cultivation in Jharkhand and Bihar and other adjoining states.

Tomato



Swarna Manjari and Swarna Uphar:

- ◆ Developed through hybridization followed by Pedigree selection and is recommended for cultivation in U.P, Jharkhand, Bihar and other areas.

Ridge Gourd



<p>Pointed Gourd</p> 	<p>Swarna Rekha and Swarna Alaukik:</p> <ul style="list-style-type: none"> ◆ Developed through clonal selection from existing germplasm. ◆ Recommended for cultivation in Jharkhand and Bihar.
<p>France bean</p> 	<p>Swarana Priya and Swarana Lata:</p> <ul style="list-style-type: none"> ◆ Developed through Pure line selection. ◆ The string less, fleshy, flat and green pods are highly preferred by consumers for vegetable purpose.
<p>Dolichus (Sem)</p> 	<p>Swarana Utkrisht:</p> <ul style="list-style-type: none"> ◆ Developed through pure line selection. ◆ Recommended for commercial cultivation in Jharkhand, Bihar and U.P.
<p>Pea</p> 	<p>Swarna Amar:</p> <ul style="list-style-type: none"> ◆ Developed through Pure line selection. ◆ This variety is suitable for mid and late winter season cultivation in plains and early summer cultivation in hills of Netarhat. <p>Swarana Mukti:</p> <ul style="list-style-type: none"> ◆ Developed through hybridization followed by pedigree selection.
<p>Cowpea</p> 	<p>Swarna Sweta, Swarna Harita and Swarna Suphala:</p> <ul style="list-style-type: none"> ◆ Developed through pure line selection. ◆ High yield potential and better quality of pods are suiting to consumer.
	<p>Rejuvenation of Unproductive, Old and Senile Mango Orchard:</p> <ul style="list-style-type: none"> ◆ For rejuvenation of orchard existing root system is utilized. The rejuvenation period is three years. ◆ Extra space is created for intercropping in the orchard. ◆ Availability of large amount of pruned wood provides additional income.

High-Density Planting in Mango

- ◆ In mango cultivar Amrapali, planting at a spacing of 2.5 x 2.5m accommodating 1600 plants per ha as compared to 100 plants per ha in case of traditional method.
- ◆ Nearly 2.5 times higher yield is obtained compared to traditional system of planting.



Participatory Technology Transfer / Demonstrations / Action Research / Capacity Building

ICAR RCER is organizing need-based and skill oriented entrepreneurship development programmes for upcoming entrepreneurs including farmers, rural unemployed youth, farm-women as well as for industries and other stakeholders. Institute is also engaged in consultancy services for farmers, industries, NGOs and other organizations.

Evaluation of Agricultural Technologies:

Division of socio-economics, extension and training is engaged in developing and standardizing extension / evaluation methodologies for impact assessment of agricultural technologies.



Novel "Phone-in-Live Programme" Launched:

From 15th January 2010, institute has launched a Novel "**Phone-in-Live Programme**" to provide scientific advice services to farming community on every Friday from 10 AM to 5 PM.



Exhibition and Demonstration of Proven Technologies:

Institute is involved in demonstration and exhibitions of latest agricultural technologies like conservation agriculture (zero tillage technology, laser land leveling), water saving technologies etc. to judge its worth and wider adoption thereafter amongst end user population.





Capacity Building through Training Programmes:

Need-based and skill oriented training programmes are conducted to various stakeholders viz., farmers, rural women, rural youth, extension functionaries etc. to improve their knowledge level.



Formation, Stabilization and Evaluation of Social Capital:

Numerous self-help groups are formed, stabilized and extension methodologies also developed to measure the knowledge, skill, attitude and other attributes of self help group members and other stakeholders.

Director's Cell and Research Coordination & Management Section:

These units serve as a coordinating link with Indian Council of Agricultural Research, government, semi-government and other research and development organizations in addition to providing information on various research, training and extension activities of the institutes. RCMS unit reviews and scrutinize the research projects and coordinate the activities within and outside the institute and also compiles distinguished reports of institute.

Research Facilities

ICAR RCER, Patna has developed well-equipped laboratories for plant, soil and water analysis and natural resource management. A brief account of facilities is as:



Soil and Water Analysis Laboratory:

The laboratory is well equipped with state-of-art equipment for micro and macro nutrient analysis like Atomic Absorption Spectrometer, Particle Size Analyzer, Automatic Nitrogen Analyzer, Flow Injection Analyzer, Time Domain Reflectometer for soil moisture measurement, Neutron Probe Analyzer, Pressure Plate Apparatus and Soil Penetrometer besides basic laboratory facilities.

Plant Science Laboratory:

The laboratory has sophisticated facilities like Portable Photosynthesis Measuring System, PAM Chlorophyll Fluorometer, Porometer, Pressure Chamber Apparatus, Thermocouple Psychrometer, Sap Flow Meter, Automatic Leaf Area Meter, Crop Canopy Analyzer, Line Quantum Sensors, Tube Solarimeters, UV-VIS Double Beam Spectrophotometer, Theta Probes and Portable Chlorophyll Meters.

**Pressurized Irrigation Laboratory:**

The pressurized irrigation laboratory was equipped to carry out indoor and outdoor testing of various pressurized irrigation system components. It also has a plastic injection moulding machine for in-house fabrication of various components of pressurized irrigation system for research and development work.

**Livestock and Fisheries Laboratory:**

Livestock and fisheries laboratory is equipped with modern equipments like Automatic Milk Analyzer, Kjeltach, Trinocular Research Microscope with digital photographic system, Trinocular Stereo Zoom Microscope, Water Analyzing Kit besides basic laboratory facilities for conducting research in animal and fishery sciences. An eco-hatchery has been installed as a facility for breeding of fishes.

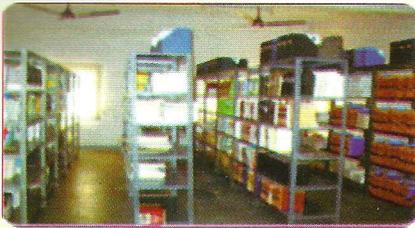
**Agricultural Engineering Workshop:**

Agricultural engineering workshop is equipped with modern machineries supporting the research and developmental activities of the complex. Workshop has facilities of drilling machine, Lathe machine, Milling machine, Sharper machine, Sheet shearing machine, Gas welding set up and Arc welding for fabrication.



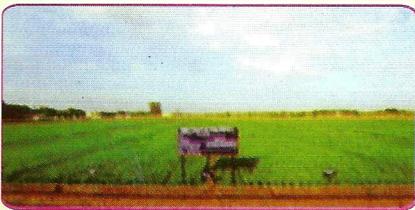
Other Facilities

Besides laboratories, the institute has good services for recording meteorological parameters like Automatic Weather Stations at Patna. The institute has developed an excellent workshop with basic facilities for fabrication, repair and maintenance of farm implements and tools. All the scientists and technical personnel are provided computer with internet network facilities and also connected through a Local Area Network for information exchange. The institute has developed Remote Sensing and Geographical Information System (GIS) facilities having latest versions of software packages like Geomatica, TNTmips, ENVI, ArcView, ArcGIS etc. National Knowledge Network (NKN) and ASRB online examination centre have been established at this complex. ARIS cell also developed and equipped with the latest software like SPSS, SAS etc.



Library:

The institute library has a total of 1665 books covering different areas of agriculture and allied areas. The institute subscribes 38 Indian and 22 foreign journals and periodicals and has procured electronic scientific reference databases like CAB abstracts, Agricola etc. for easy information retrieval.



Research Farm:

The institute has two research farms one of 4.0 ha at WALMI Complex and another of 17.0 ha at Sabajpura (about 2 km from WALMI Complex) at Patna. The research farms have basic infrastructural facilities for supporting field experimentation and demonstrations.



Guest House and Residential Quarters :

The ICAR Research Complex has two VIP suits and 16 rooms (2 AC) at WALMI Complex, Patna. At present the staffs of ICAR-RCER at Patna are accommodated in residential quarters (37) in WALMI Campus and 13 at main complex.



Auditorium and Conference Hall:

A.P.J Abdul Kalam Auditorium and Norman Borlaug conference hall have been developed with ultra modern facilities at main complex.



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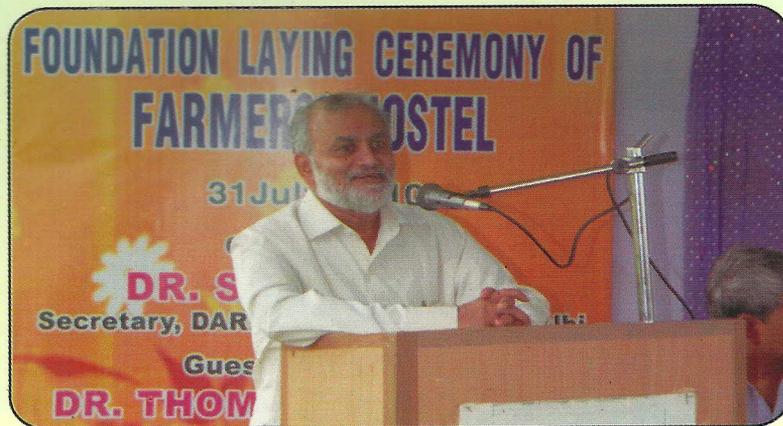
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