

ICAR RCER *Perspective Plan*

VISION-2025



भाकृअनुप  
ICAR



INDIAN COUNCIL OF AGRICULTURAL RESEARCH



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## **FOREWORD**

Indian agriculture must continuously evolve to remain ever responsive to manage the change and to meet the growing and diversified needs of different stakeholders in the entire production to consumption chain. In order to capitalize on the opportunities and to convert weaknesses into opportunities, we at the ICAR attempted to visualize an alternate agricultural scenario from present to twenty years hence. In this endeavour, an in-depth analysis of the Strengths, Weaknesses, Opportunities, and Threats (SWOT) was undertaken to place our research and technology development efforts in perspective so that we succeed in our pursuit of doing better than the best. Accordingly, the researchable issues are identified, strategies drawn and programmes indicated to have commensurate projects and relevant activities coinciding with the launch of the 11<sup>th</sup> Five Year Plan.

The eastern region of the country, a 'low productivity high potential' region that needs holistic management of land, water, crops, biomass, horticultural, livestock, fishery and human resources. The region, though endowed with rich natural resources has lacked in capitalizing on these resources. Declining per capita land and water availability, reduced diversion of water for agriculture to meet the food requirement of burgeoning population by 2025 coupled with degrading land and water resources are a serious challenge towards improving productivity and sustainability in the Eastern Region. Integrated management of land and water, biomass, livestock and aquatic resources together with human capital through Integrated Farming System approach is a high priority research area of the Council. Integrated farming system approach coupled with multiple use of water in irrigated, rainfed, flooded, flood prone and waterlogged agro-eco system forms the basis for sustainable agriculture in the eastern region.

The Council established ICAR Research Complex for Eastern Region in 2001 to fulfill the technological needs for improving agriculture in the region. The Complex released 15 improved varieties of fruits and vegetable crops and the area under improved varieties has increased considerably in Jharkhand and Bihar. The Complex has made a modest beginning in development of location-specific, multi-commodity, integrated farming system models for rainfed, irrigated and water stagnated and flooded ecosystems in eastern Region.

It is expected that realizing the Vision embodied in the document would further ensure that the ICAR Research Complex for Eastern Region, Patna continues to fulfill its mandate to make Indian agriculture locally, regionally and globally competitive. The efforts and valuable inputs provided by my colleagues at the ICAR Headquarters and by the Director and his team at the institute level for over an year to develop Vision 2025 deserve appreciation.



**( MANGALA RAI )**

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and**

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## PREFACE

The ICAR Research Complex for Eastern Region (ICAR-RCER) has its origin in erstwhile Directorate of Water Management Research (DWMR). It came into existence in 2001 after merger of DWMR, Patna; Central Horticultural Experiment Station, Ranchi and Central Tobacco Research Station, Pusa, Samastipur. The National Research Centre on Makhana, Darbhanga was also brought under the administrative and financial control of ICAR-RCER during December, 2003 as its Centre. In view of changing scenario, emerging opportunities of research, new government policies and broad based mandate of the Complex, the Vision-2025 Perspective Plan has been prepared. The Vision Document crafted on the lines of an approved format, collates all the basic information on mission, mandate, achievements, impact, future scenario, emerging issues, perspective and strategies of ICAR-RCER in the next 20 years.

The inspiration for preparing the present Vision-2025 came from Dr. Mangala Rai, DG, ICAR and Secretary, DARE. In preparing the Perspective Plan, the comments/ suggestions from DG, DDG (NRM), ADG (IWM), members of RAC, and Scientists of the Complex were cognized and incorporated. The original Plan was modified twice as per the guidance of Dr. J.S. Samra, DDG (NRM) and comments of RAC and SRC of the Complex.

I take this opportunity to express my indebtedness to Dr. Mangala Rai, DG, ICAR and Secretary, DARE for his foresight, encouragement and guidance in bringing out this Vision-2025. I express my sincerest thanks to Dr. J.S. Samra, DDG (NRM), ICAR for his keen interest, professional input and support. While the Vision-2025 captures and reflects the collective wisdom of ICAR-RCER Scientists, I specially wish to place on record the significant contribution of Dr. R.K. Batta, Head, LWEERP in compiling and editing the Vision-2025 document. Inputs from all Heads of the Programme and Dr. B. Saha of ICAR-RCER are thankfully acknowledged. The untiring efforts of all others involved in this exercise are acknowledged and appreciated.



(Alok K. Sikka)  
Director

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## EXPLANATION TO ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
AIT	Asian Institute of Technology
BoES	Bureau of Economics and Statistics
CADA	Command Area Development Authority
CBIP	Central Board of Irrigation and Power
CGIAR	Consultative Group for International Agricultural Research
CIAT	International Centre for Tropical Agriculture
CIFA	Central Institute of Fisheries and Aquaculture
CIFRI	Central Inland Fisheries Research Institute
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (The International Maize and Wheat Improvement Center)
CPWF	Challenge Programme on Water & Food
CRIDA	Central Research Institute for Dryland Agriculture
CRRRI	Central Rice Research Institute
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSU	Colorado State University
CSWCRTI	Central Soil & Water Conservation Research & Training Institute
CTRI	Central Tobacco Research Institute
CWC	Central Water Commission
DFID	Department for International Development
DMSI	Dry Matter Stress Index
DSE	Delhi School of Economics
DSI	Drought Stress Index
DSP	Deep Summer Ploughing
DST	Department of Science and Technology
DWMR	Directorate of Water Management Research
DWR	Directorate of Wheat Research
EFC	Expenditure Finance Committee

FAO	Food and Agriculture Organization
FLD	Front Line Demonstration
FMD	Foot and Mouth Disease
FYM	Farm Yard Manure
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GFCC	Ganga Flood Control Commission
GHG	Green House Gas
GIS	Geographical Information System
HRD	Human Resource Development
HS	Haemorrhagic Septicaemia
HYV	High Yielding Variety
IARI	Indian Agricultural Research Institute
IASRI	Indian Agricultural Statistics Research Institute
IBPGR	International Board for Plant Genetic Resources
ICARDA	International Center for Agricultural Research in Dry Areas
ICMR	Indian Council of Medical Research
ICRAF	International Council for Research on Agro-forestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information Communication Technology
IDMI	International Data Management Institute
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IFS	Integrated Farming System
IIHR	Indian Institute of Horticultural Research
IIP & DM	Indian Institute of Pests and Disease Management
IIPR	Indian Institute of Pulses Research
IIT	Indian Institute of Technology
IITM	Indian Institute of Tropical Meteorology
IIVR	Indian Institute of Vegetable Research
ILRI	International Livestock Research Institute
IMC	Institute Management Committee
IMD	India Meteorological Department
INARIS	Integrated National Agricultural Research Information System

INCID	Indian National Committee on Irrigation and Drainage
IVLP	Institute Village Linkage Program
IPGRI	International Plant Genetic Resources Institute
IPR	Intellectual Property Right
IRRI	International Rice Research Institute
IVRI	Indian Veterinary Research Institute
IWMI	International Water Management Institute
LCC	Leaf Colour Chart
LEWA	Low Energy Water Application
LF	Liquid Fertilizer
MNC	Multi National Company
MoEF	Ministry of Environment and Forests
MoRD	Ministry of Rural Development
MoWR	Ministry of Water Resources
MRC	Mekong River Commission
NAARM	National Academy of Agricultural Research and Management
NABARD	National Bank for Agriculture and Rural Development
NARES	National Agriculture Research and Extension System
NATP	National Agricultural Technology Project
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources
NBSS&LUP	National Bureau of Soil Survey and Land Use Planning
NCAP	National Centre for Agricultural Economics and Policy Research
NCIWRD	National Commission for Integrated Water Resources Development
NGOs	Non-Government Organizations
NHB	National Horticultural Board
NIH	National Institute of Hydrology
NRCW	National Research Centre for Women in Agriculture
NRM	Natural Resource Management
NRSP	Natural Resources Support Programme
PDCSR	Project Directorate for Cropping System Research
PIM	Participatory Irrigation Management
PME	Project Monitoring and Evaluation
PSD	Particle Size Distribution

PWM	Participatory Watershed Management
QPM	Quality Protein Maize
QRT	Quinquennial Review Team
RAC	Research Advisory Committee
RAU	Rajendra Agricultural University
RCT	Resource Conservation Technology
RD	Ranikhet Disease
RPC V	Right Parallel Channel V
SAD	State Agricultural Department
SAUs	State Agricultural Universities
SHG	Self Help Group
SIWI	Stockholm International Water Institute
SRC	Staff Research Council
SSF	Solid Soluble Fertilizer
TDM	Total Dry Matter
TRIPS	Trade Related Aspects of Intellectual Property Rights
UC	University of California
UEA	University of East Anglia
UR	University of Reading
USAID	United States Agency for International Development
WALMI	Water and Land Management Institute
WFC	World Financial Centre
WMO	World Meteorological Organisation
WRI	World Resources Institute
WTCER	Water Technology Centre for Eastern Region
WTO	World Trade Organization
WTP	Wireless Transaction Protocol
WUA	Water Users' Association
YSR	Yield Stability Ratio
ZT	Zero Tillage
ZTDSR	Zero Tillage for Direct Seeded Rice



## EXECUTIVE SUMMARY

The ICAR Research Complex for Eastern Region Patna came into existence on April 01, 2001. The Complex is a broad based institutional framework to address diverse issues relating to land and water resources management, crop husbandry, horticulture, fisheries, livestock and poultry, agro-processing and socio-economics in a holistic manner for enhancing research capability and providing backstopping for improvement in agricultural productivity and livelihood in the eastern region. The region is a 'Low Productivity - High Potential' region endowed with rich natural resources which so far have remained underutilized. Per capita availability of net cultivated land in the eastern region is low with fragmented land holdings. About 50% of the area of the eastern region suffers from various forms of land degradation resulting in lower productivity. Even though the region receives 1000 to 2000 mm rainfall, the productivity of rainfed agriculture continues to be low. A vast stretch of area (3.5 Mha) is permanently or seasonally waterlogged and / or faces serious drainage congestion problem owing to flat topography. The region abounds in seasonal and perennial waterbodies whose potential for fisheries and other aquatic crops like Makhana remains to be exploited.

The eastern region has a rich resource base for intensive and diversified agriculture. Average productivity of rice, varies from 1.46 t/ha in Bihar to 2.51 t/ha in West Bengal. The gap between present and potential yields ranges from 2.49 t/ha in West Bengal to 4.92 t/ha in eastern Assam. Fruits and vegetable crops cover more than 70 per cent of the total area under horticulture in the eastern region. The per capita availability of fruits is much below the dietary requirement of about 90 g fruits per day. The eastern region is inhabited by 28 per cent of livestock population in India. In spite of large number of livestock population, milk production is only 12 per cent of national production. The area under fodder cultivation in the region is also reduced because of high demand of food crops.

Ever since the Complex came into existence, it identified major research thrust areas in view of the natural resource endowments and the constraints faced by the eastern region. As a result of the research, demonstration, dissemination and adoption by the farmers, the X Plan targeted productivity levels of rice, wheat, fish and fruits viz. 3.5-4.5 t/ha, 3.0 t/ha, 2.1-2.6 t/ha and 13.5 t/ha respectively have been achieved in the project areas. The Complex released 15 improved varieties of fruits and vegetable crops and the area under improved varieties has increased considerably in Jharkhand and Bihar. The Complex has made a modest beginning in development of location-specific, multi-commodity, integrated farming system models for rainfed, irrigated and water stagnated and flooded ecosystems in eastern region. The Complex has developed inter-departmental linkages for research complementarity with line departments in the eastern region.

Declining per capita land and water availability, increased population pressure, increasing pressure on natural resources, changing food habits and life styles, livelihoods and socio-

economic scenario need serious consideration for developing future perspective for the eastern region. Reduced diversion of water for agriculture and increased food requirements by 2025 would require enhancing agricultural water productivity at different levels. For improving the productivity of rainfed agriculture, rain water management through storage and recycling of runoff will be the key for controlling soil erosion and sustaining horticulture, crop, livestock & fisheries production system in rainfed plains and plateau areas through integrated watershed management. Participatory water management and value addition of water through multiple uses will receive special importance. In order to improve the productivity of available water, research on water saving irrigation methods, including micro irrigation would be required to sustain the emerging water needs of sugarcane, banana etc. in eastern region particularly Bihar. There is a need to develop multiple water use models for different agro-hydrological conditions to suit various categories of small and marginal farmers to improve their livelihoods.

There is an urgent need to develop suitable high yielding, disease and pest resistant location-specific varieties of important, cereals, oilseed, pulses, fruits, vegetables and medicinal and aromatic plants to meet the global competition in view of WTP, PVP, IPR and TRIPS guidelines. Technologies need to be developed for horticultural enterprises such as post-harvest handling of produce, processing and value addition for gainful employment to the rural people. The Complex envisages developing and evaluating technologies for breeding, feeding and health care of livestock, poultry and fisheries suitable for the climates of eastern region. Crop-livestock-water interactions including livestock water productivity aspects would require special attention. Fodder production in rainfed condition will be given importance. Economic rations for livestock based on locally available feed resources would be needed.

Major thrust of the Complex will be on developing integrated, location-specific multi-commodity farming system modules having synergistic interaction of horticultural, crop and agro-forestry based cropping system incorporating fishery and animal components, beekeeping and mushroom to enhance the income of resource poor farmers of the eastern region.

The Complex will develop research programmes to improve the effectiveness of the service delivery mechanisms in terms of reliability, quality, timeliness and access. The major focus will be to minimize the dependence on government institutional support and to rely on local participatory community organizations for effective service delivery including linkages. Policy research will be an integral part of the ICAR-RCER mission. In order to train the personnel of ICAR-RCER in frontier areas of knowledge, the scientists of the Complex would be deputed for national and international training programmes in cutting edge technologies.

In order to transform the 'Low-Productivity-High Potential' eastern region into 'High Productivity' region, the Complex would adopt agro-ecosystem based Integrated Farming System approach in various identified eco-systems in the region viz. irrigated plain ecosystem, rainfed ecosystem, plateau ecosystem, flooded and flood prone ecosystem, and coastal ecosystem through a new business model involving ICAR Institutes, SAUs, CG Centres, NGOs, private institutes and state agencies in a network/consortia mode.

