Six frontiers. One integrated rice future.

Connecting discoveries, resilient production, One Health, intelligent technologies, industrial innovation and farmer prosperity.



01 DISCOVER

REWRITING RICE

The Biological Revolution



02 SUSTAIN

ONE PLANET

Climate & sustainable systems



03 PROTECT

ONE HEALTH, ONE RICE ECOSYSTEM

Healthy plants • ecosystems • people



04 INTELLIGENCE

RICE INTELLIGENCE

The Digital Revolution



05 TRANSFORM

BEYOND THE GRAIN

The Rice Bioeconomy



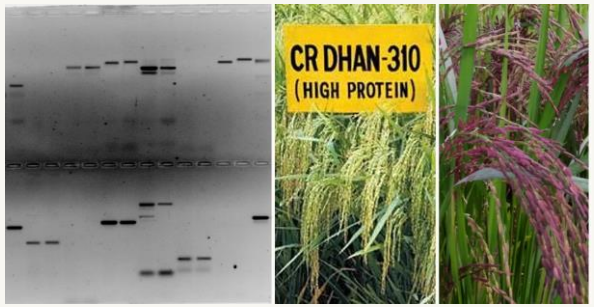
06 PROSPER

RICE 2047

Innovation to Prosperity

DISCOVER → SUSTAIN → PROTECT → INTELLIGENCE → TRANSFORM → PROSPER

Rewriting Rice: The Biological Revolution



01 Rice genetic resources, wild relatives, landraces, biodiversity, conservation, characterization and pre-breeding

02 Classical, quantitative, population and statistical genetics; cytogenetics, genome evolution and heterosis

03 Structural, comparative, functional and pan-genomics; transcriptomics, epigenomics, proteomics and metabolomics

04 Gene discovery, GWAS, QTL mapping, haplotypes, genetic architecture and molecular marker development

05 Conventional breeding, hybrid breeding, marker-assisted breeding, genomic selection and accelerated breeding

06 Genome editing, biotechnology, transgenics, synthetic biology and trait engineering, subject to applicable regulation

07 Plant physiology, anatomy, development, photosynthesis, source–sink relationships, reproductive biology and flowering

08 Root biology, nutrient physiology, signalling, metabolism, abiotic-stress physiology and functional adaptation

09 Seed biology, development, dormancy, germination, vigour, longevity, seed enhancement, priming and coating

10 Phenotyping and physiological trait measurement; genotype × environment analysis and multi-environment breeding

11 Specialty rice genetic improvement, quality trait genetics, nutritional trait breeding and biofortification genetics

One Planet



01 Rice ecologies: irrigated, upland, rainfed lowland, deepwater, flood-prone, coastal saline, hill and tribal production systems

02 Climate change, extreme weather, risk assessment, adaptation, mitigation and resilient rice production

03 Agronomy, crop establishment, direct-seeded rice, transplanting, conservation and precision crop management

04 Weed biology, weed ecology, integrated weed management, herbicide resistance and DSR weed challenges

05 Soil science, fertility, soil organic carbon, nutrient cycling, fertilizers and integrated nutrient management

06 Water management, irrigation and drainage, water productivity and water-saving production systems

07 Abiotic stress agronomy including drought, flood, heat, cold, salinity, sodicity and multiple stresses

08 Regenerative, organic, natural and agroecological rice production; validation of biological inputs

09 Rice-based cropping systems, rice–pulse/oilseed/vegetable rotations, diversification and sustainable intensification

10 Integrated farming systems including rice–fish, rice–livestock and allied enterprises

11 Methane and other greenhouse gases, carbon footprint, life-cycle assessment and climate-smart resource management

12 Rice residue and straw management, non-burning alternatives, conservation of biodiversity and ecosystem services

One Health, One Rice Ecosystem



01 Rice pathology, epidemiology, disease diagnostics, resistance, plant immunity and integrated disease management

02 Rice entomology, pest ecology, resistance, biological control and integrated pest management

03 Nematology, weeds as pest hosts, invasive organisms and emerging pest and disease threats

04 Seed health, seed-borne pathogens, phytosanitary standards and biological/chemical seed protection

05 Rice microbiomes, rhizosphere biology, beneficial microorganisms and plant–microbe–soil interactions

06 Pesticide stewardship, resistance management, residue monitoring and environmental toxicology

07 Rice-field biodiversity, natural enemies, aquatic organisms, wetlands and ecosystem services

08 Arsenic, cadmium, heavy metals, mycotoxins and other contaminants: surveillance, risk and mitigation

09 Food safety, nutritional security, rice-associated dietary health and public-health interfaces

10 Rice–fish–livestock interfaces, animal health and antimicrobial resistance where evidence and relevance warrant

11 Integrated One Health surveillance, ecological risk assessment and safer rice-based production and food systems

Rice Intelligence: The Digital Revolution



01 Artificial intelligence, machine learning, deep learning, explainable and agentic AI for rice research

02 Digital phenotyping, image analytics, computer vision, hyperspectral sensing and high-throughput trait measurement

03 Genomic prediction, computational breeding, automated breeding design and decision-support tools

04 Remote sensing, drones, satellites, GIS, crop mapping and geospatial intelligence

05 Digital twins, crop and climate simulation, forecasting, optimization and predictive analytics

06 Agricultural statistics, experimental design, biometrics, spatial field-trial analysis and reproducible computation

07 Bioinformatics, biological databases, FAIR data, interoperability, computational biology and research platforms

08 Sensors, IoT, smart irrigation, variable-rate inputs and precision crop protection

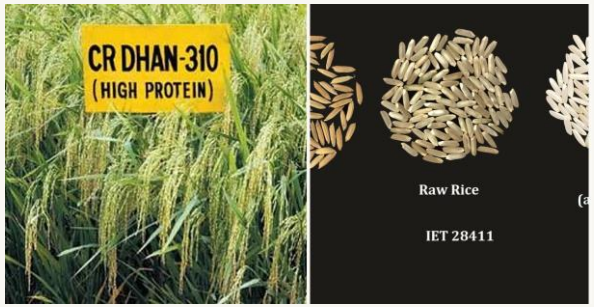
09 Agricultural engineering: seeders, transplanters, weeders, harvesters, threshers and field machinery

10 Robotics, automation, autonomous field operations, machinery design, ergonomics and energy efficiency

11 Digital grain-quality evaluation, industrial process automation, traceability and smart post-harvest systems

12 Digital extension, advisory platforms, accessible farmer technologies and implementation at scale

Beyond the Grain: The Rice Bioeconomy Revolution



01 Grain quality, milling, cooking and eating quality; aromatic, pigmented, specialty and premium rice

02 Food chemistry, starch and protein functionality, resistant starch, rice processing and product development

03 Functional foods, nutraceuticals, fortified foods, dietary products and food innovation

04 Rice bran oil, gamma-oryzanol, phytosterols, ferulic acid, waxes and specialty lipid/chemical products

05 Rice-derived bioactives for pharmaceutical, biomedical and cosmeceutical research, including safety and efficacy validation

06 Rice straw pulp, paper, paperboard, cellulose, moulded fibre, packaging and textile applications

07 Rice starch/bran/husk-based bioplastics, biodegradable films, biopolymers and composite materials

08 Rice husk silica, nanosilica, ash, advanced functional materials, coatings and construction products

09 Bioenergy, biogas, bioethanol, briquettes, biochar, biorefineries and industrial biotechnology

10 Rice by-products in animal feed, aquaculture feed, fertilizers, soil amendments and agricultural inputs

11 Post-harvest engineering, drying, storage, pest management, milling machinery and loss reduction

12 Extraction, fermentation, analytical chemistry, separation, pilot processing, product testing and quality standards

13 Wastewater treatment adsorbents, environmental materials and pollution-control applications

14 Circular bioeconomy, industrial scale-up, life-cycle assessment, techno-economics and sustainable manufacturing

Rice 2047: Innovation to Prosperity



01 Rice economics, profitability, farm management, resource economics and cost of cultivation	05 Agricultural extension, participatory research, farmer behaviour, technology adoption and digital outreach	09 Agricultural policy, food security, institutional systems, social sciences and impact assessment
02 Breeder, foundation, certified and hybrid seed production; seed multiplication, testing, certification and quality assurance	06 Rice markets, exports, trade, consumer preferences, geographical indications and competitiveness	10 Gender, youth, tribal and smallholder inclusion, producer organizations and livelihood diversification
03 Seed corporations, seed supply chains, seed entrepreneurship, seed industry regulation and farmer access to quality seed	07 Agribusiness, rice milling enterprises, value chains, startups, entrepreneurship and industrial clusters	11 Agricultural education, skill development, research capacity building and national/international partnerships
04 Variety evaluation, release, notification, registration, plant variety protection and seed-sector governance	08 Intellectual property, patents, licensing, commercialization, public–private partnerships and technology transfer	12 Rice innovation missions aligned with Viksit Bharat 2047, Atmanirbhar Bharat and sustainable development