

Recent Rice Varietal Innovations at ICAR-NRRI

(2022-2024)

Research Bulletin for Rice Stakeholders

RL Verma, RP Sah, J Meher, BC Marndi, LK Bose, K Chattopadhyay,
SK Dash, Prakash Singh, MR Mohanty, D Jena, D Rout, L Kuanr,
Meera K Kar, S Samantaray and AK Nayak



ICAR-NATIONAL RICE RESEARCH INSTITUTE

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PREFACE

We are delighted to present the latest Research Bulletin from ICAR-NRRI (Indian Council of Agricultural Research - National Rice Research Institute), designed for all stakeholders in the rice industry. This bulletin aims to connect scientific research with practical applications, focusing on advancements in agriculture.

ICAR-NRRI has long been a leader in rice research and development, dedicated to boosting agricultural productivity, enhancing sustainability, and supporting food security in India. The institute has achieved significant progress by developing innovative technologies and solutions to meet the challenges faced by farmers and the broader agricultural sector.

This bulletin highlights ICAR-NRRI's dedication to fostering collaboration between researchers and industry stakeholders while also reaching out to the farmers. It serves as an invaluable resource for entrepreneurs, businesses, and organizations interested in adopting varietal innovations in rice cultivation and processing.

This bulletin contains detailed information on a range of commercializable varietal technologies developed by the institute. These varieties address various aspects of rice production such as yield, climate resilience, quality types and nutritional aspects and value addition and many more through varietal intervention. Each technology is presented with a clear description of its features and potential adoption.

ICAR-NRRI's efforts go beyond mere technology transfer; the institute is actively involved in capacity building and knowledge sharing to ensure effective adoption of these innovations. By encouraging collaboration, facilitating knowledge exchange, and supporting entrepreneurial ventures, ICAR-NRRI is making significant contributions to agricultural innovation and economic growth.

We encourage industry professionals, entrepreneurs, policymakers, and farmers to explore the commercializable varietal technologies detailed in this bulletin and consider their integration into your operations. Embracing these innovations can significantly boost rice productivity, ensure food and nutritional security, and promote sustainable development in agriculture.

May this Research Bulletin spark productive collaborations, strengthen the synergy between ICAR-NRRI and the industry, and contribute to the growth and prosperity of our agricultural landscape.

Authors

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ICAR-National Rice Research Institute

The ICAR-National Rice Research Institute (formerly known as the Central Rice Research Institute) in Cuttack, established in 1946, stands as a premier institution for rice research in India. It has been pivotal in enhancing rice cultivation by developing high-yielding varieties, which have greatly contributed to the country's rice self-sufficiency. The institute has notified around 185 rice varieties,

including 6 hybrids, suited for diverse rice-ecologies, now spanning ~ 8.0 million hectares area across India. Committed to addressing the challenges of climate change and boosting rice production, the institute continues to develop new high-yielding varieties and technologies. Over the past



two years (2022-23 to 2023-24), institute has successfully notified 32 innovative rice varieties for cultivation, both independently and in collaboration with other institutions. Additionally, the institute engages with stakeholders through Public-Private Partnership (PPP) models to support effective technology transfer.

Key accomplishments @ ICAR-NRRI

- A total of 185 varieties including 6 hybrids (~ 13% of the rice varieties released in the country) have been released by NRRI, which covers about 18% of rice area with 18.5 Mt production.
- Four rice varieties, CR Dhan 310 (>10% protein), CR Dhan 311 (>10% protein and >20ppm Zn), CR Dhan 324 (>11% protein, 22ppm Zn and 2.5 ppm Fe) and CR Dhan 411 (>10% protein) with high protein and zinc content were developed and released.
- The Institute has also developed 20 climate-smart rice varieties, including CR Dhan 801, CR Dhan 802 combined with dual traits, drought, and submergence tolerant are important.
- Four varieties namely Improved Tapaswini, Improved Lalat, CR Dhan 800 and CR Dhan 803 with bacterial blight resistance developed through MAS and commercialized.
- Thirteen rice varieties with high water use efficiency namely, CR Dhan 200, 201, 202, 203, 205, 206, 207, 209, 210, 211, 212, 213, 214 were developed for adaptation under aerobic conditions in India.

Rice variety suitable for upland ecosystem

Rice varieties for upland conditions are specifically bred to thrive in dry, well-drained environments, offering benefits such as drought resilience and adaptability to poor soil conditions. These varieties play a crucial role in providing stable yields and contributing to food security in regions with limited water resources. Effective cultivation practices and ongoing research are essential for maximizing the potential of upland rice and addressing the challenges faced by farmers in these environments. Institute has developed altogether 28 rice varieties suitable for this ecology.

CR Dhan 103 (Pramod)

Released by and year	SVRC, Jharkhand in 2022
Pedigree and breeding method	Vandana x IR64; Pedigree method
Suitable ecology and recommended state	Rainfed direct seeded conditions (Tanr2/Don3) of Jharkhand
Maturity duration	95-100 Days
Average grain yield	3396 kg/ha
Grain type & test weight (TW)	Long slender grains with 1000-grain weight of 23.03 g.
Other quality parameter	High HRR (61.4%), intermediate AC (26.04%) and soft GC (72) and intermediate ASV (4.5)
Special trait	Drought tolerant early rice variety with excellent grain quality. Low P tolerance, possessing PSTOL1 gene
Resistance to pests and diseases	Resistant to blast and moderately resistant to brown spot; moderately tolerant to gall midge, WBPH, leaf folder and stem borer



CR Dhan 107 (Unnat Vandana)

Released by and year	SVRC, Jharkhand in 2022
Pedigree and breeding method	Vandana*4 / C101A51//IR84984-83-15-862-B; MAB
Suitable ecology & recommended state	Rainfed direct seeded conditions (<i>Tanr2/Don3</i>) of Jharkhand
Maturity duration	90-95 Days
Average grain yield	3370 kg/ha
Grain type & TW	Long bold grains with TW of 23.03g.
Other quality parameter	High HRR (61.4%), intermediate AC (26.04%) and soft GC (72) and intermediate ASV (4.5)
Special trait	Climate resilient variety- drought (<i>qDTY12.1</i> , <i>qDTY2.3</i> & <i>qDTY3.2</i>), leaf blast (<i>Pi2</i>) and low P tolerance (<i>PSTOL1</i>)
Resistance to pests and diseases	Resistant to blast, moderately resistant to brown spot, sheath rot, false smut and rice tungro diseases;



CR Dhan 108

Released by and year	CVRC 2024
Pedigree and breeding method	APO/CR 143-2-2, pedigree method
Suitable ecology & recommended state	Early direct seeded rainfed condition of Odisha and Bihar
Maturity duration	110-114
Average grain yield	3446 Kg/ha
Grain type & TW	Medium slender grains with high TW of 25.1g.
Other quality trait	High HRR (62.5%), intermediate AC (25.5%), ASV (4.0), soft GC (62).
Special trait	Moderate drought tolerant
Resistance to pests and diseases	Moderately resistant/tolerant to Gall midge, BPH, WBPH, SB, LF and leaf blast, neck blast, BB, Sh. B; moderate drought tolerant.



Rice varieties adaptive under aerobic situation

Aerobic rice is a cultivation method where rice is grown under non-flooded conditions. Unlike traditional rice farming that relies on continuous flooding of fields, aerobic rice is cultivated in well-drained, aerobic soil, allowing for better water use efficiency and improved soil health. The institute has released a total of 13 water saving rice varieties suitable for cultivation under aerobic condition. CR Dhan 200, CR Dhan 201, CR Dhan 202, CR Dhan 203, CR Dhan 204, CR Dhan 205, CR Dhan 206, CR Dhan 207, CR Dhan 209, CR Dhan 210, CR Dhan 211, CR Dhan 212, CR Dhan 214. Notably, CR Dhan 211, CR Dhan 212, and CR Dhan 214 have recently been notified and are described in detail. has developed altogether 28 rice varieties suitable for this ecology.

CR Dhan 211

Pedigree and breeding method	IR10L146 / IR10L149, pedigree method
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Aerobic condition of Odisha, Bihar, Jharkhand, Maharashtra, Gujarat, Tripura, Chhattisgarh and Haryana
Maturity duration	114-118 Days
Average grain yield	4500-5500 Kg/ha
Grain type & TW	Long slender grains with TW of 24.51g
Other quality trait	High HRR (66.0%), intermediate AC (24.86%), ASV (5.0), GC (22).
Special trait	Wide adaptability
Resistance to pests and diseases	Moderately resistant to neck blast, leaf blast, brown spot, sheath rot and grain discoloration

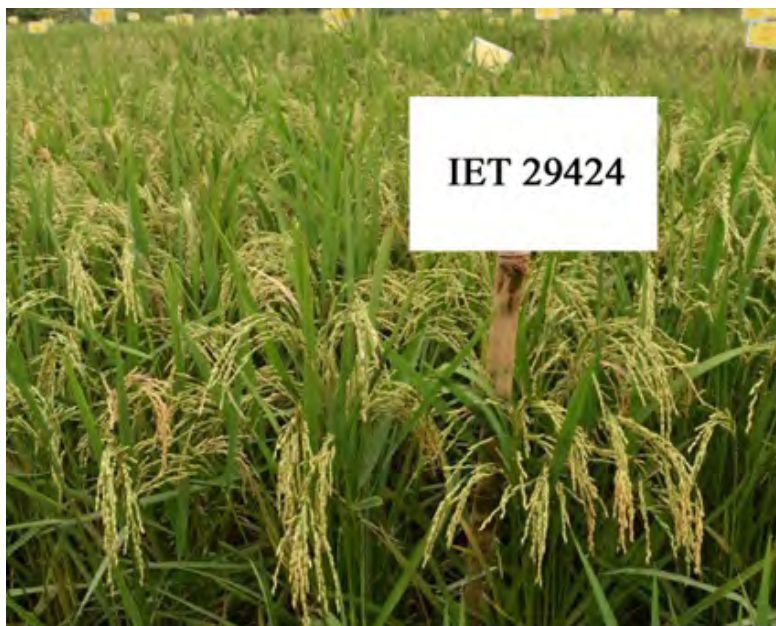


Field view of CR Dhan 211 (IET 29411) at dough stage



CR Dhan 212

Pedigree and breeding method	IR09L337 / IR09L154, pedigree method
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Aerobic condition of Odisha, Bihar, and Jharkhand
Maturity duration	110-113 Days
Average grain yield	4400-5700 Kg/ha
Grain type & TW	Long bold grains with TW of 25.45g
Other quality trait	High HRR (60.15%), intermediate AC (23.5%), LS grain, ASV (4.5), GC (22).
Special trait	Non-lodging type, moderately tolerant to drought
Resistance to pests and diseases	Moderately resistant to neck blast, leaf blast, brown spot, sheath rot, RTD and grain discoloration



CR Dhan 214

Pedigree and breeding method	IR 09L337 XIR 09L154, pedigree method
Released by and year	CVRC 2024
Suitable ecology & recommended state	Aerobic condition of Odisha, Bihar, and Jharkhand
Maturity duration	110 Days
Average grain yield	4451 kg/ha
Grain type & TW	Long slender grains with TW of 21.0g.
Other quality trait	High HRR (62.3%), intermediate AC (24.5%), ASV (5.0), soft GC (44.5).
Special trait	Short duration, drought tolerant
Resistance to pests and diseases	Moderately resistant to leaf blast, sheath rot and RTD



High Yielding Varieties for Irrigated Ecosystem

High-yielding rice varieties for irrigated ecosystems are bred to take full advantage of consistent water availability, leading to increased productivity and improved grain quality. These varieties play a vital role in meeting global food demands and supporting agricultural development. Effective management practices and ongoing research are essential to address challenges and enhance the sustainability and resilience of these high-yielding rice varieties. ICAR-NRRI is leading rice institute, notified > 70 rice varieties for this ecology, most notable are Naveen, CR Dhan

CR Dhan 314

Pedigree and breeding method	ICR 3724-1 / TJ 171-1, pedigree method
Released by and year	CVRC in 2022
Suitable ecology & recommended state	Irrigated condition of Odisha and Bihar
Maturity duration	130 Days
Average grain yield	6620 kg/ha
Grain type & TW	Medium slender grains with TW of 24.5g
Other quality trait	Moderate HRR (56.6%), intermediate AC (25.13%), ASV (5.0), soft GC (65.0).
Special trait	New generation rice
Resistance to pests and diseases	Highly resistant to false smut, moderately susceptible to leaf blast and neck blast; resistant to leaf folder and MR to stem borer (Dead heart).



CR Dhan 321

Pedigree and breeding method	ICR 3724-1 / TJ 171-1, pedigree method
Released by and year	CVRC in 2022
Suitable ecology & recommended state	Irrigated early transplanted condition of Odisha, Bihar, Jharkhand, WB, UP, Tripura, Assam, CHH & MH.
Maturity duration	120 Days
Average grain yield	5500- 6000 kg/ha
Grain type & TW	Medium slender with TW of 17.7g
Other quality trait	Moderate HRR (56.6%), intermediate AC (25.13%), ASV (5.0), soft GC (65.0).
Special trait	Higher adaptability released in 9 states
Resistance to pests and diseases	Moderately resistant to false smut, neck blast, leaf blast, brown spot and grain discolouration also has high field tolerance for sheath rot.



CR Dhan 323 (Jyotsna)

Pedigree and breeding method	Doubled Haploid derivative of hybrid CR Dhan 701
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Irrigated and shallow lowland condition of Odisha
Maturity duration	135-140 Days
Average grain yield	5500-6000 kg/ha
Grain type & TW	Short bold grains with TW of 25.0g
Other quality trait	High HRR (65.2%), intermediate AC (23.97%), ASV (4.0), soft GC (35.0).
Special trait	Doubled Haploid derivative
Resistance to pests and diseases	Resistant to false smut, moderately resistant to leaf blast, neck blast, glume discoloration, RTD, and moderate tolerance to Gall midge



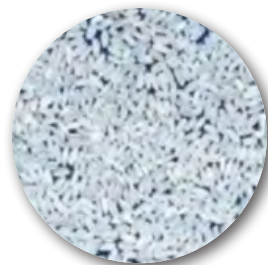
CR Dhan 326 (Panchatatva)

Pedigree and breeding method	Naveen / IRBB66; Marker assisted pedigree breeding
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Irrigated ecology of Odisha
Maturity duration	135-140 Days
Average grain yield	6200 kg/ha
Grain type & TW	Medium slender grains with TW of 21.03
Other quality trait	High HRR (60.2%), intermediate AC (24.8%), ASV (5.0)
Special trait	Bacterial blight resistance, non-lodging and non-shattering type
Resistance to pests and diseases	Resistant to bacterial blight with five resistance genes (<i>Xa4</i> , <i>xa5</i> , <i>Xa7</i> , <i>xa13</i> and <i>Xa21</i>); tolerate Gall midge biotype 1



CR Dhan 327(Madhumita)

Pedigree and breeding method	Birupa/Pusa 44, pedigree breeding
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Irrigated ecology of Odisha
Maturity duration	135-140 Days
Average grain yield	5500-6000 kg/ha
Grain type & TW	Medium slender grains with TW of 21.06g
Other quality trait	Moderate HRR (59.95%), intermediate AC (24.21%), ASV (5.0), GC (22.0).
Special trait	High yielding
Resistance to pests and diseases	Resistant to False smut and also moderately resistant to Neck blast, Bacterial blight and Brown spot



CR Dhan 328 (Divya)

Pedigree and breeding method	IR 73963-86-1-5-2 / CR 2324-1, pedigree breeding
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Irrigated ecology of Odisha
Maturity duration	143 Days
Average grain yield	6700 kg/ha
Grain type & TW	Long bold grains with TW of 23.4g
Other quality trait	High HRR (63.0%), intermediate AC (24.20%), ASV (4.0), GC (22.0).
Special trait	New plant type variety with high photosynthetic efficiency
Resistance to pests and diseases	Resistant to leaf folder, stem borer, moderately susceptible to plant hopper. MR to RTD and leaf scald and MS to neck blast



CR Dhan 322

Pedigree and breeding method	IR-73930-31-3-2-2/Pratikshya, pedigree breeding
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated late ecology of Chhattisgarh and Maharashtra
Maturity duration	135-140 Days
Average grain yield	5450 kg/ha
Grain type & TW	Long slender grains with TW of 19.15g.
Other quality trait	High HRR (67.0%), intermediate AC (24.71%), ASV (3.0), GC (38.0).
Special trait	
Resistance to pests and diseases	Moderately resistant to stem borer, leaf folder and grain discoloration



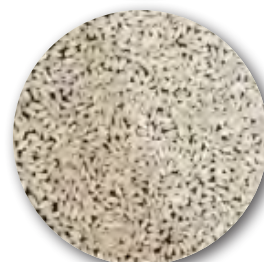
CR Dhan 329

Pedigree and breeding method	Lalat/ N 22, pedigree breeding
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated ecology of Odisha, Gujarat, Maharashtra and Bihar
Maturity duration	125-132 Days
Average grain yield	5500-6200 kg/ha
Grain type & TW	Short Bold grains with TW of 22.36g
Other quality trait	High HRR-63.5%; high AC-26.3%, soft GC-55.5
Special trait	Non-lodging, Intermediate grain shattering
Resistance to pests and diseases	Resistant to False smut; moderately resistant to neck blast, brown spot and sheath rot; highly tolerant to leaf folder, whorl maggot and rice thrips.



CR Dhan 331

Pedigree and breeding method	Swarna/ARC 10075, pedigree breeding
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated ecology of Chhattisgarh and Maharashtra
Maturity duration	140 Days
Average grain yield	5600 t/ha
Grain type & TW	Short bold grains with 21.5g TW
Other quality trait	High HRR-70.1%; intermediate AC-24.55%, soft GC-49.0
Special trait	High head rice recovery with Swarna grain type
Resistance to pests and diseases	Tolerant to neck blast and moderately tolerant to bacterial blight, leaf blast and sheath rot



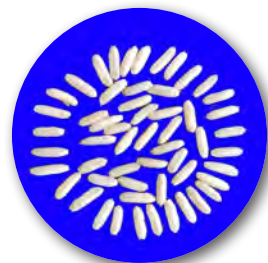
CR Dhan 332

Pedigree and breeding method	Pooja / IR64 MAS, developed through Pedigree method
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated ecology of Odisha and W.B.
Maturity duration	135-140 days
Average grain yield	5758 kg/ha
Grain type & TW	Long bold with test weight of 23.5g.
Other quality trait	High HRR-58.95%; intermediate AC-24.71%, ASV-3.0, soft GC-59.0
Special trait	High grain yield
Resistance to pests and diseases	Moderately resistant to brown spot and sheath rot, leaf folder, whorl maggot and thrips attack



CR Dhan 337

Pedigree and breeding method	IET 22729 / Brown gora; pedigree
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated early transplanted condition of Odisha, Bihar, Jharkhand, and West Bengal
Maturity duration	118-121 days
Average grain yield	5.6 t/ha
Grain type & TW	Long Slender
Other quality trait	Moderate HRR: 55.5%; intermediate AC:24.4; moderate GC:24 mm and ASV: 4.0
Special trait	Released for 4 states, Long slender grain type
Resistance to pests and diseases	Moderately resistant to neck blast, leaf blast, BLB, sheath rot, RTD and grain discolouration; Highly tolerant to leaf folder, stem borer (dead heart) and whorl maggot insect pests



Biofortified rice variety-nutridence traits

To address nutritional security in the country, the institute has released 05 nutridence rice varieties namely CR Dhan 310 (High Protein 10.5%), CR Dhan 311 (High Protein 10.1% & Moderately High Zinc 20 ppm), CR Dhan 315 (High Zinc 25 ppm), CR Dhan 324 (11.68% protein, 23.2ppm Zn and 2.7ppm Fe) and CR Dhan 411 (High Protein 10%). Amongst, CR Dhan 310 and CR Dhan 311 are in formal seed chain covering about 0.102 and 0.017-million-hectare area which cumulatively contributing about 0.363 million tonnes of biofortified rice grains to national food basket. The breeder seed supply of these biofortified rice varieties has witnessed a sharp growth from 3.9 quintals in 2018-19 to 121.60 quintals in 2021-22 indicating that by the year 2024-24, these varieties will be cultivated on about 3.5-million-hectare rice area.

CR Dhan 324 (Abhaya Paushtik)

Pedigree and breeding method	Doubled haploid derivative of hybrid CRHR 32
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Irrigated ecology of Odisha
Maturity duration	115-120 Days
Average grain yield	4500-5500 kg/ha
Grain type & TW	Long slender grains with TW of 24.0g
Other quality trait	High HRR: 67.9 %; intermediate AC:25.66%; moderate GC:33 mm and ASV: 4.0
Special trait	Doubled Haploid derivative biofortified variety with high protein (11.68%), medium high zinc (23.2ppm) and moderate Fe (2.7 ppm)
Resistance to pests and diseases	Moderate Resistance to leaf blast, neck blast, brown spot, grain discoloration and false smut; moderate resistance to leaf folder and Gall midge

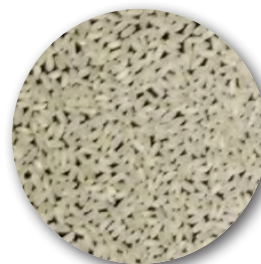


Coastal saline ecosystem

Coastal saline rice areas are critical for sustaining rice production in regions affected by high salinity. Effective management practices and the use of specialized rice varieties are essential for overcoming the challenges posed by saline conditions, ensuring continued agricultural productivity, and supporting food security in these vulnerable regions. The institute has developed >10 rice varieties i.e. Lunishree, Sonamani, Luna Suvarna (CR Dhan 403), Luna Sampad (CR Dhan 402), Luna Barial (CR Dhan 406), Luna Sankhi (CR Dhan 405), CR Dhan 412 (NICRA Dhan: Luna Ambiki), CR Dhan 414, CR Dhan 414, CR Dhan 415, CR Dhan 416 suitable for coastal ecology.

CR Dhan 414

Pedigree and breeding method	Gayatri/SR-26-B; Bulk-pedigree
Released by and year	CVRC in 2022
Suitable ecology & recommended state	Coastal saline ecology of Odisha, West Bengal and Andhra Pradesh
Maturity duration	145 Days
Average grain yield	4226 Kg/ha
Grain type & TW	Medium slender grains with TW of 23.5g
Other quality trait	High HRR (61%), very occasionally grain chalkiness, intermediate AC (26.3%) and soft GC (41)
Special trait	Moderately tolerant to salinity (at 6-7 dS-m) and stagnant flooding at reproductive stage.
Resistance to pests and diseases	Multiple stress tolerance, ability to germinate in anaerobic condition, tolerant to osmotic stress and salinity stress at seedling stage



CR Dhan 415 (Kamesh)

Pedigree and breeding method	Apo/ IR 64; pedigree method
Released by and year	SVRC, Jharkhand in 2022
Suitable ecology & recommended state	Drought-prone rainfed shallow lowland (<i>Don 2</i>) of Jharkhand
Maturity duration	120-125 Days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Short bold grains with TW of 22.0g
Other quality trait	High HRR (64.9%), moderate gelatinization temperature (ASV-3.5), intermediate AC of 22.09 and soft GC of 41.
Special trait	Drought tolerant
Resistance to pests and diseases	Resistant to blast and brown spot; resistant to moderately resistant to gall midge, WGPH, leaf folder and stem borer



CR Dhan 416

Pedigree and breeding method	CR Dhan 310/Getu; Bulk Pedigree
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Coastal saline ecology of West Bengal, Maharashtra and Gujarat
Maturity duration	125-130 days
Average grain yield	4.9 t/ha
Grain type & TW	Long bold grains with 24.0 TW
Other quality trait	Moderate HRR (56.1%), moderate gelatinization temperature (ASV-4.0), high AC of 27.48 and soft GC of 62.0.
Special trait	Saline tolerant, red colour grain
Resistance to pests and diseases	Moderately resistant neck blast, brown spot, sheath rot, Glume discoloration and rice tungro virus. Pest Resistant to Brown Plant Hopper, Grasshopper and Stem borer



Boro ecosystem

Boro rice is a specific type of rice grown during the Boro season, which is a major cropping season in South Asia, particularly in Bangladesh and parts of India. Boro rice is typically sown in late November to early January and harvested from April to June. The growing season coincides with the dry winter and early summer. It thrives in cooler temperatures during the initial growing phase and warmer temperatures as it matures. The crop is usually grown in areas with sufficient irrigation, as this season doesn't rely on monsoon rains. Boro rice prefers well-drained, fertile soils. It is often grown in low-lying areas where irrigation can be easily managed. Unlike other rice crops that rely on rainwater, Boro rice requires a consistent supply of irrigation water. This makes it more suited to regions where controlled irrigation is available. The NRRI has spearheaded the development of rice varieties specifically suited for Boro season cultivation. In total, five rice varieties, including two hybrids, have been officially approved for Boro season planting.

CR Dhan 603

Pedigree and breeding method	Vandana/BG90-2//PSB RC 18 pedigree method of breeding
Released by and year	SVRC, Odisha 2023
Suitable ecology & recommended state	Boro situation of Odisha
Maturity duration	130-140 days
Average grain yield	5881 kg/ha
Grain type & TW	Long slender with TW of 23.5
Other quality trait	Moderate HRR (57.8%), moderate gelatinization temperature (ASV-4.0), intermediate AC and soft GC of 23.0.
Special trait	Long slender grains with high yield
Resistance to pests and diseases	Resistant to leaf folder, stem borer, and gall midge; moderately tolerant to BPH. R to false smut and MR to blast, sheath rot and brown spot .



Hybrid rice

Hybrid rice technology is impressive as it enhances farm productivity of 15-25% more than HYVs. Given its yield advantage and economic importance several hybrids in rice have been commercialized in more than 40 countries, which creates a huge seed industry world-wide. ICAR-NRRI has been pioneering to start with the technology, has developed 06 popular rice hybrids viz. Ajay, Rajalaxmi, CR Dhan 701, CR Dhan 702, CR Dhan 703 and CR Dhan 704 for irrigated-shallow lowland, DSR and Boro ecosystem. Hybrid seed production creates additional job opportunity (100-105 more-man days) and comparatively more net income (70% more than production cost) than HYVs. Hence, this technology has great scope for further enhancement in per se rice productivity and livelihood of the nation.

CR Dhan 704 (Shyamdev)

Pedigree and breeding method	PMS17A/CR546, CGMS
Released by and year	SVRC, Odisha 2023
Suitable ecology & recommended state	Irrigated, RSL and DSR ecologies in Odisha
Maturity duration	130-135 Days
Average grain yield	7000-7500 kg/ha
Grain type & TW	Short slender grains with TW of 12.50g
Other quality trait	High HRR (68.25%), intermediate alkali value (5.7) and intermediate AC (24.72%)
Special trait	Hybrid rice suitable for DSR condition
Resistance to pests and diseases	Moderate resistance to false smut, leaf blast, neck blast, brown spot, sheath rot and glume discoloration; also has MRto Gal midge.



Rice variety with special traits

Rice varieties with special traits cater to diverse culinary needs and environmental conditions. From aromatic and sticky varieties like Basmati and Jasmine to resilient types such as saline-tolerant and drought-tolerant rice, each variety offers unique benefits suited to its intended use and cultivation environment. Advances in breeding and technology continue to expand the range of specialized rice varieties available, addressing both agricultural challenges and consumer preferences. Marker-Assisted Selection (MAS) is a breeding technique that uses molecular markers to select for specific genetic traits in rice. This approach accelerates the development of rice varieties with desirable traits, improving productivity, resilience, and quality. Institute has well equipped laboratory and screening facilities, could developed ~20 MAS varieties with desirable traits, amongst most notable are CR Dhan 800 (BLB resistant), CR Dhan 801,802,803,804, 805, 806, 807, 808,809,810 are 811 bred for resilient traits.

CR Dhan 805 (Naveen Shakti)

Pedigree and breeding method	Naveen*3 / CR 3006-8-2; MAB Breeding
Released by and year	SVRC, Odisha 2023
Suitable ecology & recommended state	Irrigated ecology in Odisha
Maturity duration	125-130 Days
Average grain yield	4800 kg / ha
Grain type & TW	Medium slender grains with TW of 21.1g
Other quality trait	High HRR (61.0%), intermediate alkali value (4.0) and intermediate AC (25.6%)
Special trait	MAS derived variety with biotic stress (BPH) resistance in Naveen background
Resistance to pests and diseases	Near Isogenic line of popular variety Naveen carrying two BPH resistant QTLs <i>qBph4.3</i> and <i>qBph4.4</i> Tolerant to brown spot, leaf blast and sheath rot



CR Dhan 806 (Varsadhan Sub1)

Pedigree and breeding method	MAS derived variety with submergence tolerance in Varshadhan background
Released by and year	SVRC, Odisha 2023
Suitable ecology & recommended state	Semi-deep water rainfed ecology of Odisha
Maturity duration	155 days
Average grain yield	3500-4000 kg/ha
Grain type & TW	Long bold grains with 24.0 g TW
Other quality trait	Moderate HRR (56.1%), intermediate alkali value (5.0) and intermediate AC (22.02%)
Special trait	Submergence tolerant, carrying <i>Sub1</i> gene
Resistance to pests and diseases	Resistant to stem borer (dead heart) and BPH; resistant to false smut and moderately resistant to neck blast



Premium quality rice

Indian sub-continent is well known for its native wealth of basmati and aromatic non- basmati rice, of which aromatic short grain (ASG) types remain important with respect to aroma, cooking and quality traits. These traits are responsible for greater consumer preference globally and fetching premium prices in domestic as well as in global markets. Institute has commercialized altogether 11 premium quality aromatic rice varieties viz. Geetanjali, Keteki Joha, Nua Dhusara, Nua Kalajeera, Nua Chinikamini, Poornabhog, CR Sugandh Dhan 907, CR Sugandh Dhan 908, CR Sugandh Dhan 909, CR Sugandh Dhan 910, CR Dhan 911 for different ecologies across the country.

CR Dhan 911(Basudev)

Pedigree and breeding method	Doubled Haploid derivative of BS 6444G
Released by and year	SVRC, Odisha 2023
Suitable ecology & recommended state	Irrigated ecology of Odisha
Maturity duration	120-125 Days
Average grain yield	4000-4500 kg/ha
Grain type & TW	Long slender grains with 20.5 g TW
Other quality trait	High HRR (68.2%), intermediate alkali value (3.0) and intermediate AC (21.03%)
Special trait	Double haploid non-basmati aromatic rice variety
Resistance to pests and diseases	Moderate Resistance to leaf blast, brown spot, grain discoloration and Resistant to false smut Moderate resistance to leaf folder and Gall midge



Rice variety with special traits

CR Dhan 807

Pedigree and breeding method	Sahbhagidhan*4/ Robin ; Marker Assisted Backcross Breeding
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Upland ecology of Jharkhand, Odisha, Andhra Pradesh, Tamil Nadu, Chhattisgarh and Gujarat
Maturity duration	105-110 Days
Average grain yield	4402 kg / ha (under normal rainfall), 2770 kg / ha (under drought situations)
Grain type & TW	Short bold grains with TW of 22.84g
Other quality trait	High HRR (58.0%), intermediate alkali value (7.0) and intermediate AC (22.78%)
Special trait	Herbicide (Imazethapyr) tolerant near isogenic line (NIL) of mega variety Sahbhagidhan, suitable for early DSR
Resistance to pests and diseases	Moderately resistant to brown spot and blast disease; tolerant to stem borer



CR Dhan 808

Pedigree and breeding method	IR 84984-83-15-481-B/ 3*Anjali // IR 81896-B-B-195/ 3*Anjali
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Upland ecology, Suitable for early direct seeded drought-prone areas of Bihar, Jharkhand, Odisha, Assam and Tripura
Maturity duration	90-95 Days
Average grain yield	3.0 to 3.5 t/ha
Grain type & TW	Short bold grains with TW of 26.5g
Other quality trait	High HRR (62.5%), intermediate AC (20.51%), GC (47.5) and ASV (3.5), Quality traits are similar to Anjali
Special trait	MAS product with drought tolerance (<i>qDTY12.1</i> & <i>qDTY3.1</i>) in Anjali background
Resistance to pests and diseases	Moderately resistant to blast, brown spot, GM Biotype 5 & 1, stem borer, leaf folder and WBPH (similar to Anjali)



CR Dhan 804

Pedigree and breeding method	IR 64 Sub1*4/ IR 88287-367-B-B, MAS
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Suitable for drought-prone/ irrigated areas with occasional flash flooding in Jharkhand, UP, TamilNadu, Madhya Pradesh, Chhattisgarh, AP and Telangana
Maturity duration	115-120 Days
Average grain yield	4.8 t/ha in normal & 1.9 t/ha under drought
Grain type & TW	Long slender grains with 22.0g TW
Other quality trait	High HRR (56.8%), intermediate AC (25.12%), GC (38) and ASV (7), Quality traits are similar to Anjali
Special trait	MAS product with multiple abiotic stress tolerant (drought and submergence)
Resistance to pests and diseases	Resistant to Blast & moderately resistant to brown spot, BLB, sheath rot, sheath blight, rice tungro, BPH, stem borer and LF (similar to IR64); QTL/gene content- <i>qDTY2.2</i> , Sub1 and <i>Pita-2</i> .



CR Dhan 809

Pedigree and breeding method	Naveen*3 / CR 3006-8-2; Marker Assisted Backcross Breeding
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Irrigated mid-early ecology of Odisha and Tripura, West Bengal, Bihar, Jharkhand and Assam
Maturity duration	125-130 Days
Average grain yield	5290 kg / ha
Grain type & TW	Short bold grains with TW of 21.03
Other quality trait	High HRR (56.4%), intermediate AC (24.4%), GC (31) and ASV (3.8), Quality traits are similar to Naveen
Special trait	BPH resistant variety
Resistance to pests and diseases	Near Isogeneic line of popular variety Naveen carrying two BPH resistant QTLs <i>qBph4.3</i> and <i>qBph4.4</i> ; Resistant to brown plant hopper



CR Dhan 810

Pedigree and breeding method	Gayatri*3/ IR49830-7 developed through Marker assisted backcrossing
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Rain-fed shallow lowland area in Odisha, West Bengal and Assam
Maturity duration	150 days
Average grain yield	4238 kg/ha
Grain type & TW	Short bold with test weight of...
Other quality trait	High HRR (56.8%), intermediate AC (25.12%), GC (38) and ASV (7), Quality traits are similar to Anjali
Special trait	Submergence tolerant Gayatri
Resistance to pests and diseases	Moderately resistant to leaf folder, stem borer (dead heart), and moderately tolerant to stem borer (white ear head). Similarly, it has intermediate reaction to neck blast.



CR Dhan 811 (Sarala sub-1)

Pedigree and breeding method	Sarala *3/ IR49830- 7 developed through Marker assisted backcrossing
Released by and year	CVRC, 2024
Suitable ecology & recommended state	Rain-fed shallow lowland area in Odisha and West Bengal
Maturity duration	151 days
Average grain yield	3660 kg/ha (in stress condition)
Grain type & TW	Medium slender with TW of
Other quality trait	High HRR (56.8%), intermediate AC (25.12%), GC (38) and ASV (7), Quality traits are similar to Anjali
Special trait	Submergence tolerant Sarala
Resistance to pests and diseases	It is resistant leaf folder and moderately resistant to stem borer (dead heart) and sheath rot



Varieties released & notified under inter-institutional collaboration

Inter-institutional collaboration is a powerful approach to achieving common goals by leveraging the strengths and resources of multiple organizations. By fostering innovation, expanding resources, and addressing global challenges, these collaborations play a crucial role in advancing research, education, and community development. Successful collaborations require clear communication, aligned goals, and effective management strategies to overcome challenges and maximize impact. ICAR-NRRI in collaboration with ICAR institute and SAUs could developed ~13 high yielding rice varieties suitable for diverse rice ecosystem across India.

OUAT Kalinga Rice -5 (Nabanna) (in collaboration with OUAT)

Pedigree and breeding method	ZHU-11-26 / Geetanjali; Pedigree method
Released by and year	SVRC, Odisha in 2023
Suitable ecology & recommended state	Rainfed upland ecology of Odisha
Maturity duration	85-90 days
Average grain yield	2775 kg / ha
Grain type & TW	Long slender grains with TW of 18.1
Other quality trait	HRR (49.0 %), AC (19.0%) and ASV (3)
Special trait	Aromatic, biofortified (protein and zinc), Drought tolerant
Resistance to pests and diseases	Moderately resistant to blast, sheath rot, bacterial blight, false smut, gall midge, leaf folder



DRR Dhan 75 (in collaboration with ICAR-IIRR)

Pedigree and breeding method	Samaba Mahsuri*2//Habataki/ ST 12; MAB
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated ecology in Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Odisha, Jharkhand, Bihar, Gujarat, Maharashtra
Maturity duration	130-135 days
Average grain yield	5982 kg/ha
Grain type & TW	Medium slender grains
Other quality trait	High HRR (61.4%), intermediate AC (24.2%), GC (22) and ASV (4)
Special trait	Non-lodging, good grain quality
Resistance to pests and diseases	Moderately resistant to blast and sheath blight



Sabour Mahsuri

Pedigree and breeding method	IR74355*CN3/CN6-78 (TTB680-2-35-2-sel).
Released by and year	CVRC in 2023
Suitable ecology & recommended state	Irrigated and RSL ecology in UP, Bihar, Jharkhand, MP, Chhattisgarh, Maharashtra, Gujarat, Telangana, Karnataka and Pudducheri
Maturity duration	135-140 Days
Average grain yield	6000-6500 kg/ha
Grain type & TW	Medium slender grains with TW of 20.6g
Other quality trait	High HRR (62%), AC (25.78%), ASV (4.5), soft GC (46.0)
Special trait	Wide adaptive, recommended for 10 states
Resistance to pests and diseases	Moderately resistant to leaf blast and neck blast, BPH, sheath blight and leaf folder



Sabour Heera Dhan (IET27538)

Pedigree and breeding method	Improve White Ponni * Kalajoha (AD 12173-Sel)
Released by and year	CVRC in 2022
Suitable ecology & recommended state	Irrigated and RSL ecology of Andhra and Karnataka
Maturity duration	140-145 Days
Average grain yield	6000-6500 kg/ha
Grain type & TW	Medium slender grains with TW of 22.3g
Other quality trait	High HRR (62.0%), AC (24.9%), ASV (4.5), soft GC (39.3)
Special trait	Wide adaptive, recommended for 02 states
Resistance to pests and diseases	Moderately Resistant against major diseases i.e., Gloom discoloration, Brown Spot, blast, bacterial leaf blight and Sheath blight; moderately resistant to brown plant hopper, stem borer and leaf folder insects



Sabour Pratap Dhan (IET30083)

Pedigree and breeding method	CR 2582-2*Varshadhan * IR 82809-237
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Irrigated and RSL ecology of Jharkhand, UP, Bihar, Chhattisgarh, Maharashtra Gujarat, Telangana and Andhra Pradesh
Maturity duration	130-135 days
Average grain yield	5500 kg/ha
Grain type & TW	Medium slender grains with TW of 18.5g
Other quality trait	High HRR (64.40%), AC (25.52%), ASV (7.0), soft GC (52.0)
Special trait	Wide adaptive, recommended for 08 states
Resistance to pests and diseases	Moderately Resistant against Gloom discoloration, Brown Spot, false smut, blast, bacterial leaf blight; MR to brown plant hopper, stem borer and leaf folder



Sabour Vijay Dhan (IET30029)

Pedigree and breeding method	IR74355 * CN3 / CN6-78-2
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Aerobic and irrigated ecosystem of Jharkhand, Bihar, Chhattisgarh, Karnataka
Maturity duration	130-135 days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Medium slender grains with TW of 20.5g
Other quality trait	High HRR (62.6%), AC (26.7%), ASV (4.0), soft GC (46.5)
Special trait	Wide adaptive, recommended for 04 states
Resistance to pests and diseases	Moderately Resistant against Gloom discoloration, Brown Spot, false smut, blast, bacterial leaf blight; Moderately Resistant/ tolerant against brown plant hopper, stem borer and leaf folder



Sabour Narendra Dhan (IET30041)

Pedigree and breeding method	Huang-Hua-Zhan *2/ IR64
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Aerobic and irrigated ecosystem of Bihar, Uttar Pradesh, Chhattisgarh
Maturity duration	110-115 days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Long slender grains with 19.5 g TW
Other quality trait	High HRR (61.3%), AC (20.0%), ASV (5.0), soft GC (84.5)
Special trait	Wide adaptive, recommended for 03 states
Resistance to pests and diseases	Moderately Resistant against major diseases i.e., Gloom discoloration, Brown Spot, false smut, blast, bacterial leaf blight; Moderately Resistant/ tolerant against brown plant hopper, stem borer and leaf folder



Sabour Sriram Dhan (IET30367)

Pedigree and breeding method	Huang-Hua-Zhan *2/ IR64
Released by and year	CVRC in 2024
Suitable ecology & recommended state	Rainfed Shallow Lowland ecosystem of Bihar, Uttar Pradesh, Odisha
Maturity duration	140-145 days
Average grain yield	6000-6500 kg/ha
Grain type & TW	Medium slender grains with TW of 21.8g
Other quality trait	High HRR (60.9%), AC (22.6%), ASV (4.0), soft GC (40.5)
Special trait	Wide adaptive, recommended for 03 states
Resistance to pests and diseases	Moderately Resistant against Gloom discoloration, Brown Spot, false smut, blast, bacterial leaf blight; Moderately Resistant/ tolerant against brown plant hopper, stem borer and leaf folder insects



OUAT Kalinga Dhan 9

Pedigree and breeding method	IR 78875-176-B-2 / IR 78875-207-B-3
Released by and year	CVRC in 2023
Suitable ecology & recommended state	Irrigated ecosystem of Bihar, West Bengal
Maturity duration	115 days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Long bold grains
Other quality trait	High HRR (67.4%), AC (20.94%) and GC (54 mm).
Special trait	Wide adaptive, recommended for 02 states
Resistance to pests and diseases	Moderately Resistance to Sheath Rot & Blasts.



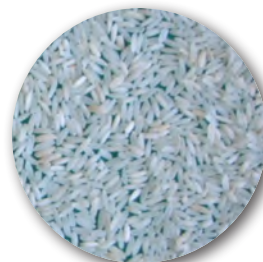
OUAT Kalinga Dhan 10

Pedigree and breeding method	RP Bio 226/IRGC 48960//MTU 1081
Released by and year	CVRC in 2023
Suitable ecology & recommended state	Irrigated ecosystem of Odisha, West Bengal & Bihar
Maturity duration	120 days
Average grain yield	5500-6000 kg/ha
Grain type & TW	Long slender grains
Other quality trait	HRR of 57%, AC of 27.98%, soft GC of 63mm and ASV of 4.
Special trait	Wide adaptive, recommended for 03 states
Resistance to pests and diseases	MR to leaf and neck blast, stem borer and Brown plant hopper



OUAT Kalinga Dhan 1

Pedigree and breeding method	IR 825865/ IR 82861-B
Released by and year	SVRC in 2023
Suitable ecology & recommended state	Irrigated ecosystem of Odisha
Maturity duration	120 days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Long slender grains
Other quality trait	HRR of 57%, AC of 27.98%, soft GC of 63mm and ASV of 4.0
Special trait	Wide adaptive
Resistance to pests and diseases	Better cooking quality and moderate resistance to Sheath Rot.



OUAT Kalinga Rice 2 (Salandi)

Pedigree and breeding method	Birupa/IR 76561-AC-8-8
Released by and year	SVRC in 2023
Suitable ecology & recommended state	Irrigated ecosystem of Odisha
Maturity duration	130-135 days
Average grain yield	5000-5500 kg/ha
Grain type & TW	Long bold grains with TW of 20.5g
Other quality trait	HRR of 55.9%, AC of 27.8%, soft GC of 42 mm and ASV of 4.0
Special trait	Wide adaptive
Resistance to pests and diseases	Moderate resistance to leaf blast, neck blast, GMB1 & WBPH



Future prospects

The future of rice varietal innovations is poised for remarkable advancements, driven by technological progress and the need to tackle global challenges. Cutting-edge biotechnologies will enable precise modifications in rice genomes, leading to varieties with enhanced traits such as improved disease resistance, superior nutrient profiles, and better stress tolerance. Techniques like genomic selection and double haploid/speed breeding will accelerate and refine the breeding process. With climate change causing more extreme temperatures, developing rice varieties that can endure both high and low temperatures will become essential. New varieties will also be designed to thrive under varying water conditions, including reduced water availability, addressing the challenges of water scarcity. Future rice varieties will focus on increasing levels of essential nutrients like vitamins, minerals, and antioxidants to combat global nutritional deficiencies. Innovations will aim to reduce the reliance on fertilizers, pesticides, and water, thereby minimizing environmental impact and promoting sustainable agriculture. Rice varieties with built-in resistance to pests and diseases will decrease the need for chemical control methods. Breeding efforts will continue to enhance the sensory qualities of rice to meet consumer preferences and culinary uses. New varieties will aim to be high-yielding and economically viable for farmers, considering factors such as seed costs and market value.

Overall, the future of rice varietal innovations promises to be dynamic and transformative, with the potential to greatly impact global food security, nutrition, and environmental sustainability.

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