

DRR Dhan 74 (IET 30252) a Climate Resilient High Yielding Rice Variety with Low Soil Phosphorous Tolerance

Divya Balakrishnan*, Sarla Neelamraju, Sundaram RM, Swamy AVSR, Jyothi Badri, Padmavathi G, Anantha MS, Senguttuvel P, Aravind Kumar J, Sai Prasad SV, Neeraja CN, Kalyani MB, Suneetha K, Prasad MS, Ladhalakshmi D, Laha GS, Gireesh C, Jhansi Lakshmi V, Padmavathi Ch, Padmakumari AP, Latha PC, Mahendrakumar R, Sreedevi B, Tuti M, Mangrauthia SK, Brajendra P, Manasa V, Sanjeeva Rao D, Muthuraman P, Pranay G, Rao YV, Krishnamraju A, Kavitha B, Vijay Kumar M and Tahseen M

ICAR-Indian Institute of Rice Research (ICAR-IIRR), Rajendranagar, Hyderabad-500030

*Corresponding author Email: dbiirr23@gmail.com

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Abstract

Changing climate conditions along with nutrient deficient soils adversely affect the environment and reduce rice production. Wild introgression lines derived from KMR 3 and *O. rufipogon* were evaluated in various environments to identify high yielding stress tolerant genotypes. DRR Dhan 74 (IET 30252) is a variety developed by IIRR, using parental lines from an Indian accession of *Oryza rufipogon* (IC22015/WR120) collected from Kerala, India, which was maintained at IIRR (erstwhile DRR) and was used as a donor parent. KMR 3, a restorer line for popular high yielding hybrid KRH 2 was used as recurrent parent and the variety was developed through advanced back cross breeding and selection. This short bold grain type variety is suitable for both normal irrigated and low soil phosphorous conditions in *kharif* and *rabi* seasons. An average yield of 7 t/ha under normal conditions with recommended dosage of fertilizers and 4.5 t/ha under low Phosphorus condition was reported under AICRPR multi location trials. Variety possesses good cooking quality with short bold grain type and higher yield and moderately resistant reaction to leaf blast, neck blast, sheath rot and plant hoppers. It was released for cultivation in Karnataka, Maharashtra, Telangana and Jharkhand through Central Sub-committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops vide S.O. 4027(E) dated 8th Oct 2024, CG-DL-E-14102024-257835.

Keywords: Rice variety, Low P tolerance, Climate resilience, Wild introgression

Introduction

Wild species are known for their stress tolerance and growth in resource-limited conditions. Several genes which contribute to yield and stress tolerance were lost during domestication and are not available in the existing gene pool of cultivars. Prebreeding programme at IIRR was initiated with the objective of bringing the lost valuable genes to cultivar background

and enhance the allelic diversity for climate resilience. Phosphorus is the second most important key nutrient, vital for plant growth and development at all stages. Phosphorous deficiency is one of the factors limiting rice yields and farmer's profitability so it is necessary to identify genotypes with stable yield and tolerance to P deficiency. DRR Dhan 74 (IET 30252) is a



climate resilient rice variety developed by ICAR-IIRR using an interspecific cross (RP Bio 4919) between KMR 3 and *Oryza rufipogon* (IC22015/WR120). It is high yielding under both low soil phosphorus and normal irrigated condition. An advanced backcross strategy with repeated selections was followed to develop the variety as it is having a wild species in the parentage.

The high yielding lines in the genetic background of KMR 3 were characterized for 3 years and were further advanced based on single panicle selection up to BC₃F₁₀ and the seed was multiplied. RP Bio 4919-NSR 5 is selected from a back cross introgression line derived from this cross, the genotype was tested rigorously in normal and low p conditions for several seasons and only tolerant line was advanced further. Interspecific introgression of *O. rufipogon* into *O. sativa* background helped to improve yield and tolerance to low Phosphorus in soil.

DRR Dhan 74 recorded an yield of 7 t/ha (under normal conditions; 60 kg/ha of P *i.e.*, recommended dose), 4.4 t/ ha (under low Phosphorus; 40 kg/ha of P) and 4.56 t/ha (under no Phosphorus; 0 kg/ha of P). It recorded average grain yield advantage of +14.43% and +2.96% (in terms of weighted average) over the positive check Swarna (late duration) under 0% and 50% application of phosphorous. It also showed a yield advantage of +79.56, +14.43%, +20.58 and +5.94 over Rasi, Swarna (Positive Check), Improved Samba Mahsuri (Negative check) and Qualifying check 1 (IET 30242) respectively considering weighted mean average of *kharif* 2021, 2022 and 2023 under no application of recommend dose of fertilizer (RDF) phosphorus. Similarly, at Low phosphorus condition it yielded with +14.44, +2.96, +14.78 and +8.13% advantage over Rasi, Swarna, Improved Samba Mahsuri and Qualifying check 1 (IET30242) respectively considering weighted mean average of

kharif 2021, 2022 and 2023 under application 50% of recommend dose of fertilizer (RDF) phosphorus. Based on the performance under both 0% and 50% P of RDF. IET 30252 was found promising in zone 7, zone 3, zone 6 and also based on overall mean for all three testing years of 2021, 2022 and 2023 and promoted in AICRPR testing. In addition, entry was found superior to best check during 2021 in Karnataka and overall, it yielded 4.94 t/ha with 2nd rank and 16% yield advantage over best check. During 2022, recorded 1st, 4th, 6th and 9th rank in the states of Bihar, Telangana, Karnataka and Maharashtra. During 2023, recorded 2nd, 3rd and 5th rank in the states of Telangana, Jharkhand and Karnataka.

Variety possesses short bold grain type with high HRR (62.2%) and acceptable grain quality parameters of amylose content (23.7%), gel consistency (22) and alkali spreading value (7.0) and cooking quality parameters. Based on molecular marker analysis, it has shown > 95% recovery of recurrent parent genome. Considering better performance of the variety for yield in P deficit as well as under normal conditions and stress tolerance, grain and cooking quality traits IET 30252 was released in the states of Karnataka, Telangana andhra Pradesh and Jharkhand as DRR Dhan 74. Hon'ble Prime Minister of India dedicated DRR Dhan 74, a climate resilient variety to the farmers of the Nation on 11 August, 2024. This variety has potential to replace medium to late duration short bold varieties in low-input areas of the country with reduced cost of cultivation and making rice cultivation more economical.



Field view DRR dhan 74



Pot view DRR dhan 74



Under normal conditions



Under low P conditions

Normal and low P of field view DRR dhan 74



Grains



Decorticated grains



Milled grains