Agronomy ICAR-IIRR Technology : 2

Indian Council of Agricultural Research

Proforma for Certifying a Technology

Iron coated seed for enhanced productivity in direct seeded rice broad casting

Submitted by

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Certifying Products/Technologies/Process/Methodology/Model/Protocol/Policy etc.

Item	
1. Name of the product/technology (as defined above)	Iron coated seed for direct seeded rice
2. Name and address of the Institute	ICAR-Indian Institute of Rice Research, Rajendranagar, Hyderabad – 500030, Telangana
3. Institution(s) responsible for developing/evaluating/identifying including collaborators, if any	JFE Steel India Pvt. Ltd., Mumbai.
4. Source of product/technology (Research Project/Student Research/Any other ad-hoc research study)	Research Project
5. Period of development/evaluation/validation	Four years 2016 to 2021
6. Developers (Lead and Associates)	Dr. R. Mahender Kumar
7. Summary of the product/technology (maximum of 200 words)	The field trial was initiated to study effect of Fe-coating on growth and yield parameters of Direct seeded broadcast rice in 2016 at ICAR-IIRR and continued to 2021 to standardise the iron coated treatments which includes four date of sowings with one week interval as main plots and five establishment methods(T1- Iron coated seed, seed rate 25 kg/ha, broadcasting in 1-2mm water level condition (Direct sowing) T2- Iron coated seed, seed rate 25 kg/ha, broadcasting in wet Condition (Direct sowing) T3 – Un-coated seed, seed rate 25 kg/ha, broadcasting in 1-2mm water level condition (Direct sowing) T4 – Un-coated seed, seed rate 25 kg/ha, broadcasting in wet condition (Direct sowing) T5 – Normal transplanting 21-25 days after sowing as subplots in 3 replications. Mean over the years, the mean grain yield revealed that **1st date of sowing was the best time of sowing resulting the highest yield of rice (5.09 t/ha)** followed by 2nd (4.65 t/ha), 3rd (4.42 t/ha) and 4th (4.10 t/ha) date of sowing. Iron coated treatments performed better than without coated treatments. Iron coated seed with seed rate of 25 kg/ha and broadcasted in 1-2 mm water level condition, wet condition (direct sowing) recorded higher grain yield (4.95, 4.63 t/ha) than 3.84, 3.66 t/ha under uncoated seeds. **There is an increase of 26.6% grain yield due to iron coating of seeds**.

8. Is it a new technology? (Yes/No). If no, prove the details of the technology modified	Yes
9. IPR involved, if any (Patent/Copyright/Industrial Design Registration/Variety/Germplasm registration). Provide Filed/Granted number	NA
10. Validation procedure followed (within Institute, collaborators, multilocation/multi-site testing)	Within institute and multisite
11. Brief description of research output/technology	• Very useful for promotion of Direct seeding and sustaining the yields of direct seeded rice • Conversion of waste to useful product in Agriculture

a**. Objective**

- To enhance the productivity of the DSR rice through seed priming
- To assess the impact of the seed coating on crop establishment and productivity of the DSR system

b. Methodology

It is reported that, seeds that had been soaked and then dried have increased a-amylase activity and a high germination rate. Thus, the treatment of soaking, incubation, and drying is a useful priming method. Primed rice seeds could be utilized in direct seeding in lieu of pre-germinated seeds. The high density Fe-coated seeds are resistant to birds and seed borne diseases. Iron-coated seeds exhibit improved anchorage in water seeding in puddled fields. Hydro primed seed was coated with gypsum, micro particles of Fe and water by a seed coating equipment. The coated seed was air dried for oxidation (rust formation) with intermittent water application for a period of 7 -10 days to confirm there was no further oxidation. The seed density ratio was 1:1.70 with non-coated and coated seed.

c**. Yield**

The number of germinated seedlings per square meter was significantly higher in Fe coated treatments especially in heavy rainfall situation. Fe coating facilitated with good anchorage of seed due to its high density (1:1.70), uniform distribution in field and controlled bird damage which in turn lead to good plant population, tillers, panicles finally better yield over non coated treatments in all tested years. The percent grain yield increase was ranged from 12.18% in Iron coated seed wet condition treatment in the year 2019 to 44.51% Iron coated seed 1-2mm water level treatment in the year 2017. Significantly higher grain yields were recorded in all the years tested in iron coated treatments over non coated treatments and were comparable with normal transplanting.

d. Saving of water, labour, time and energy

Crop duration was 7 to 9 days less due to broad casting method which saved 10 to 15% irrigation water and 4 to 8 irrigations.

Reduced 64 man hours equivalent to 251.2 MJ/ha/season over normal transplanting method.

16% lesser energy input recorded over NTP (15.25 GJ/ha for Iron coated DSR and 18.11 GJ/ha for NTP) with higher energy productivity and energy intensity.

e. Cost effectiveness including B:C ratio

Cost of cultivation for iron coated DSR with broadcasting was less as there was no need of nursery raising and transplanting. Higher net returns were recorded in NTP and were nearly par with iron coated treatments.
B:C ratio was higher in iron coated treatment with 1-2mm water (1.61) followed by iron coated wet treatment (1.45) followed by NTP (1.40)

f. Passport data of the product/ technology
Seed treatment of soaking, incubation, and drying increases the germination rate of rice even at low temperatures or under anoxia and that the treatment is effective not only in Japonica but also in Indica cultivars (Yamauchi, 2002; Mori et al., 2012). Andoh and Kobata (2002) reported that seeds that had been soaked and then dried have increased a-amylase activity and a high germination rate. Thus, the treatment of soaking, incubation, and drying is a useful priming method. Primed rice seeds could be utilized in direct seeding in lieu of pre-germinated seeds. The high density Fe-coated seeds are resistant to birds and seedborne diseases. Iron-coated seeds exhibit improved anchorage in water seeding in puddled fields. Hence, the field trial was initiated to study effect of Fe-coating on growth and yield parameters of rice.

12. Details of relevant data generated during the development/validation	Attached

Table: Grain yield, straw yield and harvest index in direct seeded rice as affected by different treatments, *Kharif* 2017

		Plant height (cm)	No of tillers/m2	No of panicles/m2	Panicle length (cm)	Panicle wt (g)	Grain Yield (t/ha)	Straw Yield (t/ha)	Harvest Index	Germinated seedlings/m2	% GYI over non coated
1st sowing (11.08.2017)	T1	95.18	481	458	22.83	3.8	5.62	6.24	47.4	99	31.92
	T2	92.86	458	431	21.21	3.56	5.49	6.18	47.05	88	23.37
	T3	94.37	461	423	20.79	3.48	4.26	4.77	47.18	82	
	T4	94.87	456	419	20.22	3.45	4.45	5.07	46.7	80	
	T5	92.14	341	327	23.03	3.96	6.36	7.03	47.68	96	
2nd sowing (18.08.2017)	T1	96.49	461	423	21.36	3.6	5.73	6.23	47.9	94	51.59
	T2	95.74	464	496	21.36	3.3	4.67	5.25	47.02	80	31.55
	T3	93.47	304	278	20.13	3.28	3.78	4.29	46.87	69	
	T4	99.39	303	280	20.74	3.22	3.55	4.14	46.15	63	
	T5	87.43	348	338	22.5	3.75	6.2	6.71	48.03	96	
3rd sowing (24.08.2017)	T1	93.88	473	454	22.5	3.52	5.09	5.87	46.43	80	49.71
	T2	90.85	485	458	22.12	3.92	4.63	5.2	47.14	77	35.78
	T3	90.12	341	325	21.42	3.09	3.4	3.98	46.16	48	
	T4	85.02	278	266	21.23	3.17	3.41	3.97	46.16	44	
	T5	85.54	358	329	22.62	3.67	5.57	6.39	46.58	96	
4th sowing (31.08.2017)	T1	87.82	359	341	22.28	3.18	4.61	5.29	46.53	95	48.71
	T2	87.07	387	369	22.08	3.12	3.99	4.63	46.31	81	31.25
	T3	84.87	304	282	21.33	3.1	3.1	3.62	46.12	65	
	T4	87.94	306	283	21.19	3.13	3.04	3.59	45.73	60	
	T5	84.26	330	305	22.51	3.28	4.88	5.63	46.5	96	
Mean of Main methods											
M1		93.88	439	412	21.62	3.65	5.24	5.86	47.2	89	
M2		94.5	376	363	21.22	3.43	4.79	5.33	47.19	80	
M3		89.08	387	366	21.98	3.47	4.42	5.08	46.49	69	
M4		86.39	337	316	21.88	3.16	3.92	4.55	46.24	80	
CD(0.05)		2.18	54	58	NS	0.16	0.34	0.35	NS	6.62	
CV(%)		2.68	16	18	4.81	5.23	8.25	7.54	3.16	9.32	
Mean of Sub methods											
T1-Fe coated with 1-2 cm water level		93.34	443	419	22.24	3.53	5.26	5.91	47.06	92	**44.51**
T2-Fe coated wet		91.63	448	438	21.69	3.48	4.7	5.32	46.88	82	**30.19**
T3-Non coated with 1-2 cm water level		90.71	353	327	20.92	3.24	3.64	4.16	46.58	66	
T4-Non coated wet		91.81	336	312	20.85	3.24	3.61	4.19	46.19	62	
T5-NTP		87.34	344	325	22.66	3.67	5.75	6.44	47.2	96	
CD(0.05)		3.48	37	41	0.84	0.26	0.32	0.43	NS	5.57	
CV(%)		4.63	11.71	13.55	4.68	9.19	8.43	10.07	2.68	8.49	
Interaction											
M and T		NS	74.36	NS	NS	NS	NS	NS	NS	11.14	
T and M		NS	78.37	NS	NS	NS	NS	NS	NS	11.21	
Experimental Mean		**90.97**	**385**	**364**	**21.67**	**3.43**	**4.59**	**5.21**	**46.78**	**80**	

Table: Grain yield, straw yield and harvest index in direct seeded rice as affected by different treatments, *Kharif* 2018

Main plot	Sub plot	Plant height (cm)	No of panicles/m2	Panicle length (cm)	Panicle wt (g)	Days for 50% Flowering	Germinated seedlings/m^2	Grain Yield (t/ha)	Straw Yield (t/ha)	Harvest Index	% GYI over non coated
1st sowing (04.07.18)	T1	99.74	316	23.23	4.91	93.33	121	5.00	5.58	47.22	42.35
	T2	96.03	413	23.4	4.62	93.67	113	4.65	5.29	46.79	46.75
	T3	96.14	114	23.5	4.03	95	85	3.24	3.67	46.78	
	T4	89.89	105	23.5	4.09	95.67	77	2.97	3.43	46.38	
	T5	100.29	324	22.8	4.51	97.67	108	5.87	6.55	47.27	
2nd sowing (11.07.18)	T1	94.64	698	20.67	5.2	93	109	4.77	5.35	47.14	26.74
	T2	91.22	569	20.62	4.06	93.33	109	4.65	5.01	48.17	34.57
	T3	98.88	276	22.12	4.16	94	86	3.40	3.78	47.27	
	T4	90.87	195	22.14	3.81	94.67	81	3.10	3.42	47.67	
	T5	99.09	284	22.38	4.18	97.33	108	5.86	6.43	47.66	
3rd sowing (18.07.18)	T1	102.14	371	23.04	3.53	94.33	112	4.62	5.08	47.61	24.44
	T2	96.49	284	23.07	4.59	94.33	106	4.50	4.96	47.57	23.26
	T3	104.26	187	23.5	4.34	95	90	3.46	3.86	47.23	
	T4	103.89	208	22.72	4.42	95.33	86	3.07	3.49	46.78	
	T5	100.49	292	22.93	4.49	97	108	5.68	6.23	47.68	
4th sowing (26.07.18)	T1	89.32	249	22.14	4.45	94.33	100	3.93	4.36	47.4	20.48
	T2	105.67	338	23.14	4.52	93.67	95	3.85	4.25	47.54	23.38
	T3	102.64	294	22.54	4.32	96	83	3.32	3.7	47.3	
	T4	100.91	295	23.63	4.68	95.67	77	3.28	3.7	46.98	
	T5	101.4	348	21.89	5.05	97.67	108	5.34	5.94	47.31	
Mean of Main methods											
M1		96.42	254	23.29	4.43	95.07	101	4.35	4.9	46.89	
M2		94.94	404	21.59	4.28	94.47	98	4.35	4.8	47.58	
M3		101.45	268	23.05	4.28	95.2	100	4.26	4.72	47.37	
M4		99.99	305	22.67	4.6	95.47	92	3.95	4.39	47.31	
CD(0.05)		2.58	77	NS	NS	0.45	NS	0.30	NS	NS	
CV(%)		2.94	28	6.36	6.36	0.53	10.84	7.99	10.67	2.24	
Mean of Sub methods											
T1-Fe coated 1-2 cm water level		96.46	408	22.27	4.52	93.75	110	4.58	5.09	47.34	**27.91**
T2-Fe coated wet		97.35	401	22.56	4.45	93.75	106	4.41	4.88	47.52	**32.50**
T3-Non coated 1-2 cm water level		100.48	218	22.92	4.21	95	86	3.35	3.75	47.15	
T4-Non coated wet		96.39	201	23	4.25	95.33	80	3.11	3.51	46.95	
T5-NTP		100.32	312	22.5	4.56	97.42	108	5.69	6.29	47.48	
CD(0.05)		NS	68	NS	0.18	0.65	5.44	0.31	0.31	NS	
CV(%)		4.7	26.9	5.25	4.91	0.83	6.73	8.90	8.08	1.99	
Interaction											
M and T		7.62	136.7	NS	0.36	NS	NS	NS	NS	NS	
T and M		7.11	136.1	NS	0.37	NS	NS	NS	NS	NS	
Experimental Mean		**98.2**	**308**	**22.65**	**4.4**	**95.05**	**98**	**4.23**	**4.7**	**47.29**	

Table: Grain yield, straw yield and harvest index in direct seeded rice as affected by different treatments, *Kharif* 2019

Main Plot (Diff. sowing dates)	Treatments	Plant height	No of panicles/m2	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Grain Yield (t/ha)	Straw Yield (t/ha)	Harvest Index	% GY Increase over Non Coated
1st sowing (24.08.2019)	T1	75.54	543	3.17	22.2	102	5.95	6.82	46.59	11.21
	T2	72.94	567	3.14	22.03	102	5.68	6.35	47.24	13.83
	T3	73.89	490	2.67	20.7	103	5.35	5.95	47.35	
	T4	63.98	528	2.64	20.77	103	4.99	5.48	47.62	
	T5	72.33	603	2.92	22.2	109	6.37	7.06	47.41	
2nd sowing (30.08.2019)	T1	65.67	471	2.75	21.93	102	5.14	5.76	47.16	17.62
	T2	66.79	342	2.76	21.8	102	4.67	5.28	46.97	15.88
	T3	65.18	158	2.6	20.6	103	4.37	4.91	47.15	
	T4	67.3	212	2.65	20.67	103	4.03	4.5	47.3	
	T5	66.03	612	2.65	22.9	109	5.86	6.49	47.43	
3rd sowing (07.09.2019)	T1	67.49	420	2.68	21.6	103	4.66	5.1	47.75	9.65
	T2	64.96	506	2.47	20.67	102	4.54	5.05	47.35	9.66
	T3	65.76	356	2.33	19.87	102	4.25	4.78	47.07	
	T4	65.38	321	2.45	19.77	101	4.14	4.72	46.76	
	T5	68.6	532	2.6	22.57	106	5.34	6.09	46.72	
4th sowing (13.09.2019)	T1	65.81	477	2.39	20.8	101	4.64	5.2	47.16	11.54
	T2	64.96	394	2.55	20.97	101	4.25	4.85	46.75	8.14
	T3	67.27	279	2.39	19.8	101	4.16	4.74	46.74	
	T4	63.61	309	2.39	20.5	101	3.93	4.41	47.12	
	T5	69.57	531	2.46	22.67	105	5.13	5.73	47.23	
Interaction										
M and T		NS	NS	NS	NS	NS	NS	NS	NS	
T and M		NS	NS	NS	NS	NS	NS	NS	NS	
Mean of Main methods										
M1		71.74	546	2.91	21.58	104	5.67	6.33	47.24	
M2		66.19	359	2.68	21.58	104	4.82	5.39	47.2	
M3		66.44	427	2.5	20.89	103	4.59	5.15	47.13	
M4		66.24	398	2.44	20.95	102	4.42	4.99	47	
CD(0.05)		NS	68.87	0.19	0.39	0.79	0.26	0.23	NS	
CV(%)		8.48	17.82	8.02	2.05	0.86	5.97	4.71	1.16	
Mean of Sub methods										
T1-Fe coated 1-2 cm water level		68.63	477	2.75	21.63	102	5.02	5.72	47.17	12.58
T2-Fe coated wet		67.41	452	2.73	21.37	102	4.79	5.38	47.08	12.18
T3-Non coated 1-2 cm water level		68.02	321	2.5	20.24	102	4.53	5.1	47.08	
T4-Non coated wet		65.07	343	2.53	20.43	102	4.27	4.77	47.2	
T5-NTP		69.13	570	2.66	22.58	108	5.68	6.34	47.2	
CD(0.05)		NS	85.79	0.13	0.62	0.81	0.34	0.37	NS	
CV(%)		5.77	24.04	6.02	3.56	0.96	8.45	8.31	1.35	
Experimental Mean		67.65	433	2.63	21.25	103	4.87	5.46	47.14	

Energetics

Treatmets	Energy Input(MJ/ha)	GY (t/ha)	Grain Energy (14.7 GJ/t)	SY (t/ha)	Straw Energy (12.5 GJ/t)	Total Energy Output (GJ/ha)	Energy Productivity (kg/MJ)	Energy intensity (MJ/Rs)
T1-Fe coated 1-2 cm water level	15248	4.95	72.81	5.57	69.67	142.48	0.69	3.96
T2-Fe coated wet	15248	4.63	68.11	5.19	64.92	133.03	0.64	3.70
T3-Non coated 1-2 cm water level	14968	3.84	56.45	4.34	54.21	110.66	0.55	3.19
T4-Non coated wet	14968	3.66	53.85	4.16	51.96	105.81	0.52	3.05
T5-NTP	18108	5.71	83.89	6.36	79.46	163.35	0.67	3.62

Economics

Treatmets	Cost of cultivation (Rs/ha)	GY (t/ha)	SY (t/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	Benefit : Cost Ratio
T1-Fe coated 1-2 cm water level	35991	4.95	5.57	94113	58122	1.61
T2-Fe coated wet	35991	4.63	5.19	88033	52042	1.45
T3-Non coated 1-2 cm water level	34741	3.84	4.34	72960	38219	1.10
T4-Non coated wet	34741	3.66	4.16	69603	34862	1.00
T5-NTP	45091	5.71	6.36	108427	63335	1.40

13. Proposed stakeholders	Dry DSR broad casting farmers
14. Commercial potential, if any	Can be commercialized
15. Publications/photos/video clipping, if any	

Lightening talk

Mahender Kumar. R, Kazumichi Sashi, Soumya Saha, Srinivas. D, Sreedevi. B., Mangal Deep Tuti, Sandhyarani. A., Vijaya Kumar. S., Arun. M.N and Venkatanna.B. Iron coated seed - an effective water seeding technique for increased productivity in direct seeded rice in puddled soil condition. Presented in: *International conference on system of crop intensification*, 12-14th December, 2022, Hyderabad.

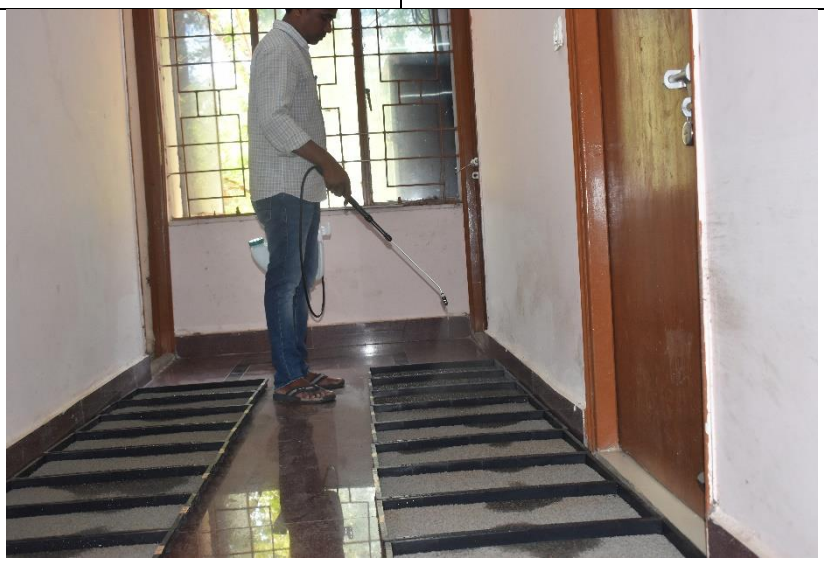


Plate 1: Coating the seed with iron by seed coating machine

Plate 2. Iron Coated (left) and Uncoated seed before sowing

Plate 3: JFE team visit to IIRR experimental plot

Plate 4. JFE team visit to farmers fields in Manikantapuram village, Nandyal

Plate 5. Harvesting & over view of plot at different stages at IIRR field

వరిపంట పరిశీలన

వరి పంటను పరిశీలిస్తున్న శాస్త్రవేత్తలు

బండి ఆత్మకూరు, అక్టోబరు 17: మండలంలోని మణికంఠపురం గ్రామంలో ఐరన్ కోటింగ్ వరి పంటసాగును శాస్త్రవేత్తలు పరిశీలించారు. గురువారం హైదరాబాద్ వరి పరిశోధనాలయం, జపాన్ జేఎఫ్‌సీ స్టీల్ కంపెనీ శాస్త్రవేత్తలు డాక్టర్ కోమోజీ ససి, సూర్యప్రకాశ్, అరుణ్ కుమార్, శ్రీనివాస్‌లు ధనుంజయరెడ్డి సాగుచేసిన వరి వంగడాన్ని పరిశీలించారు. ఒక హెక్టార్‌లో జపాన్ సాగు, ఇండియా పద్ధతి సాగులో పంట వేశారు. తక్కువ పెట్టుబడితో ఎక్కువ లాభాలు సాధించేందుకు ఈ పంటను కొత్తగా సాగుచేయించి శాస్త్రవేత్తలు పరిశీలించారు.

శుక్రవారం, 18 అక్టోబర్ 2019

ఆంధ్రప్రభ

ఆత్మకూరు

ఆత్మకూరు, వెలుగోడు, శ్రీశైలం, మహానంది,బండి ఆత్మకూరు

వరిపైరును పరిశీలించిన జపాన్ బృందం

వంట పొలాలను పరిశీలిస్తున్న జపాన్ బృందం

బండి ఆత్మకూరు, అక్టోబర్ 17 (ప్రభన్యూస్)॥ మండల పరిధిలోని మణికంఠాపురం గ్రామానికి చెందిన ధనుం జయ రెడ్డి అనే రైతు వేసిన పొలంలో జపాన్, భారతదేశ పద్ధతుల్లో సాగుచేసిన వరిపై రును జ పాన్ వ్యవసాయ శాస్త్రవేత్తలు డాక్టర్ కోమూజీ షఫి, సూర్య ప్రకాష్‌లు వరిపైరును గురువారం పరిశీలించారు. ధనుంజయ రెడ్డికి చెందిన ఒక హెక్టార్ పంటపొ లంలో జపాన్ సాగుపద్ధతుల చేత తక్కువ పెట్టుబడితో ఎక్కువ దిగుబడి సాధించేందుకు వరిపైరు సాగుచేశారని అన్నారు. దీంతోపాటు భారతదేశ పద్ధతుల్లో వరిపైరును సాగుచేశారు. వీటిని పరిశీలిం చిన శాస్త్రవేత్తలు వరిపైరు పరిశోధన స్థాయిలోనే ఉందన్నారు. వారివెంట హైదరాబాదు వరిశోధన సంచాలకులు డాక్టర్ అరుణ్‌కుమార్, శ్రీనివాసులు, రీసర్చ్ అసోసియేషన్ తదితరులు పాల్గొన్నారు.

Plate 6. News Paper articles about JFE team visit in Manikantapuram village, on Iron coated direct seeded rice

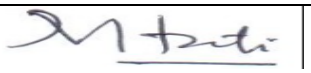
News Highlights:

A team of Scientists from JFE Steel, Japan and ICAR-Indian Institute of Rice Research, Hyderabad, India have visited the paddy crop in Manikantapuram village, Nandyal, which was raised by broad casting method with Iron coated seed, supplied by JFE Steel. The DSR method with Iron coated seed reduces the cost of cultivation. The team includes Dr. Kazumichi Sashi, Surya Prakash, Arun kumar, Srinivas, Danumjaya Reddy.

- Along with station trial at IIRR, Iron coated DSR was also conducted under AICRIP at five locations for 2018 & 2019 where Iron coated seed treatment found promising in Broadcasting method over non coated seed treatment.
- 20 FLDs were conducted at Bapatla, Nandyal, Coimbatore and Yadagiri. All the farmers were satisfied with this technology with reduced man power and increase in yield upto 17%.

Declaration: I/We hereby undertake that the above information is correct. All scientists in the development of this research output have been included in the list of Associates. The research output does not involve any third party IPR.

1. Name and signature of all the developers

Name	**Developer / co-developer / Collaborator**	**Signature**
Dr. R.Mahender Kumar	Developer	
Dr. B.Sreedevi	Co-developer	
Dr. Mangal deep Tuti	Co-developer	
Dr. Soumya Saha	Co-developer	
Dr. Ch. Padmavathi	Co-developer	
Dr. D. Srinivas	Co-developer	
JFE		
Kazumichi Sashi	Co-developer	
Guruprakash Tiwari	Co-developer	

2. Recommendations of the Head of Division

3. Recommendations of ITMC/PME

4. Recommendations of Director

5. Recommendations of SMD

No Objection Certificate

JFE Steel Corporation
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21 July, 2023

To:
Dr. R. Mahender Kumar,
Principal Scientist and PI of AICRIP (Agronomy)
Crop Production Section
ICAR-Indian Institute of Rice Research
Rajendranagar, Hyderabad- 500 030
Telangana State (T.S.), India

Dear Sir:

We are happy to note that IIRR (Indian Institute of Rice Research) is proposing the "Iron-coated seed technology" for its identification as Joint JFE and IIRR Crop production technology for enhancing the productivity of direct seeded rice. In this regard, JFE Steel Corporation has no objection for Granting ICAR-CPPT's (Crop protection and production technologies) as AICRIP (All India Co-ordinated Rice Improvement Project) Production technology.

Thank you and best regards.

Sincerely,

Kazumichi Sashi

Kazumichi Sashi
Senior Researcher, Stainless steel & Iron Powder Research Dept.,
STEEL RESEARCH LABORATORY, JFE Steel Corporation