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NATIONAL LEVEL MONITORING TEAM

BRINGING GREEN REVOLUTION TO EASTERN INDIA

CHHATTISGARH
NLMT-BGREI
2018

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE & FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, COOPERATION& FARMERS WELFARE)
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ANNEXURE

ABBREVIATIONS

1. ADO-Agriculture Development Officer
2. ATMA- Agricultural Technology Management Agency
3. BGREI -Bringing Green Revolution in Eastern India
4. CSBD- Cropping System based Demonstration
5. DDA-Deputy Director Agriculture
6. DES- Directorate of Economics and Statistics
7. DLMT- District Level Monitoring Team
8. DM-District Magistrate
9. DMF- District Mineral fund
10. DSR- Direct Seeded Rice
11. FLD- Frontline Demonstration
12. GSC- General Steering Committee
13. HYVs – High Yielding Varieties
14. KVK- Krishi Vigyan Kendra
15. MARKFED- Marketing Federation
16. MITs- Minor Irrigation Tanks
17. NAM-National Agriculture Market
18. NFSM- National Food Security Mission
19. NHM-National Horticulture Mission
20. NLMT- National Level Monitoring Team
21. NMAET-National Mission on Agricultural Extension & Technology
22. NMSA-National Mission for Sustainable Agriculture
23. NRRI- National Rice Research Institute
24. PMFBY-Pradhan Mantri Fasal Bima Yojana
25. PMKSY-Pradhan Mantri Krishi Sinchai Yojana
26. RAEO- Rural Agriculture Extension Officer
27. RKVY -Rashtriya Krishi Vikas Yojana
28. SHC-Soil Health Card
29. SLMT- State Level Monitoring Team
30. SRI-System of Rice Intensification
31. ToT- Transfer of Technology
32. TRFA-Targeting Rice Fallow Areas

PREFACE

The Government of India, Department of Agriculture, Co-operation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare is implementing various agricultural development schemes/ programmes like NFSM, BGREI, NMSA, RKVY, PKVY, PMKSY, NMAET (SMAM, SMSP & Extension Reforms/ATMA), NHM, PMFBY, SHC, NAM etc. The major crop development interventions during 2018-19 are through NFSM and RKVY. To effectively monitor the implementation of these interventions at the field level, the DAC&FW has constituted National Level Monitoring Team (NLMT) under the National Food Security Mission *(NFSM-Rice, Wheat, Pulses, Coarse Cereals and Commercial Crops)*. The NLMT comprises of the Director, Crops Development Directorates (Directorate of Pulses Development) as Convener/Team Leader, 01 Principal/Sr. Scientists as Subject Matter Specialist (SMSs) representing ICAR/SAUs and State Mission Director, NFSM/Nodal Officer.

The Terms of Reference (TOR) of this Central Team suggest mandatory monitoring at least once in each crop season *(Kharif, Rabi & Spring/Summer)*; to conduct in-depth inspection of the executed activities in consonance to Mission's mandate and Approved Action Plan and to study the "Local Initiatives", to study quantitative, qualitative achievements and impact of the Transfer of Technology (ToT), delivery mechanism in totality taking all CSS/CS/State plan schemes in a district, and providing analytical report on observations and suggestions/recommendations for further necessary corrections at the level of state stake-holders for better implementation of the Mission and desired mandated outcome.

The Team visited the state of Chhattisgarh from August 27th to 30th 2018. The composition of the Monitoring Team was broad based and included the experts from ICAR-AICRP/SAUs. The Team interacted with the farmers individually in the field and also by organizing *Kisan Gosthies*. The Wrap-up meeting with collector District-Bastar and Deputy Directors and Joint Director Agriculture of Bastar Division, Govt. of Chhattisgarh was also convened at the end of the field visit. The report has tried to capture the impact of BGREI implementation, during XIIth five year plan over to XIth five year plan programme implementation.

I am thankful to the ACS/APC, Secretary (Agri.), Director (Agri.), Director (SAMETI) Govt. of Chhattisgarh for facilitating the monitoring/visit and the Vice Chancellor, IGKVV, Raipur for nominating experts/scientists to represent the NLMT.

Bhopal (M.P.)
04thOct, 2018

(A.K.Tiwari)
Director

STATE PROFILE: CG

Particulars	STATUS
Population(crore)	2.56 (Male- 1.29, Female-1.28)
Population Growth (%)	22.61 – 2011
Forest Village	74
Revenue Districts(Nos.)	27
Block/ Janpad Panchayat (Nos.)	146
Village Panchayat (Nos.)	10971
Tehsil (Nos.)	150
Total Village (Nos.)	20273
KrishiUpajMandi(Nos.)	73
Annual Rainfall (Ave.)	1296 mm

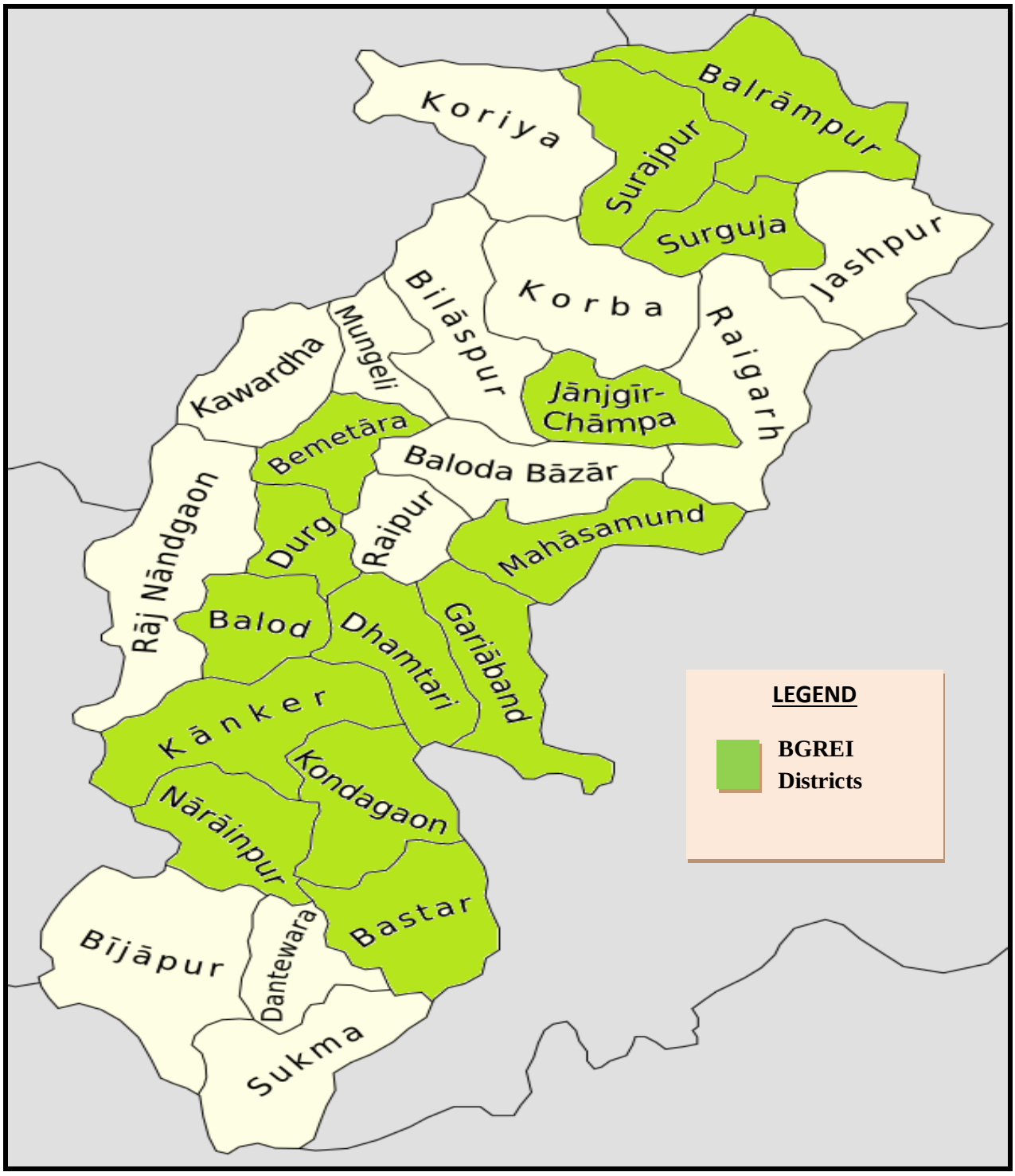
Land Use Pattern (Area : lakh ha)		**Agricultural land use (Area -lakh ha)**	
Geographical Area	138.00	Net sown area	47.75
Cultivable area	57.28 (41.53%)	Double Cropped Area	10.47
Forest area	63.15 (45.80%)	Gross cropped area	65.25
Land under non-agricultural use	10.30 (7.46%)	*Kharif* Area	47.75
Permanent pastures	5.25 (3.80%)	*Rabi* Area	17.50
Cultivable wasteland	3.51(2.55%)	Cropping Intensity	137%
Barren and uncultivable land	8.88 (6.43%)		
Current fallows	2.67 (1.93%)		

Irrigation (Area: lakh ha)		**Source of Irrigation (Area : lakh ha)**	
Net irrigated area	14.68	Canals	9.03 (61.55%)
Gross irrigated area	17.87	Tanks	0.43 (2.93%)
Rainfed area (to Cultivable Area)	39.41 (69%)	Open wells	0.20 (1.37%)
		Bore wells/ Tube Wells	4.28 (29.17%)
		Other Sources	0.73 (4.98%)
		Total Irrigated Area	**14.67**

Soil Type		**(Area - lakh ha)**	
Alluvial Soil (Kachhar)	1.38 (2.7%)	Inceptisols (Matasi)	13.54 (26.9%)
Entisols (Bhata)	10.02 (20%)	Vertisols (Kanhar)	11.43 (22.8%)
Alfisols (Dorsa)	13.82 (27 %)	**Land Classif. Total**	**50.19**

Major Agricultural crops	
Kharif	Paddy, Pigeonpea. Soyabean, Maize,Mung, Urd, Kulthi
Rabi	Wheat, Gram, Mustard, Safflower, Lathyrus, Field Pea, Lentil, Linseed, Groundnut
Development Programme CSS / CS	
NFSM	NFSM-Paddy (13) ; Pulses (27); Coarse Cereals (08); Nutri-Cereals (10)PMT District- 27
	Mini Mission I- (Oilseeds) Mini Mission III- (TBOs)
TRFA	Districts(09)- Gariyaband,Raigarh, Rajnandgaon, Kanker, Kondagaon, Sarguja, Bilaspur, Baloda Bazar, Jagdalpur
RKVY	Districts (27)
(*Source- ENVIS, Centre of CG State)	

Note: Farm Families-37.46 lakh (80% small & Marginal farmers);> 57 % soil is medium to light Soil (i.e. Entisols, Alfisols & Inceptisols).



BGREI PROGRAMME IN 14 DISTRICTS OF CHHATTISGARH

CHHATTISGARH: REPORT OF NATIONAL LEVEL MONITORING TEAM TO REVIEW IMPLEMENTATION OF BRINGING GREEN REVOLUTION TO EASTERN INDIA (BGREI) DURING KHARIF 2018

1. BACKGROUND

1.1 The program of "Bringing Green Revolution to Eastern India (BGREI)"- a lateral to Rashtriya Krishi Vikas Yojana (RKVY), is operational since 2010-11 in 07 eastern Indian states of Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, Eastern Uttar Pradesh (Purvanchal) and West Bengal. The programme aims at reasonably enhancing the productivity and sustainability in rice based cropping system.

1.2 During 2010-11, the major focus of the states was on promotion of improved crop production technologies of major crops, water harvesting measures and their utilization for overall agriculture development.

1.3 In the subsequent years 2011-12 and 2012-13, the BGREI program provided a more focused approach on medium and long term strategies for asset building activities of water conservation and utilization along with short-term strategies pertaining to transfer of technology of major cereals in BGREI districts. Some of the states namely; Chhattisgarh, Jharkhand & West Bengal planned medium and long term strategies related to water & soil conservation such as construction of check dams, minor irrigation tanks (MITs), lift irrigation points, re-excavation of old ponds etc.

1.4 However, year 2013-14 marked for including the intervention of marketing support including post harvest technology in programme.

1.5 Currently, the programme has been planned under 03 broad categories of interventions: ***(i) Block demonstrations; (ii) Asset building*** activities such as construction of shallow tube wells/bore wells/dug wells, pump sets, seed drills etc; and ***(iii) site specific activities*** for facilitating petty works such as construction/renovation of irrigation channels/electricity for agricultural purposes in a cluster approach for convenience and cost effectiveness.

1.6 The funding pattern since 2015-16 is 60:40 (Central + State). The inter- allocation of total funds amongst 06 major interventions is envisaged at *40% for block/ cluster demonstrations, 10% for Seed distribution (HYV/Hybrids),5% for Seed production (HYV/ Hybrids) , 10% for Need based Inputs ((i) Micro nutrients and soil ameliorants- 5% ii) PP chemicals- 4% iii) Cropping System based training-1%,),15% for asset building (farm machines & implements,*

irrigation devices),15% for site specific activities,5% for Marketing support (including Post-harvest Management) and 1% for Monitoring at national level.

1.7 Of the total block/cluster demonstrations, 30% funds have been earmarked for cropping system based demonstrations (CSBD) ***to be organized on stress tolerant rice varieties.***

1.8 2017-18 BGREI allocation for all India was Rs. 707.29 crore. The allocation for Chhattisgarh state was Rs. 118.30 crore (GoI-Rs. 70.98cr + State -Rs. 47.32cr) wherein allocation towards rice was Rs. 111.05 cr and for wheat was Rs. 7.25 cr . However, the total expenditure has been Rs.110.29 cr.

1.9 ***2018-19 BGREI allocation*** *for all India is Rs. 495.30 crore. The allocation for Chhattisgarh is Rs. 82.90 crore (GoI-Rs. 49.74cr + State -Rs. 33.16cr) wherein funds towards rice is Rs. 65.30 cr and for wheat is Rs. 16.58 cr.*

2. AREA OF OPERATION

Commodity/ Crops covered	All India		Districts covered in Chhattisgarh (Nos.)	
	States (Nos.)	Districts (Nos.)		
Rice	7	102	14	Gariyaband, Mahasamund, Dhamtari, Durg, Balod, Bemetara, Janjgir, Sarguja, Surajpur, Balrampur, Kanker,Narayanpur, Jagdalpur, Kondagaon
Wheat	6	52	14	Gariyaband, Mahasamund, Dhamtari, Durg, Balod, Bemetara, Janjgir, Sarguja, Surajpur, Balrampur, Kanker,Narayanpur, Jagdalpur, Kondagaon

3. BGREI IMPLEMENTATION MONITORING MECHANISM

Level	Composition		Frequency of Meeting
Central	Central Steering Committee (CSC)	Secretary (DAC&FW)- Chairman J.S. (Crops) (DAC&FW), Member Secretary	Twice in a year
National	National Level Monitoring Team (NLMT)	Director – GoI, DPD, Bhopal Convener/Team leader P S - NRRI, Cuttack Member JDA- SDA, CG- Member	Once in a crop season
State	State Steering Committee (SSC)	APC/ Principal Secretary – Chairman Director (agriculture)- Member Secretary	Quarterly
District	District Steering Committee (DSC)	DM/CEO –Chairman DDA/DAO- Member Secretary	Thrice in a crop season (Pre-sowing, Mid-season, During harvest)

4. NLMT : COMPOSITION

S.No.	Organization	Names and Designation
i.	Government of India, Directorate of Pulses Development Deptt. of Agriculture, Cooperation & FW (Min. of Agri.& Farmer's Welfare) Vindhyachal Bhavan, Bhopal, (M.P.) (Email-dpd.mp@nic.in)	Dr. A.K. Tiwari, -Team leader Director
ii.	ICAR-National Rice Research Institute (NRRI), Division of Crop Production, Cuttack (Odisha) (Email-krishnenducrri@gmail.com)	Dr. K. Chattopadhyay -Member PS, (Plant Breeding)
iii.	Joint Director & State Nodal, BGREI Govt. of Chhattisgarh, Directorate of Agriculture Labhandi, Raipur (CG) (E-mail- diagricg.cg@gov.in)	Shri R.K.Chandrawansi -Member

5. a) RAINFALL STATUS: 2016-2017

(unit- mm)

Year	June	July	August	September	October	Total	%
Avg. Rainfall	168	364.05	323	230.05	64.15	1149.25	
2016	153.80	371.20	361.50	297.80	72.30	1256.60	109
2017	182.20	356.90	284.50	162.3	56.0	1041.9	91

b) RAINFALL STATUS: 2018

(Average 01/ 06 / 2018 to 26/09/2018)

DISTRICT	ACTUAL (mm)	NORMAL (mm)	DEP (%)	CATEGORY
BALOD	1092.5	1008.1	8	N
BALODA BAZAR	987.8	1009.1	-2	N
BALRAMPUR	738	1125.8	-34	D
BASTAR	1239.6	1178.2	5	N
BEMETARA	1251.4	994.1	26	E
BIJAPUR	1945.3	1352.3	44	E
BILASPUR	822.1	1066.7	-23	D
DANTEWADA	1208.9	1225.8	-1	N
DHAMTARI	1083.3	1044	4	N
DURG	1011.6	1008.1	0	N
GARIABAND	1065	1075	-1	N
JANJGIR	839.2	1189.8	-29	D
JASHPUR	1002.3	1329.8	-25	D
KABIRDHAM	744.1	876.8	-15	N
KANKER	1343.9	1153.6	16	N
KONDAGAON	1018	1179.7	-14	N
KORBA	1021.5	1350.1	-24	D
KORIYA	919.3	1127.3	-18	N
MAHASAMUND	1013.1	1036.7	-2	N
MUNGELI	868.8	1066.7	-19	N
NARAYANPUR	1376	1216.4	13	N
RAIGARH	959.8	1126.9	-15	N
RAIPUR	1235.4	1037.1	19	N
RAJNANDGAON	856.7	1024.2	-16	N
SUKMA	1688.3	1130.7	49	E
SURAJPUR	1125	1134.7	-1	N
SURGUJA	1077.5	1271.1	-15	N
SUBDIVISION RAINFALL	**1102.60**	**1139.00**	**-3**	**N**

Note: D: Deficient, E: Excess and N: Normal.

CATEGORY (DEPARTURE% BASIS)	NO. OF DISTRICTS
LARGE EXCESS (≥60)	0
EXCESS (+ 20 TO +59)	3
NORMAL (+19 TO -19)	19
DEFICIENT (-20 TO -59)	5
LARGE DEFICIENT (-60 TO -99)	0
NO RAIN (-100)	0

6. PADDY CROP SCENARIO : 2016-17 to 2018-19

(A-lakh ha, P- Lakh tonnes, Y- kg/ha)

Description	Area	Production	Yield (kg/ha)
2016-17			
BGREI Districts (14)	19.14	45.44	2374
State	38.30	80.48	2101
All India	439.93	1096.98	2494
2017-18			
BGREI Districts (14)	19.15	37.00	1932
State	37.61	47.26	1256
All India	437.89	1129.06	2578
2018-19			
State *	37.23	84.52	2270
All India*	-	992.4	-

Source: *Deptt. of economics and statistics,GoI*

Note: **According to first advance estimate of 2018-19.*

7. ALLOCATION AND EXPENDITURE (2018-19) *(Rs in Lakh)* (As on 25-09-2018)

Allo.	Revalidation	Rel.	Total Fund Available	Exp.	Unspent	% Utilization	
						Against total fund available	Against Allocation
8188.04	4657.09	4093.33	8750.42	674.97	8075.45	7.71	8.24

8. (a) Ecology wise management practices of rice (ICAR-NRRI) is given under *Annex-VIII*

8. (b) NRRI District wise recommended rice varieties for Chhattisgarh: The NRRI Cuttack has circulated the following varieties for demonstrating/cultivating in the state of Chhattisgarh through IGKVV, Raipur.

S. No.	Districts	Direct Seeded Rice	Line Transplanting	SRI	Stress Tolerant Varieties	Hybrid Rice
Chhattisgarh Plains						
1	Garyiaband	**Indira Barani Dhan-1** **Indira Aerobic-1**	**Indira Maheshwari** Indira Sona Badshah Bhog selection-1 Tarun Bhog selection-1 CG Madhuraj-55 Arize-6444 Gold Sampada	**Swarna sub -1** **Karma Mahasuri** **Indira Maheshwari** **IGKV-R-1244** **Arize-6444 Gold**	**Indira Barani Dhan-1** **DRR Dhan 42** **Swarna Sub 1** (Submergence tolerant) **Improved Samba Mahsuri**	Indira Sona DRH-775 JKRH-3333 HRI-157 Arize-6444 Gold (HRI-174) PAC-8744 Arize-6129 (Gold) US-312 & US-382
2	Mahasamund					
3	Dhamtari					
4	Durg					
5	Bemetara					
6	Balod					
7	Janjgir					
Northern Hill Zone						
8	Surguja	**Indira Barani Dhan-1** **Sahbhagi Dhan** **CG Zinc Rice** **Indira Aerobic-1** **DRR Dhan 42** **(IR-64 Drought)**	Vishnu Bhog selection-1 Tarun Bhog selection-1 IGKV-R-2 DRH-775 PAC-837 VNR-2245	**IGKV-R-2** **IGKV-R-1244**	**Swarna Sub-1** **Indira Barani Dhan** **Indira Aerobic-1** **CR Dhan 201** **Sahbhagi Dhan** **Improved Samba Mahsuri**	Indira Sona DRH-775 27-P-31 Arize-6444 Gold (HRI-174) PAC-8744 Arize-6129 (Gold) US-312 & US-382
9	Surajpur					
10	Balrampur					
Bastar Plateau Zone						
11	Kanker	**Indira Barani Dhan-1** **Sahbhagi Dhan** **CG Zinc Rice** **Indira Aerobic-1** **DRR Dhan 42** **IR-64 (Drought)**	Badshah Bhog TarunBhog Sampada IGKV-R-2 PAC 837 VNR-2245 CG Sugandhit Dhan	**IGKV-R-2** **IGKV-R-1244**	**Indira Barani Dhan-1** **Indira Aerobic-1** **CR Dhan 201** **Sahbhagidhan** **Improved Samba Mahsuri**	Indira Sona Suruchi DRH-775 JKRH-3333 27-P-31 Arize-6444 Gold (HRI-174) US-382
12	Naraynapur					
13	Jagadalpur					
14	Kondagaon					

9. DETAILS OF FIELD VISIT/ACTIVITIES

The team visited 04 districts namely Jagdalpur (Bastar), Kondagaon, Narayanpur and Dhamtari of Chhattisgarh under BGREI programme from 27th to 30th August, 2018. Dr. Rajendra Lakpale , Associate director research (ADR), IGKVV accompanied in Kondagaon and Narayanpur while Dr. Ashwini Thakur, Scientist IGKVV, Raipur accompanied during the visit at Bastar. The detail of visit and the observations presented below:

Visited Districts	Village/ Block	Activities	Contact Person	Observations/Remarks
Bastar (28-08-2018)	**Vill.- Babusemra, Block- Jagdalpur**	Cluster System Based Demonstration	Shri Mithun Mandal, RAEO, Shri R. K. Mishra, SADO and Mr. Shiv ram Nag (Farmer)	• Block officer informed that CSBD under hybrid rice Kaveri (KPH) covered in 30 ha involving 20 farmers. • The paddy was transplanted from 10 July to 30July in the presence of RAEO and SADOs, the seed was supplied to the farmer @ 15 kg/ha. • Crop was in active tillering stage with good physiological condition. • Infestation of any insect pests was not seen and farmers are using conoweeder for weeding however blast has been seen in the field. Monitoring team advised to spray Tricyclazole 75 WP @ 0.6g/l of water and avoid application of nitrogenous fertilizer. • *Line transplanting* was done *using paddy transplanter* however, conventional planting was also seen. • Deptt. has done excellent work under convergence mode with Mukhya Mantri Kaushal Vikas Yojna for repairing and maintenance of transplanter and tractor.

Visited Districts	Village/ Block	Activities	Contact Person	Observations/Remarks
Bastar (28-08-2018)	**Vill.- Dhurguda, Block- Jagdalpur**	Demonstration under NFSM	Mr. Maniram (Farmer)	• Hybrid maize (JK-502) demonstrated in 40 ha under NFSM including 43 farm families. • Sowing: From 10 to 15 July • Crop was in tasseling stage. • Shoot borer has been seen and advised to apply Carbofuran 3G @ 30 kg/ha on whorl of maize. • Weed infestation was also seen in the field and advised to apply Tembotrione @ 130g/ ha for all kinds of weed and 2, 4-D for broad leaved weed @ 1kg/ha at 20-25 DAS. • The team suggested the farmer to grow pigeonpea in the field bunds.
	Vill.- Ghatkawali , Block- Bastar	Demonstration under ATMA	Mr. Budhram (Farmer)	• Groundnut (Kadri-9) demonstrated in 1 ha area under ATMA on the field of mentioned farmer. • Only 5 acre of area covered in village and remaining was sown in nearby villages. • Groundnut was in pegging and pod formation stage. • Plant population was poor due to termite attack and disease. • The team also discussed with the farmer about distribution of soil heath card & its utility. • The farmers said that they were following the recommendation of soil health card & use fertilizer according to that only.

Visited Districts	Village/ Block	Activities	Contact Person	Observations/Remarks
Bastar (28-08-2018)	**Vill.- Palwa, Block- Tokapal**	FLD under NFSM (Pulse) scheme	Shri G. P. Ayam KVK, Senior Scientist and Swati Thakur, Head	• Moong (IPM 2-3) demonstrated in 8 ha including 34 farmers. • The standing crop was in good condition but due to heavy rain, the plant mortality was seen. • The weed infestation was also seen and the team advised to use chemical like Imazathaypr @ 50 g ai/ ha. • It is found that the crop was sown earlier than its actual sowing time which also causes the heavy weed infestation and mortality.
Bastar (29-08-2018)	**Vill. – Lamker, Block- Bastar**	Seed Production under seed hub	SGCARS officials	• Team visited upland research station cum instructional farm and seed hub, which comes under SGCARS, Jagdalpur. • In this research station mostly upland crop research is being conducted. • Small millets & coarse cereals are also growing for research purpose.
Bastar (29-08-2018)	**Vill.- Chargaon, Block- Bakawand**	IFS model development under FRA, Line transplanting of Paddy under BGREI, Demonstration of Maize and Pigeonpea under NFSM	Shri Kanti lal Baghel (Farmer) (9165603776)	• Deptt. of Agril.,Bastar developed IFS Model under FRA (Forest Right Act *" Van AdhikarPatta"*) *" Hamar Jungal Hamar Aajivika" in Chhatisgarhi and in Hulbi*(Local Language) *"Aamcho Jungle Amcho Jeevana"* in 55.89 ha of land having 26 small ponds (25 x 25 x 2.5 m) and two big ponds (85 x 85x 2.5 m)for doubling the income of farmers.24 solar tube wells were also available.

Visited Districts	Village/ Block	Activities	Contact Person	Observations/Remarks
Bastar (29-08-2018)	**Vill.- Chargaon, Block- Bakawand**	IFS model development under FRA, Line transplanting of Paddy under BGREI, Demonstration of Maize and Pigeonpea under NFSM	Shri Sandhu ram Baghel , Krishak Mitra (9407749631)	• Different types of components were available in this IFS model i.e. Crop Components like rice, maize and pigeonpea, Shade net for vegetable production, Poultry shade, NADEP and Construct home for farmers under Indira Awas Yojna -07 beneficiaries etc. • The model was constructed in convergence of DMF (district mining fund) and allied. • Here, *Line transplanting of PKV HMT & Hybrid Rice JKRH-3333 variety was done under BGREI.* • The demonstration of Maize variety JK-502 and Dhaanya 1107 was also done under NFSM course cereals. • In the farm pond bunds, line sowing of Arhar (cv. Rajiv Lochan) was also demonstrated in the cluster.
Kondagaon (29-08-2018)	**Vill.- Sarebendri, Block- Kondagaon,**	Cluster System Based Demonstration	-	• Hybrid rice (US 382) demonstrated in 50 ha. • Crop was in active tillering stage. • The infestation of many insects like leaf folder, gall midge, whorl maggot and disease like bacterial leaf blight and blast was also seen. • Team suggested the department to publish advisory for insect and diseases.
	Vill.-Kiwai Block- Kondagaon	Cluster System Based Demonstration	-	• Crop condition was good.

Visited Districts	Village/ Block	Activities	Contact Person	Observations/Remarks
Narayanpur (29-08-2018)	**Vill.- Benoor Block - Narayanpur**	Cluster System Based Demonstration	-	• Hybrid Paddy Sahyadri demonstrated in 100 ha; Transplanted on 2nd July was in very good condition. • The demonstration was properly laid out by the dept.
	Vill.-Garanji, Block - Narayanpur	Seed Production Programme	Shri Mahesh Dewangan (Farmer)	• Seed production programme of rice variety DDR Dhan 44, are drought tolerant variety has been organized in 6 acre area in the field of mentioned farmer.
	Vill.-Basing and Kundla Block- Orchha	Demonstration under ATMA	-	• These villages are adopted by the Ram Krishna Mission, NGO who is doing the work under ATMA.
Dhamtari (30-08-2018)	**-**	Cluster System Based Demonstration	District officials	• A district level presentation was taken by the team to have a feedback of BGREI implementation in the district. • The Demonstrations have been taken under Kaveri 37, Sahyadri (Both are hybrids). • It was observed that recommended variety under DSR, line transplanting etc. are yet to be adapted under demonstrations. • The NRRI recommended varieties of paddy have been advised to be taken under seed production programme so that these could find place under the different ecosystem.

10. OBSERVATIONS

- More or less the scenario under BGREI plots in respect of crop growth and establishment is satisfactory. Predominant rice varieties taken under the programme are Hybrids (Kaveri, Sahyadri, JK-333 and Arize 444 gold), *Samleshwari as a stress tolerant variety.*
- Infestation of bacterial leaf blight in paddy crop was seen in field. So, Dr. K. Chattopadhya suggested to use Improved Sambha Mahsuri in bacterial leaf blight affected areas of Bastar district and *variety Swarna Sub-1*for *water logged (water stress) area.*
- Infestation of insect- pest was also observed during field visit. *The field staff/ADO informed of non release of funds to the districts owing to unavailability of state matching grant. This has resultantly affected the purchase important inputs like micronutrient, pesticides etc. to be demonstrated in the BGREI Programme.*
- The field staff/Districts/KVK Scientists were advised to prepare the performance of the previous varieties/ hybrids over the succeeding/ new varieties. The performance of varieties such as per cent increase in yield, duration of maturity, resistance to insect-pest and diseases etc. have been advised to be compiled at the level of SAU/NRRI for further submission to the DAC & FW, GoI.
- In view of some Local varieties/ Land races performing much better in different eco-situations in districts, the NLMT has advised to assess the district wise performance of landraces, so that these varieties could be included under BGREI programme. This exercise may be completed by the SAU in consultation with the department (DDAs), KVKs for onward submission to the DAC & FW, GoI.
- Weed infestation was also prevalent in the paddy field, farmer were using weedicides and cono weeders. However, higher doses of use of herbicides by thr farmers may be attributed to the lack of knowledge. The team, therefore, advised to invariably mention the technical name, formulations and generic name with concentration of active ingredient of herbicides on the flax board erected on the site of demonstrations.
- The team also had a wrap up meeting in Jagdalpur in the presence of Dr. A. K. Tiwari, Director, Govt. of India, Min. of Agri. and FW (DAC and FW), Director of pulses Development, Bhopal (MP), Dr. K. Chattopadhya, Principal Scientist (Plant Breeding), Division of Crop Improvement, NRRI, Cuttack (Odisha), Shri R. K. Chandrawanci, Joint Director and State Nodal, BGREI, Govt. of CG, Directorate of Agriculture, Raipur, CG, Dr.

Ashwani Kumar Thakur, Scientist (Agronomy), monitoring member of BGREI and NFSM, Shri Kapil Dev Deepak, DDA, Bastar and other stakeholders.

During the discussion it was concluded that while planning BGREI demonstrations/components in the field, following point should be kept in view by the DDA and the KVK:

- Suitability of crop in different land situations; suitability of paddy variety as per eco-situation/field situation; Use of nutrients as per soil health card recommendation; method of sowing/transplanting; maintain harvesting data/yield data and observation of the demonstration site on weekly/fortnightly/monthly basis by a joint team of DDA+KVK.

11. RECOMMENDATIONS/SUGGESTIONS

- Non-release of BGREI funds to districts (both for unspent/Revalidated amount of 2017-18 and the regular release of 2018-19) was brought to the notice of ACS/APC during the wrap up meeting. The fund release may be ensured immediately in the interest of realizing the impact of BGREI programme.
- Non Supply/ Poor supply of quality seeds of paddy, including the varieties and hybrids by the state seed corporation is another major area of concern, needing immediate attention of State govt. The NRRI Cuttak, being the central nodal technical backstopping agency for BGREI, may be advised to collaborate with their AICRP/SAU (IGKVV Raipur) counterpart to organize seed production programme of the varieties/hybrids recommended by the NRRI but not being demonstration/popularized for the last many years owing to non availability of seeds.
- Delayed/incomplete supply of inputs *under cafeteria* needs immediate attention of the State nodal agency i.e. SSC or an alternate mechanism such as decentralized supply of inputs etc. may be decided at level of state headquarters.
- Poor expenditure up till the end of second quarter needs immediate release of fund to the districts.
- A road map for increasing the production and productivity of paddy with water efficient cultivation technologies for Chhattisgarh may be developed by NRRI cuttak and IGKVV.
- For proper execution of programme, the SLSC meeting should be convened in the much beginning of the crop season and the BGREI targets (complete targets) including the fund release is highly recommended.

VISIT PHOTOGRAPHS

District-Bastar

Brief Discussion on implementation of BGREI scheme in Bastar district with district collector Dr.Ayyaj Fakirbhai Tamboli & NLMT team

Under Extension Reform ATMA Scheme, Groundnut crop Variety K-9 demonstration field in vill.- Ghatkawali, Block – Bastar

Under BGREI Cropping System Based Cluster demonstration on Hybrid Rice Variety Kaveri-KPH demonstration field in vill.- Babusemra, Block – Jagdalpur

Under NFSM demonstration on Maize Crop Variety JK-502 demonstration field in vill.-Dhurguda/Kalcha, Block – Jagdalpur

District-Bastar

NLM Team and other official visited integrated farming system (IFS) model on research farm SGCARS Jagdalpur.

Front Line Demonstration under NFSM (Pulse) scheme Moong crop Variety IPM 2-3 demonstration field in vill.-Palwa Block – Tokapal

Ragi (var. Indira Ragi-1) at its vegetative stage in field at Vill.-Lamker, Block-Bastar

NLMT along with SGCARS officials visited upland research station cum instructional farm and seed hub at vill.- Lamker Block – Bastar for small millets and coarse cereals

District-Bastar

All India coordinated rice improvement project plots at research farm SGCARS, Jagdalpur

Breeder Seed Production plot, SGCARS, Jagdalpur under NFSM

Wrap-up meeting with NLMT Dated 28-08-2018 at SGCARS Jagdalpur, Bastar

District-Bastar


FRA Cluster village – Chargaon, Block – Bakawandunder "HamarJungalHamarAjivika" scheme


NLMT Team discussing with farmers in FRA Cluster vill. – Chargaon, Block – Bakawand under "Hamar Jungal Hamar Ajivika" scheme and also visited demonstration field of Hybrid Rice variety JKRH-3333 and instructed for measure taken for plant protection

District-Kondagaon

Paddy in tillering stage in demonstrated field vill.-Sarebandari, Dist.-Kondagaon investigated by monitoring team

Under BGREI, Hybrid paddy (cv. US-382) demonstration in vill.-Sarebandari, Dist.-Kondagaon

District- Narayanpur

Hybrid Paddy cv. Sahyadri-4 demonstrations in Vill.-Garhbengal, District -Narayanpur under BGREI Programme

Hybrid Paddy cv. Sahyadri-4 demonstrations in Vill.-Narayanpur, District -Narayanpur under BGREI Programme

District - Dhamtari

Discussion with District Agriculture officers about implementation of BGREI programme in District-Dhamtari

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ANNEXURE I

BGREI Rice 2018-19: Action Plan for Chhattisgarh

Financial: (Rs in lakhs)

S. No.	Components	Target Proposed by state		Target Approved by GoI	
		Phy.	Fin.	Phy.	Fin.
A	**Cluster Demonstration on Rice in different eco-system (100 ha. each)**				
	(i) Direct Seeded Rice @ Rs. 9000/- per ha. (Max.)	700	63.00	700	63.00
	(i) Line Transplanting @ Rs. 9000/- per ha. (Max.)	700	63.00	700	63.00
	(iii) SRI @ Rs. 9000/- per ha. (Max.)	1400	126.00	1400	126.00
	(iv) Stress Tolerant Varieties @ Rs. 9000/- per ha. (Max.)	2100	189.00	2100	189.00
	(v) Hybrid Rice @ Rs. 9000/- per ha. (Max.)	13900	1251.00	13900	1251.00
	(vi) Cropping System Based @ Rs. 15000/- per ha. (Max)	6405	960.75	6405	960.75
	Sub Total	**25205**	**2652.75**	**25205**	**2652.75**
B	**Production of Seeds**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls	500	50.00	500	50.00
	(b) Certified Seeds @ Rs. 2,000 per qtl.	14080	281.60	14080	281.60
	Sub Total	**14580**	**331.60**	**14580**	**331.60**
C	**Distribution of Seeds**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls	4632	463.20	4632	463.20
	(b) Certified Seeds @ Rs. 2,000 per qtl. (<10 years varieties)	10000	200.00	10000	200.00
	Sub Total	**14632**	**663.20**	**14632**	**663.20**
D	**Nutrient Management and Soil Ameliorants**				
	(a) Micro Nutrient Rs. 500 per ha.	48030	240.15	48030	240.15
	(b) Lime Rs. 1,000 per ha.	600	6.00	600	6.00
	(c) Bio-fertilizers Rs. 300 per ha.	27000	81.00	27000	81.00
	(d) Gypsum Rs. 750 per ha.	600	4.50	600	4.50
	Sub Total	**76230**	**331.60**	**76230**	**331.60**
E	**Integrated Pest Management**				
	(a) PP Chemicals & Bio Pesticides / Bio-Agent (Need based) Rs. 500 per ha.	30056	150.28	30056	150.28
	(b) Weedicides Rs. 500 per ha.	23000	115.00	23000	115.00
	Sub Total	**53056**	**265.28**	**53056**	**265.28**
F	**Assets building**				
	(a) Borewell Rs. 30,000	3000	900.00	3000	900.00
	(b) Conoweeder for SC/ST, Small & Marginal, Women farmers & NE States- 50% or Rs. 600	2800	16.80	2800	16.80
	(c) Conoweeder for other farmers- 40% or Rs. 500	10000	50.00	10000	50.00
	(d) Manual / knap sack / foot operated sprayer for SC ST, Small, Marginal, Women farmers 50% or Rs.600	3000	18.00	3000	18.00
	(e) Manual / knap sack / foot operated sprayer for other farmers 40% or Rs. 500	2000	10.00	2000	10.00
	Sub Total	**20800**	**994.80**	**20800**	**994.80**

BGREI Rice 2018-19: Action Plan for Chhattisgarh

Financial: (Rs in lakhs)

S. No.	Components	Target Proposed by state		Target Approved by GoI	
		Phy.	Fin.	Phy.	Fin.
G	**Site Specific Activities**				
	(a) Construction of Checkdams on Govt. lands @ Rs. 15 lakh	63	934.80	63	934.80
	(b) Construction of Minor Irrigation Tanks on Govt. Land@ Rs. 30 lakh	2	60.00	2	60.00
	Sub Total		994.80		994.80
H	**Post Harvest & Marketing Support**				
	(a) Construction of Godown@ Rs. 15.50 lakh	15	229.65	15	229.65
	(b) Subsidy to farmers for protection of grains by HDPE Shed Cover (8' × 15)*	35900	101.95	0	0
	Sub Total		331.60		229.65
I	**Cropping System based training (04 sessions) Rs. 14,000 per training (@ Rs. 3,500 per session)**	**474**	**66.32**	**474**	**66.32**
J	**Contingency(limited to 1% of total allocation)**		0		0
	Grand Total		**6631.95**		**6530.00**
	GoI Share		**3979.17**		**3918.00**
	State Share		**2652.78**		**2612.00**

Note: *HDPE Shed cover under post harvest & marketing support as proposed by state has not been agreed as it is not permissible.*
**State is advised to use funds earmarked for promotion/creation of processing facilities (drying, grading par-boiling of paddy and bagging etc.*

ANNEXURE II

INPUT CAFETERIA/DEMONSTRATION NORMS 2018-19

Rice Demonstration Norms: Kharif **(Rs. Per Hectare)**

Activity/Particular	Direct seeded rice	Line Transplanting	SRI	Stress tolerant varieties	Hybrid Rice
Seed (per ha.)	1000	1000	400	1000	4200
Honorarium for Sowing (per ha.)	500	1000	1000	1000	1000
Seed Treating Drum (per 3 ha. one)	800	800	800	800	0
Pigeonpea Plantation on Rice Bund (2.5 kg/ha.)	400	400	400	400	0
Zinc sulphate 25 kg/ ha. or any other micro nutrient as per recommendation by SAU/KVK green manure seed / bio-fertilizer, Mycorrhiza	2100	1850	2150	1850	1750
Weedicide (1 pre and 1 post emergence)	1800	1800	1800	1800	0
IPM (PP chemicals/ Bio Pesticides)	2100	1850	2150	1850	1750
Demonstration Board, Training Materials, farmers training, field day, POL, vehicle hiring / Visit of Scientist/State Officers and other contingencies.	300	300	300	300	300
Total	**9000**	**9000**	**9000**	**9000**	**9000**

Note: Marginal saving of any, from an item can be utilized in other item as per genuine need restricted to the limit of 10%.

Cropping System Based Demonstration Norms: Rabi

Activity/Particular	Gram (40 kg)	Pea (40 kg)	Maize (20 Kg)	Moong (20 kg)	Urd (20 kg)
First Crop Rice @ 9000 per ha.					
Cost of Seed	3000	3000	4125	2000	2000
Zinc sulphate 25 kg/ ha. or any other micro nutrient as per recommendation by SAU/KVK green manure seed / bio-fertilizer, Mycorrhiza	1500	1500	375	1500	1500
IPM (PP Chemicals/ Bio-Pesticides)	1500	1500	1500	1500	1500
Weedicide (1 Per and 1 Post emergence)	0	0	0	1000	1000
Total	**6000**	**6000**	**6000**	**6000**	**6000**

ANNEXURE III

BGREI Rice: Physical & Financial Target and Achievement of the Chhattisgarh for the month of August 2018

(Rs in lakhs)

S. No.	Components	Target		Achievement	
		Phy.	Fin.	Phy.	Fin.
A	**Cluster Demonstration on Rice in different eco-system (100 ha. each)**				
	(i) Direct Seeded Rice @ Rs. 9000/- per ha. (Max.)	700	63.00	700	0.00
	(i) Line Transplanting @ Rs. 9000/- per ha. (Max.)	700	63.00	700	0.00
	(iii) SRI @ Rs. 9000/- per ha. (Max.)	1400	126.00	1400	0.00
	(iv) Stress Tolerant Varieties @ Rs. 9000/- per ha. (Max.)	2100	189.00	2100	0.00
	(v) Hybrid Rice @ Rs. 9000/- per ha. (Max.)	13900	1251.00	13900	0.00
	(vi) Cropping System Based @ Rs. 15000/- per ha. (Max)	6405	960.75	6405	0.00
	Sub Total	**25205**	**2652.75**	**25205**	**0.00**
B	**Production of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Farmer - 75% and Agency - 25%)	500	50.00	0	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or farmer 75% (Promote stress tolerant varieties)	14080	281.60	4950	0.00
	Sub Total	**14580**	**331.60**	**4950**	**0.00**
C	**Distribution of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Max.) or 50%	4632	463.20	1136	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or 50%	10000	200.00	6657	0.00
	Sub Total	**14632**	**663.20**	**7793**	**0.00**
D	**Nutrient Management and Soil Ameliorants (for max. 2 ha.) other than demonstration**				
	(a) Micro Nutrient Rs. 500 per ha.	48030	240.15	17500	0.00
	(b) Lime Rs. 1,000 per ha.	600	6.00	200	0.00
	(c) Bio-fertilizers Rs. 300 per ha.	27000	81.00	12700	0.00
	(d) Gypsum Rs. 750 per ha.	600	4.50	0	0.00
	Sub Total	**76230**	**331.65**	**30400**	**0.00**
E	**Integrated Pest Management**				
	(a) PP Chemicals & Bio Pesticides / Bio-Agent (Need based) Rs. 500 per ha.	30056	150.28	6850	0.00
	(b) Weedicides Rs. 500 per ha.	23000	115.00	5700	0.00
	Sub Total	**53056**	**265.28**	**12550**	**0.00**
F	**Assets building**				
	(a) Borewell Rs. 30,000	3000	900.00	788	0.00
	(b) Conoweeder for SC/ST, Small & Marginal, Women farmers & NE States- 50% or Rs. 600	2800	16.80	900	0.00
	(c) Conoweeder for other farmers-40% or Rs. 500	10000	50.00	600	0.00
	(d) Manual / knap sack / foot operated sprayer for SC ST, Small, Marginal, Women farmers-50% or Rs.600	3000	18.00	1100	0.00
	(e) Manual / knap sack / foot operated sprayer for other farmers - 40% or Rs. 500	2000	10.00	300	0.00
	Sub Total	**20800**	**994.80**	**3688**	**0.00**
G	**Post Harvest APEX BANK**	0	229.65	0	0.00
H	**Cropping System based training (04 sessions) Rs. 14,000 per training (@ Rs. 3,500 per session)**	474	66.32	80	0.00
I	**Contingency**		0.00		0.00
	Total Financial (BGREI Rice)		**5535.25**		**0.00**

BGREI Rice: Physical & Financial Target and Achievement of District- Dhamtari for the month of August 2018

(Rs in lakhs)

S. No.	Components	Target		Achievement	
		Phy.	Fin.	Phy.	Fin.
A	**Cluster Demonstration on Rice in different eco-system (100 ha. each)**				
	(i) Direct Seeded Rice @ Rs. 9000/- per ha. (Max.)	0	0.00	0	0.00
	(i) Line Transplanting @ Rs. 9000/- per ha. (Max.)	100	9.00	100	0.00
	(iii) SRI @ Rs. 9000/- per ha. (Max.)	100	9.00	100	0.00
	(iv) Stress Tolerant Varieties @ Rs. 9000/- per ha. (Max.)	250	22.50	250	0.00
	(v) Hybrid Rice @ Rs. 9000/- per ha. (Max.)	700	63.00	700	0.00
	(vi) Cropping System Based @ Rs. 15000/- per ha. (Max)	100	15.00	100	0.00
	Sub Total	**1250**	**118.50**	**1250**	0.00
B	**Production of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Farmer - 75% agency - 25%)	0	0.00	0	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or farmer 75% (Promote stress tolerant varieties)	1000	20.00	35.00	0.00
	Sub Total	**1000**	**20.00**	**35**	**0.00**
C	**Distribution of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Max.) or 50%	200	20.00	35.00	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or 50%	1200	24.00	426.00	0.00
	Sub Total	**1400**	**44.00**	**461**	**0.00**
D	**Nutrient Management and Soil Ameliorants (for max. 2 ha.) other than demonstration**				
	(a) Micro Nutrient Rs. 500 per ha.	2500	12.50	643.00	0.00
	(b) Lime Rs. 1,000 per ha.	0	0.00	0	0.00
	(c) Bio-fertilizers Rs. 300 per ha.	700	2.10	384.00	0.00
	(d) Gypsum Rs. 750 per ha.	0	0.00	0	0.00
	Sub Total	**3200**	**14.60**	**1027**	**0.00**
E	**Integrated Pest Management**				
	(a) PP Chemicals & Bio Pesticides / Bio-Agent (Need based) Rs. 500 per ha.	700	3.50	0	0.00
	(b) Weedicides Rs. 500 per ha.	600	3.00	224.00	0.00
	Sub Total	**1300**	**6.50**	**224**	**0.00**
F	**Assets building**				
	(a) Borewell Rs. 30,000	200	60.00	0	0.00
	(b) Conoweeder for SC/ST, Small & Marginal, Women farmers & NE States- 50% or Rs. 600	0	0.00	0	0.00
	(c) Conoweeder for other farmers- 40% or Rs. 500	1200	6.00	0	0.00
	(d) Manual / knap sack / foot operated sprayer for SC ST, Small, Marginal, Women farmers 50% or Rs.600	0	0.00	0	0.00
	(e) Manual / knap sack / foot operated sprayer for other farmers 40% or Rs. 500	200	1.00	113.00	0.00
	Sub Total	**1600**	**67.00**	**113**	**0.00**
G	**Post Harvest APEX BANK**	-	-	-	-
H	**Cropping System based training (04 sessions) Rs. 14,000 per training (@ Rs. 3,500 per session)**	**22**	**3.08**	**9.00**	**0.00**
I	**Contingency**	-	-	-	-
	Total Financial(BGREI Rice)	**-**	**273.68**	**-**	**0**

BGREI Rice: Physical & Financial Target and Achievement of District- Jagdalpur for the month August 2018

(Rs in lakhs)

S. No.	Components	Target		Achievement	
		Phy.	Fin.	Phy.	Fin.
A	**Cluster Demonstration on Rice in different eco-system (100 ha. each)**				
	(i) Direct Seeded Rice @ Rs. 9000/- per ha. (Max.)	100	9	100	0.00
	(i) Line Transplanting @ Rs. 9000/- per ha. (Max.)	100	9	100	0.00
	(iii) SRI @ Rs. 9000/- per ha. (Max.)	500	45	500	0.00
	(iv) Stress Tolerant Varieties @ Rs. 9000/- per ha. (Max.)	100	9	100	0.00
	(v) Hybrid Rice @ Rs. 9000/- per ha. (Max.)	1500	135	1500	0.00
	(vi) Cropping System Based @ Rs. 15000/- per ha. (Max)	1400	210	1400	0.00
	Sub Total	**3700**	**417**	**3700**	**0.00**
B	**Production of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Farmer - 75% agency - 25%)		0.00		0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or farmer 75% (Promote stress tolerant varieties)	2000	40	24	0.00
	Sub Total	**2000**	**40**	**24**	**0.00**
C	**Distribution of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Max.) or 50%	1782	178.2	72	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or 50%	1000	20	523	0.00
	Sub Total	**2782**	**198.2**	**595**	**0.00**
D	**Nutrient Management and Soil Ameliorants (for max. 2 ha.) other than demonstration**				
	(a) Micro Nutrient Rs. 500 per ha.	5000	25	842	0.00
	(b) Lime Rs. 1,000 per ha.	200	2	0	0.00
	(c) Bio-fertilizers Rs. 300 per ha.	1000	3	426	0.00
	(d) Gypsum Rs. 750 per ha.	200	1.5	0	0.00
	Sub Total	**6400**	**31.5**	**1268**	**0.00**
E	**Integrated Pest Management**				
	(a) PP Chemicals & Bio Pesticides / Bio-Agent (Need based) Rs. 500 per ha.	1250	6.25	0	0.00
	(b) Weedicides Rs. 500 per ha.	800	4	368	0.00
	Sub Total	**2050**	**10.25**	**368**	**0.00**
F	**Assets building**				
	(a) Borewell Rs. 30,000	375	112.5	0	0.00
	(b) Conoweeder for SC/ST, Small & Marginal, Women farmers & NE States-50% or Rs. 600	400	2.4	0	0.00
	(c) Conoweeder for other farmers- 40% or Rs. 500	1000	5	0	0.00
	(d) Manual / knap sack / foot operated sprayer for SC ST, Small, Marginal, Women farmers 50% or Rs.600	400	2.4	143	0.00
	(e) Manual / knap sack / foot operated sprayer for other farmers 40% or Rs. 500	100	0.5	56	0.00
	Sub Total	**2275**	**122.8**	**199**	**0.00**
G	**Post Harvest APEX BANK**	-	-	-	-
H	**Cropping System based training (04 sessions) Rs. 14,000 per training (@ Rs. 3,500 per session)**	**70**	**9.8**	**23**	**0.00**
I	**Contingency**	-	-	-	-
	Total Financial(BGREI Rice)	**-**	**829.55**	**-**	**0.00**

BGREI Rice: Physical & Financial Target and Achievement of District- Kondagaon for the month August 2018

(Rs in lakhs)

S. No.	Components	Target		Achievement	
		Phy.	Fin.	Phy.	Fin.
A	**Cluster Demonstration on Rice in different eco-system (100 ha. each)**				
	(i) Direct Seeded Rice @ Rs. 9000/- per ha. (Max.)	0	0.00	0	0.00
	(i) Line Transplanting @ Rs. 9000/- per ha. (Max.)	0	0.00	0	0.00
	(iii) SRI @ Rs. 9000/- per ha. (Max.)	200	18	200	0.00
	(iv) Stress Tolerant Varieties @ Rs. 9000/- per ha. (Max.)	100	9	100	0.00
	(v) Hybrid Rice @ Rs. 9000/- per ha. (Max.)	1500	135	1500	0.00
	(vi) Cropping System Based @ Rs. 15000/- per ha. (Max)	1000	150	1000	0.00
	Sub Total	**2800**	**312**	**2800**	**0.00**
B	**Production of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Farmer - 75% agency - 25%)	0	0.00	0	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or farmer 75% (Promote stress tolerant varieties)	500	10	15	0.00
	Sub Total	**500**	**10**	**15**	**0.00**
C	**Distribution of Seeds (Less than 10 years varieties) Max. 2 ha. each farmer**				
	(a) Hybrid Rice @ Rs. 10,000 per qtls (Max.) or 50%	300	30	22	0.00
	(b) Certified Seeds @ Rs. 2,000 per qtl. (Max.) or 50%	600	12	342	0.00
	Sub Total	**900**	**42**	**364**	**0.00**
D	**Nutrient Management and Soil Ameliorants (for max. 2 ha.) other than demonstration**				
	(a) Micro Nutrient Rs. 500 per ha.	5000	25	864	0.00
	(b) Lime Rs. 1,000 per ha.	200	2	0	0.00
	(c) Bio-fertilizers Rs. 300 per ha.	1000	3	375	0.00
	(d) Gypsum Rs. 750 per ha.	200	1.5	0	0.00
	Sub Total	**6400**	**31.5**	**1239**	**0.00**
E	**Integrated Pest Management**				
	(a) PP Chemicals & Bio Pesticides / Bio-Agent (Need based) Rs. 500 per ha.	1250	6.25	0	0.00
	(b) Weedicides Rs. 500 per ha.	800	4	343	0.00
	Sub Total	**2050**	**10.25**	**343**	**0.00**
F	**Assets building**				
	(a) Borewell Rs. 30,000	300	90	0	0.00
	(b) Conoweeder for SC/ST, Small & Marginal, Women farmers & NE States-50% or Rs. 600	300	1.8	0	0.00
	(c) Conoweeder for other farmers- 40% or Rs. 500	500	2.5	0	0.00
	(d) Manual / knap sack / foot operated sprayer for SC ST, Small, Marginal, Women farmers 50% or Rs.600	300	1.8	84	0.00
	(e) Manual / knap sack / foot operated sprayer for other farmers 40% or Rs. 500	100	0.5	34	0.00
	Sub Total	**1500**	**96.6**	**118**	**0.00**
G	**Post Harvest APEX BANK**	-	-	-	-
H	**Cropping System based training (04 sessions) Rs. 14,000 per training (@ Rs. 3,500 per session)**	**50**	**7**	**18**	**0.00**
I	**Contingency**	-	-	-	-
	Total Financial(BGREI Rice)	**-**	**509.35**	**-**	**0.00**

ANNEXURE IV

CLUSTER DEMONSTRATION IN DIFFERENT ECOSYSTEM OF SAMPLE DISTRICTS

(Area-Ha)

Particulars	Dhamtari				Jagdalpur				Kondagaon			
	Area Covered		2018-19		Area Covered		2018-19		Area Covered		2018-19	
	2016-17	2017-18	T	A	2016-17	2017-18	T	A	2016-17	2017-18	T	A
Direct Seeded Rice	100	-	-	-	500	500	100	100	400	-	-	-
Line Transplanting	400	-	100	100	400	-	100	100	400	-	-	-
SRI	600	200	100	100	300	200	500	500	300	200	200	200
Stress Tolerant Varieties	1566	1100	250	250	1400	1700	100	100	1200	1700	100	100
Hybrid Rice	1500	1000	700	700	2500	1500	1500	1500	2500	1500	1500	1500
Cropping System Based	700	700	100	100	1500	1800	1400	1400	1500	1800	1000	1000
Total	**4866**	**3000**	**1250**	**1250**	**6600**	**5700**	**3700**	**3700**	**6300**	**5200**	**2800**	**2800**

Note: **T- Target, A- Achievement*

ANNEXURE -V

IRRIGATION RESOURCES *(SITE SPECIFIC)* OF SAMPLE DISTRICTS

1. Irrigation resources (*Site Specific):*Dhamtari

Irrigation Resources	Base Year (2009-10)		2010-11 to 2017-18								2018-19	
	Nos.	Irrigated area (Ha.)	Nos.				Irrigated area (Ha.)				T	A
			BGREI	Others	Total	BGREI Share %	BGREI	Others	Total	BGREI Share %		
Check Dam	10	20	124	-	124	100	250	-	250	100	-	-
Minor Irrigation Tank (MIT)	3	100	7	-	7	100	175	-	175	100	-	-

2. Irrigation resources (*Site Specific):*Jagdalpur

Irrigation Resources	Base Year (2009-10)		2010-11 to 2017-18								2018-19	
	Nos.	Irrigated area (Ha.)	Nos.				Irrigated area (Ha.)				T	A
			BGREI	Others	Total	BGREI Share %	BGREI	Others	Total	BGREI Share %		
Check Dam	-	-	75	-	75	100	413	-	413	100	-	-
Minor Irrigation Tank (MIT)	5	28.5	19	26	45	42	432.51	703.93	1136.4	38	-	-

3. Irrigation resources (*Site Specific):*Kondagaon

Irrigation Resources	Base Year (2009-10)		2010-11 to 2017-18								2018-19	
	Nos.	Irrigated area (Ha.)	Nos.				Irrigated area (Ha.)				T	A
			BGREI	Others	Total	BGREI Share %	BGREI	Others	Total	BGREI Share %		
Check Dam	-	-	75	39	**114**	**66**	592.74	535.06	1127.8	53	23	-
Minor Irrigation Tank (MIT)	-	-	5	19	**24**	**21**	96.22	522.15	618.4	16	2	-

ANNEXURE -VI

SEED COMPONENT OF SAMPLE DISTRICTS

(Quantity:Qtls)

Seed Component	Dhamtari				Jagdalpur				Kondagaon			
	Achievement		2018-19		Achievement		2018-19		Achievement		2018-19	
	2016-17	2017-18	T	A	2016-17	2017-18	T	A	2016-17	2017-18	T	A
Production of seeds												
i. Hybrid Rice	-	1500	-	-	-	-	-	-	-	-	-	-
ii. Certified Seeds	-	5000	1000	-	9874.3	2200	2000	-	-	-	-	-
Total Production	**-**	**6500**	**1000**	**-**	**9874.3**	**2200**	**2000**	**-**	-	-	-	-
Seed distribution												
a. Hybrid Rice	-	300	200	-	234.15	437.7	3782	671.1	-	164.7	300	201.89
b. (Var. >10 yr old)	4000	12000	-	-	400.7	7686.08	1000	-	-	-	-	-
c. (Var. <10 yr old)	4000	12300		-	-	-	-	-	-	1250.7	-	-
Total Distribution	**8000**	**24600**	200	0	**634.85**	**8123.78**	**4782**	**671.1**	-	**1415.4**	**300**	**201.89**

Note: **T- Target, A- Achievement*

ANNEXURE –VII

ASSET BUILDING (IRRIGATION/INFRASTRUCTURE/MACHINERIES)

(Unit: Nos.)

State/ District	Year	Schemes	Asset Building															
			Dug well	**Bore well**	**Shallow tube well**	**Pump sets**	**Seed drill**	**Rotavator**	**Self Propelled Paddy Transplanter**	**Laser Land Leveller**	**Paddy Thresher**	**Multi Crop Thresher**	**Power Tiller**	**Power Weeder**	**Power Knap Sack Sprayer**	**Self Propelled reaper**	**MB Plough**	**Leveller Blades**
Dhamtari	2010-11 to 2017-18	BGREI	1477	4764	215	60	210	175	400	0	252	113	48	325	5265	19	33	36
		Other Schemes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total	1477	4764	215	60	210	175	400	0	252	113	48	325	5265	19	33	36
	2018-19	Target	-	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Achi	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jagdalpur	2010-11 to 2017-18	BGREI	-	189	59	90	4	45	11	-	7	41	14	2	666	4	28	32
		Other Schemes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total	-	189	59	90	4	45	11	-	7	41	14	2	666	4	28	32
	2018-19	Target	-	200	-	200	20	-	-	-	-	-	-	-	-	-	-	-
		Achi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kondagaon	2010-11 to 2017-18	BGREI	-	484	-	818	1	34	2	-	42	62	11	1	2550	3	9	6
		Other Schemes	-	731	2453	4115	2	71	4	-	13	67	42	-	-	10	36	26
		Total	-	1215	2453	4933	3	105	6	-	55	129	53	1	2550	13	45	32
	2018-19	Target	-	300	-	1400	5	40	7	0	5	5	7	0	0	30	10	10
		Achi	-	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ANNEXURE - VIII

ECOLOGY WISE MANAGEMENT PRACTICES FOR RICE

A. Irrigated

A.1. Irrigated Ecologies (HYVs)

Rice crop receives assured irrigation through different sources viz., canals, tanks, wells etc. Therefore, the productivity potential of the irrigated rice is higher and hence contributes about 55% of the total rice production in the country. In eastern India the irrigated rice area is less (20-36% of the total rice area) and has a tremendous potential of producing higher yields of 5-8 t/ha. But the potential yields are not yet achieved in farmer's fields in a large scale. To achieve this following technology need to be adopted.

Nursery management:

- Raising of the Nursery near lift irrigation points and other water sources in the middle of June and December for *Kharif* and *rabi* crops respectively.
- Selection of good seeds by preparing a salt solution of 1.06 specific gravity (60g common salt in 1 liter water), Placing the seeds in container of the salt solution, removing the floating seeds, washing the selected seeds in fresh water and drying under shade.
- Treating the seeds with Carbendazim (Bavistin) @ 2g/kg of dry seeds after soaking in water for 24 hours.
- Preparing 1-1.5 m wide raised nursery beds of any convenient length with provision of drains of 30 cm width between the beds and sowing of sprouted seeds on the nursery beds using a seed rate of 30-35 kg/ha.
- Apply 5 kg Urea, 10 kg SSP and 5 kg MOP with sufficient well-rotted FYM before final leveling of nursery bed for healthy seedlings.
- Keep the nursery beds moist for first few days and maintain a shallow layer of water after the seedlings are about 1 inch high.
- Apply Carbofuran (Furadan 3G) @ 1 kg a.i./ha at 15 days after seed germination.
- For machine transplant of rice, raising of seedling done in special mat nurseries or in seedling trays where 18-25kg of good seeds per $100m^2$ of nursery area required for 1ha.

Land preparation

- Prepare the land well by using tractor drawn plough in optimum moisture condition.
- Allow the water in the field and then puddle the field twice followed by laddering.
- Give a gap of at least 7-8 days between initial and final puddling for better weed control and nutrient availability.
- Perfect leveling is also a must for better water management.

Stand establishment

- Planting by mid July with 20 × 15 cm spacing for long and 15 × 15 cm spacing for short and medium duration varieties in *Kharif* and mid January with 15 cm × 15 cm in *rabi* produces higher yield.
- 25-30 days old seedlings should be transplanted in puddle land with 2-3 seedlings per hill and gap filling once in 7 DAT.
- Machine transplanting is recommended as it is labor saving than manual method and is more efficient (1-2ha/person/day vs. 0.07ha/person/day).
- Ensure that fields are well-puddled and well-leveled.
- Drain fields and allow mud to settle for 1–2 days after the final puddling.
- The subsurface soil layers need to be hard enough to support the transplanting machine.
- The soil is ready when a small "V" mark made in the puddled soil with a stick holds its shape. At this moisture level, the soil can hold the seedlings upright.
- Soil should not be so dry that it sticks to and interferes with planting parts or wheels of the transplanter.
- Load the seedling mats into the machine and transplant the seedlings at the selected machine setting.

Fertilizer management

- Apply NPK @ 80:40:40 kg/ha in wet season and 120:60:60 kg/ha in the dry season. Soil test based fertilizer application especially for P and K is preferred over blanket dose.
- Apply half of total N, entire amount of P and three fourths of K as basal after draining out the standing water but before final puddling. Top dress the remaining N in two equal splits each at 3 weeks after transplanting and at panicle initiation. Also apply remaining one fourth of K at panicle initiation.
- For better soil health apply nitrogen in the form of both organics (green manure, FYM, Azolla etc.) and chemical fertilizer (Neem coated urea) in 50:50 proportions.

- Use Leaf Colour Chart (LCC) based N application for increased N use efficiency. Apply about 57 kg of urea per hectare within 0-7 DAT as basal. Take LCC reading from 21 days after transplanting and apply 57 kg urea/ha as and when the reading is less than 3.
- Apply $ZnSO_4$ @ 25 kg/ha in zinc deficient soils.

Weed management

- Pre- emergence application of pretilachor at 1.0 kg a.i./ha on 3 DAT + weeding with Twin row rotary weeder at 40 DAT.
- **Apply Bensulfuron methyl + Pretilachlor(Ready-mix) granule (Londax Power/Erase Strong @ 10 kg/ha) at 8-10 days after planting (at 2-3 leaf stage of weeds) to suppress the early emergent broad spectrum of weeds either in saturated soil or with 2-3 cm standing water after mixing with sand @ 30 kg/ha.**
- **In irrigated or favourable transplanted field with no standing water during early crop growth stage and mixed population of weeds are emerged, spray Azimsulfuron 50 DF @ 70 g/ha at 15 DAS (at 3-4 leaf stage of weeds). Spray it by mixing with 350 liters of water. Add surfactant (625 ml/ha) available with chemical for increasing the efficacy of the herbicide.**
- In absence of pre emergence herbicide application, 2,4-D sodium salt (Fernoxone 80% WP) 1.25 kg/ha dissolved in 625 litres with a high volume sprayer, three weeks after transplanting or when the weeds are in 3 - 4 leaf stage.
- Early post emergence application of Bispyribac sodium 50 g a.i. ha^{-1} (2-3 leaf stage of weeds) + Hand weeding on 45 DAT.
- Alternatively, hand weed twice at 20 and 40 days after transplanting.
- Maintain 3-5 cm of standing water in the field at the time of herbicide application for ensuring effective weed control.

Water management

- Field should be kept under saturated condition for a week after transplanting for establishment of roots and simulate growth of roots.
- After wards maintain a water level of 3-5 cm during the entire crop growth period.
- The field should be drained prior to top dressing and irrigate after 24-36 hours.
- Drain out water after 15 days from the milk formation stage.
- Water saving technology like alternate wetting and drying (ADW) should be adopted.

Plant protection

- Yellow stem borer is the major pest at initial stage of plant growth. Dip the seedling up to root in Chloropyriphos solution @ 2ml/lit of water overnight before transplanting. Apply Carbofuran granules @ 30 kg/ha at panicle initiation stage for its effective control during *Kharif*.
- Foliar spray of Imidacloprid @ 1 ml/lit or Chloropyriphos @ 5 ml/lit can be applied for Brown plant hopper, WBPH, Leaf folder and Case worm.
- If Sheath Blight appears towards panicle initiation stage, avoid N application; spray Validamycin or Sheathmar3 @ 2ml/lit. Spray Propiconazole @ 1 ml/lit at the appearance of the disease symptoms.
- In case of appearance of BLB or BLS apply Plantomycin 0.1% or Streptocycline 0.01% along with Cupper oxychloride 0.2%. Minimum two sprays or in severe cases 3 sprays should be applied in 8 days interval.
- Use 500 liter of water/ha for spraying pesticide and keep the field bund clean to minimize disease and pest attack.

Harvesting, drying & storage

- Harvest the crop when 80% of the grains in panicles are ripened with a reaper or combine harvester.
- If harvested manually, thresh immediately after harvesting and dry gradually under shade up to 12% moisture content for seed purpose and 14% for milling.

A.2. Irrigated medium land Ecologies (Hybrids)

Rice hybrids have higher yield potential due to the phenomenon of heterosis or hybrid vigour. Hybrids can produce 7-8 t/ha, which is more than 1 t/ha over the best high - yielding varieties of similar duration. So far, in India, more than 50 rice hybrids have been developed and released for cultivation, which are suitable for irrigated and shallow lowlands. Suitable agronomic management practices are to be followed to obtain the potential yield of the hybrids.

Nursery management

- Plough the seed bed area twice when the land is dry. Impound water for four to five days. Drain excess water. Puddle the area twice or thrice. Level it by laddering.
- Prepare raised and leveled wet nursery beds of 1 m width with provision of drains of 30 cm width between the beds. Apply NPK at the rate of 500: 500: 500 g/100 m^2 of nursery area and 100 kg of farmyard manure (FYM) for every 100 m^2 of nursery area before final land preparation.
- Use 20-25 g of seeds per 1 m^2 of nursery area. Nursery area of 600 m^2 is required for one hectare of main field.
- As the test weight of the hybrid is low, 12-15 kg of hybrid rice seeds are sufficient to transplant in one hectare of land.

- Use truthfully labeled hybrid seeds. Procure fresh hybrid seeds each time only from approved seed agencies.
- As hybrid seeds are light, never use salt solution for discarding light and half-filled grains before sowing. These grains normally have good germination.
- Treat the seeds with Carbendazim (Bavistin) at the rate of 2 g/kg of dry seeds after soaking in water for 24 hours.
- Spread the treated seeds on a hard floor under shade. Cover with wet gunny bag and straw and sprinkle water 2-3 times a day. Seeds will sprout in one to two days.
- The right time for sowing seeds is mid-June for wet season and 1st week of Decemberfor dry season.
- Sow the sprouted seeds on leveled and drained wet nursery beds with no standing water.
- Irrigate with a thin film of water two to three days after sowing of sprouted seeds. Give light irrigation afterwards.
- After 15 days of seedling growth, apply Carbofuran (Furadan 3G) at the rate of 250 g/100 m^2 of nursery.

Land preparation

- Irrigated medium land with drainage facility is suitable for growing hybrid rice.
- Apply and incorporate 5 t/ha of FYM compost during the dry ploughing.
- Irrigate the field and puddle 7 to 10 days before transplanting to incorporate the weeds, if any. Puddle the land again and level it by laddering prior to transplanting.

Transplanting

- Uproot seedlings and dip the roots of the seedlings in Chlorpyriphos solution at the rate of 1 ml/ltr of water over night before transplanting.
- Transplant 25 to 30 days old seedlings erect at a shallow depth of 2 to 3 cm on puddled and leveled land (with no standing water) at the rate of one to two seedlings/hill with a spacing of 20 × 15 cm or 15 × 15 cm for medium and short duration hybrids.

Fertilizer Application

- Apply NPK at the rate of 100: 50: 50 kg/ha in wet season and at the rate of 120: 60: 60 kg/ha in the dry season.
- Soil test based fertilizer application especially for P and K is preferred over blanket dose.
- Apply one fourth of total N, entire amount of P and three fourths of K as basal after draining out the standing water but before final puddling. Top-dress the remaining N in three equal splits, each at three weeks after transplanting, panicle initiation and panicle emergence stages. Also apply remaining one fourth of K at panicle initiation.

- Use Leaf Colour Chart (LCC) based N application for increased N use efficiency. Apply about 87 kg of urea per hectare within 0-7 DAT as basal. Take LCC reading from 21 days after transplanting and apply 87 kg urea/ha as and when the reading is less than 3.

Irrigation and cultural practices

- Irrigate the field two days after transplanting. Maintain continuous water level to a depth up to 5 cm till mid-grain filling stage.
- Complete gap filling to replace dying plants within 7 to 10 days after transplanting.
- Weed out the rice field at least twice, once at 21 days after transplanting (DAT) and again at 42 DAT.

Plant protection

- Protect the crop from insect pests and diseases with regular monitoring of pest attacks and by following need based pesticide application as suggested for HYVs.
- While spraying pesticide, use 500 liters of water/ha in case of power sprayer. Keep the field bund clean to minimize disease and pest attack.
- Yellow Stem Borer: Rynaxypyr 20SC @ 150ml/ha or Triazophos 40EC @ 1250 ml/ha or Acephate 75SP @ 750g/ha or Chlorpyrifos 20EC@ 2500ml/ha should be applied as foliar spray at brood emergence
- Leaf folder: Triazophos 40EC @ 625ml/ha or Thiamethoxam25WG @ 100g/ha or Neem oil @ 5ml/litre of water with 2% detergent liquid
- BPH/WBPH: Imidacloprid 17.8SL @125ml/ha or Thiamethoxam25WG @ 100g/ha or Ethofenoprox10EC @ 500ml/ha or Neem oil @ 5ml/litre of water with 2% detergent liquid.
- Gundhi bug: Apply dust formulation of Methyl parathion at the rate of 25 kg/ha or foliar spray of Ethofenprox 10 EC 2 ml/ltr.
- Bacterial leaf blight / streak: Spray with Plantomycin @ 1 g/lit of water using 500 liters of water per hectare or Streptocycline (150 mg) + Copper oxychloride 1 g/lit of water twice at an interval of 8 days.
- Blast: Spraying of Carbendazim 50 WP @ 2 g/lit or Tricyclazole 75 WP @ 0.6 g/lit of water may be done for controlling the disease. Otherwise, spraying of leaf extracts of Bael (25 g fresh leaves) or Tulsi (25 g fresh leaves) or Neem (200 g fresh leaves) per litre of water can help in reducing the incidence of disease.
- Sheath blight: Spray with effective fungicides like Sheathmar 3L (Validamycin 3L) @ 2ml/l of water) or Rhizocin 3L (Validamycin 3L) @ 2ml/l of water) or Contaf 5 EC (Hexaconazole 5EC) @ 2ml/l of water or Thifluzamide 24SC @ 1ml/l of water or Bavistin 50WP (Carbendazim 50WP) 2.5 g/l of water.

- Sheath rot: Spray Carbendazim 50WP (Bavistin)@ 2 g/lit, Propicanozole (Tilt 25EC) @ 1ml/lit or Hexaconazole (Cantaf 5EC)@1ml/Lit.
- False smut: Spray with 0.25% Carbendazim or 0.25% Captafol or 0.4% Mancozeb twice at 7 days interval at boot leaf stage and drain out water from the field after grain formation.
- For controlling viral diseases such as tungro and grassy stunt, remove the infected plants and control the insect vector by applying Furadan at the rate of 30 kg/ha.

Harvesting, drying and storage

- Drain out water from the rice field after 15 days from the milk formation stage. Harvest the crop when 80% of the grains in panicles are ripened. Dry the harvested paddy. Thresh with paddle thresher or power thresher. Clean paddy grains by winnowing. Dry gradually under shade. Store the rice in improved storage bins. For time and labour saving paddy harvesting, combine harvester/paddy reaper is recommended.

A.3. Irrigated Medium land Ecologies - System of Rice Intensification (SRI)

System of Rice Intensification (SRI), an emerging water saving technology, was developed by Fr. Henri De Laulanie, a French priest with a background in agriculture in Madagascar during 1980's. This method of rice cultivation involves the set of certain management practices for plant, soil, water and nutrient, which provide better growing conditions for rice plants especially in the root zone than those for plants grown under traditional practices. SRI appears to be a viable alternative that not only saves the inputs, but also improves soil health / quality and protects the environment sustainability. SRI technology needs less seed, water, chemical fertilizers and pesticides but yields more with large root volume, profuse and strong tillers with longer panicles, more and well-filled spikelets with high grain weight. The agro-techniques developed for SRI method of rice cultivation at National Rice Research Institute are cited below:

Six Important Practices to Follow

- Plant very young seedlings (8-12 days).
- Plant single seedlings per hill carefully and gently.
- Maintain wide spacing in a square pattern.
- Use mechanical weeding ('rotary hoe').
- Keep the soil at saturation during vegetative growth phase and shallow water (2-3 cm) at flowering and grain filling stage.
- Apply organic manure or other organic amendments to improve soil quality.

Selection of Land and Land preparation

- Land selected for SRI cultivation should be well leveled.
- Fertile soil with high soil organic carbon is most suitable.
- Soils which are affected by salinity / alkalinity are not suitable for SRI cultivation.
- Prepare the land carefully by proper ploughing, puddling, leveling and raking as in conventional method.
- Keep 25-30 cm wide channels at every three meter intervals across the field.
- Make small plots for easy and efficient water management.

Seed Rate

- Five to six kilograms of pre-soaked sprouted seeds would be needed for transplanting in one hectare.

Nursery Management

- Keep the seedbed as close as possible to the main field.
- Prepare nursery beds of one-meter width of convenient length.
- Place wooden planks or bamboo slits all around the bed for support.
- Use healthy seeds, soak in water for 24 hours and leave it to germination for 24 hours.
- Level the seedbed and spread a thin layer of well-decomposed FYM on the bed.
- Broadcast the sprouted seeds sparsely and evenly.
- Apply another layer of FYM to cover the seeds.
- Mulch with paddy straw to prevent the seed from exposing to sun, rain, birds etc.

Transplanting:

- Use young seedlings of 8 to 12 days old or at two-three leaves stage.
- Remove the seedling from the nursery along with seed sac, soil and roots intact.
- Transplant seedling carefully without plunging too deep into the soil.
- Transplant seedling immediately after gently removing seedlings from the nursery bed.
- Seedlings should be placed on the ground at the appropriate point on the planting grid.
- Plant the seedling widely with row to row distance and plant to plant distance should be 10 × 10 inches i.e. 25 cm × 25 cm (16 plants/m^2).

Nutrient Management

- *Preparation of soil mixture:* Four (4) $m^3$of soil mix is needed for each 100 $m^2$of nursery. Mix70% soil + 20% well-decomposed pressmud / bio-gas slurry / FYM + 10% rice hull. Incorporate 1.5 kg of powdered DAP or 2 kg 17-17-17 NPK fertilizer in the soil mixture.
- *Seed Treatment with biofertilizers*:Five packets (1 kg/ha) of *Azospirillum* and five packets (1kg/ha) of Phosphobacteria or five packets (1 kg/ha) of Azophosbiofertilizers are to be mixed with water

andseeds to be soaked for 4 hrs. The bacterial suspension after draining may be sprinkled in the nursery before sowing the treated seeds.

- *Pre-germinating the seeds 2 days before sowing:* Soak the seeds for 24 hrs, drain and incubate the soaked seeds for 24 hrs, sow when the seeds sprout and radical (seed root) grows to 2-3 mm long.
- *Soil application of biofertilizers:*Application of *Azospirillum* @ 2 kg and Arbuscular mycorrhizal fungi @ 5 kg for 100 m^2 nursery area.
- *Spraying fertilizer solution*(optional): If seedling growth is slow, sprinkle 0.5% urea + 0.5%zinc sulphate solution at 8-10 DAS.
- In highly fertile soils, instead of chemical fertilizers, application of FYM or compost @ 10t/ha is quite sufficient as source of nutrients.
- For better soil health apply nitrogen in the form of well decomposed organic manure (FYM, Vermicompost etc.) or green manure (*Azolla*) and inorganic sources in 50:50 proportions.
- Apply N, P_2O_5, K_2O @ 60:30:30 kg/ha and 80:40:40 kg/ha in the wet and dry season, respectively.
- Under sodic soils, during rotary weeding, apply Azophosmet @ 2.2 kg/ha and PPFM as foliar spray @ 500 ml/ha.

Water Management

- Do not allow water stagnation under SRI method.
- Irrigation only to moist the soil in the early period of 10 days.
- Restoring irrigation to a maximum depth of 2.5cm after development of hairline cracks in the soil until panicle initiation.
- Increasing irrigation depth to 5.0 cm after PI one day after disappearance of ponded water.
- Adopt alternate wetting and drying system of water management to keep the soil moist and create aerobic/anaerobic soil conditions for better nutrient mobilization by soil biota.
- Irrigate the field on the previous evening before the periodic weeding and drain out water in the morning to facilitate rotary weeder operation.

Weeding and inter-culturing

- Herbicides are not recommended under SRI method.
- Use simple mechanical rotary weeder/conoweeder to churn the soil for weed control. Do the first weeding may be required at intervals of 10-12 days till 40 days after transplanting.
- Working with rotary weeder helps in greater aeration, which results in more root growth, reduced weed competition, more oxygen and nitrogen to roots.

Pest and disease management

- Wider spacing and use of organic manures results in healthy growth of the plants and incidence of the pest and diseases in naturally low.

- Adopt preventive and / or need based plant protection measures as and when required by using some organic concoctions.
- Medicinal MatkaKhad: Take 1 Kg Cow dung, 2 litres Cow urine, 1 kg neem leaf, 1 kg karanj leaf, 1 kg Calotropis leaf and 50 gm jaggery in an earthen pot, thoroughly mixed for at least one hour. The pot is covered by polyethylene cover and is kept airtight for 10 days. At every two days interval the mixture is stirred with a stick. After 10 days the mixture is filtered by a thin cloth and applied to the crop by diluting upto 40 times with water. The above extract may be sprayed by using a wide mouth nozzle or sprinkled through broom. Un- filtered matkakhad may also be applied directly to the water channel.

Harvesting, drying and storage

- Drain out water from the rice field after 15 days from the milk formation stage. Harvest the crop when 80% of the grains in panicles are ripened. Dry the harvested paddy. Thresh with paddle thresher or power thresher. Clean paddy grains by winnowing. Dry gradually under shade. Store the rice in improved storage bins. For time and labour saving paddy harvesting, combine harvester/paddy reaper is recommended.

B. Rainfed Ecology

B.1. Rainfed Upland Ecologies: (Drought tolerant varieties)

Rice grows as a rainfed dry land crop in non-flooded, well-drained soil on level to steeply sloping fields. The crop is usually direct seeded and suffers from lack of moisture and inadequate nutrition. With few inputs, upland rice yields are very low but nevertheless critical to the household food security of some of the poorest people of the country. Upland rice makes up 14 percent of the country's harvested rice area and 6 percent of rice production. The uplands support millions of people, most of them at the subsistence level. Improved management practices which are needed to rehabilitate degraded uplands and transform them into sustainable agro ecosystems are presented below:

Land Preparation

- Summer ploughing during the month of March-April to control weeds like *Cyperusrotundus*.
- For dry seeding, plough the field after receipt of monsoon rain 2-3 times to get a fine tilth as the land should be properly leveled for uniform germination and crop stand.
- Make 30 cm bunds around the field to conserve rainwater.

Stand establishment

- Direct seeding is mainly recommended in rainfed upland condition where about 80kg seeds required when hand sown and sowing with country plough and 35kg seeds required per hectare when sown by seeding drill.

- Line seeding (8-10 seeds/hill at 20 × 15 cm spacing) behind the country plough with seed rate of 80 kg/ha in second or third week of June when the cumulative rainfall reaches 60 to 70 mm

Fertilizer Management

- Application of 2-5 t/ha of well decomposed FYM at the time of final land preparation along with 60:30:30 kg of N, P_2O_5 and K_2O/ha for semi-dwarfs and 40:20:20 kg of N, P_2O_5 and K_2O/ha for semi-tall varieties could meet the nutrient requirement of rice. Nitrogen may be applied in 3 splits- half at 2-3 weeks after sowing and a quarter each at 6 & 8 weeks after sowing.
- Use Leaf Colour Chart (LCC) based N application for increased N use efficiency. Apply about 42 kg of urea per hectare within 0-14 DAS as basal. Take LCC reading from 28 days after sowing and apply 42 kg urea/ha as and when the reading is less than 3.
- Placement of whole of P and K below the seed using seed drill at the time of sowing.

Weed Management

- Cultural methods to manage weeds can begin early if pre-monsoon showers allow 1-2 ploughings. Allow first flush of weeds to germinate which can be ploughed down at final land preparation.
- Pre-emergence application of pretilachlor at 800 g a.i./ha in moist surface soil effectively controls the first thrust of grassy weeds and sedges in direct seeded rice.
- Pre-emergence application of pretilachlor at 800 g a.i./ha + one hand weeding at 30-40 DAS or Mechanical weeding with finger weeder at 15-20 DAG + one hand weeding at 30 DAG take care of most of the weeds.
- Post-emergence herbicide application of bispyribac sodium 30 g a.i./ha or Azimsulfuron 35g a.i./ha within 20 days after seeding is recommended where pre-emergence herbicides could not be applied due to dry soil conditions. Chemical weed control should be followed by mechanical weeding or light manual weeding before top dressing nitrogen.

Plant protection

- Seed treatment with chloropyriphos @ 0.75 kg a.i./100 kg seed to protect from termites.
- Dusting of malathion10 D or methyl parathion 10 D & 25 kg/ha to control gundhi bug.
- Seed treatment with Bavistin @ 2.5g/kg of seed.
- Application of tilt @ 0.2% to control brown spot.
- Application of hinosan @ 0.1% to control blast.

Harvesting, drying and storage

- Drain out water from the rice field after 15 days from the milk formation stage. Harvest the crop when 80% of the grains in panicles are ripened. Dry the harvested paddy. Thresh with paddle thresher or power thresher. Clean paddy grains by winnowing. Dry gradually under shade. Store the rice in improved storage bins. For time and labour saving paddy harvesting, combine harvester/paddy reaper is recommended.

B.2. Rainfed lowland Rice

In eastern India comprising the states of Assam, West Bengal, Bihar, Orissa, eastern Madhya Pradesh and eastern Uttar Pradesh, rainfed lowland areas occupies more than 50 percent of the total 27.43 million hectares of rice area. The rice crop in this situation occasionally experiences deficit moisture stress in the early or terminal stages of growth but mostly excess water stress at any stage, which sometimes submerges the crop as well. This area has the total annual rainfall ranging from 1200 to 3100 mm annually and marked with saucer shaped physiography with drainage congestion causing accumulation of water to 100 cm or more which is further aggravated by floods from the heavily silted rivers. Based on the depth of water stagnation in the field, the rainfed lowland rice areas are classified into i) Shallow lowlands (0-25 cm), ii) Medium/Semi deep (25-50 cm) and iii) Deep water (50-100 cm). The crop production under these rainfed areas can be improved by adopting the following technologies.

B.2.1 Rainfed Shallow Lowlands

Nursery management:

- Adopt a seeding density of 40 g seeds/m^2 in nursery to produce thick, robust and healthy seedlings.
- Apply N, P_2O_5 and K_2O @ 100, 20 and 20 kg/ha for producing healthy seedlings.
- Correcting Zinc deficiency in the nursery is also beneficial.
- Seedling root dipping in Dursban (chloropyriphos) solution (0.02%) before planting helps in controlling rice whorl maggot, stem borer etc.
- Selection of good seeds by preparing a salt solution of 1.06 specific gravity (60g common salt in 1 liter water), Placing the seeds in container of the salt solution, removing the floating seeds, washing the selected seeds in fresh water and drying under shade.
- Treating the seeds with Carbendazim (Bavistin) @ 2g/kg of dry seeds after soaking in water for 24 hours.

- Preparing 1-1.5 m wide raised nursery beds of any convenient length with provision of drains of 30 cm width between the beds and sowing of sprouted seeds on the nursery beds using a seed rate of 30-35 kg/ha.
- Apply 5 kg Urea, 10 kg SSP with sufficient well-rotted FYM and 5 kg MOP before final leveling of nursery bed for healthy seedlings.
- Keep the nursery beds moist for first few days and maintain a shallow layer of water after the seedlings are about 1 inch high.
- Apply Carbofuran (Furadan 3G) @ 1 kg a.i./ha at 15 days after seed germination.
- For machine transplant of rice, raising of seedling done in special mat nurseries or in seedling trays where 18-25kg of good seeds per $100m^2$ of nursery area required for 1ha.

Land preparation

- Open the land immediately after the harvest of the previous crop, preferably with a mould-board plough.
- For direct seeded crop one or two summer ploughings after pre-monsoon showers during April-May makes the land ready for early or timely sowing.
- For transplanted crop allow the water in the field and then puddle the field twice followed by laddering. Give a gap of at least 7-8 days between initial and final puddling for better weed control and nutrient availability.

Stand establishment

- Dry direct seeding may be practiced in rainfed shallow low lands with 35 kg seeds per hectare using seed drill before onset of monsoon.
- Line seeding (8-10 seeds/hill at 20 × 15 cm spacing) behind the country plough with seed rate of 80 kg/ha in first week of June when the cumulative rainfall reaches 60 to 70 mm.
- In case of transplanted crop, early planting during first fortnight of July by adopting a spacing of 20 × 15 cm is beneficial.

Fertilizer management

- A balanced fertilizer dose of 60: 40: 40 kg N, P_2O_5 and K_2O/ha is required.
- Integrated N management involving organic sources such as dhaincha (green manure), Azolla or FYM in combination with prilled urea on a 50:50 basis ensures better and sustainable yields.
- Use of modified urea materials like neem coated urea and a urea super granule helps in improving N-use efficiency.

- Use Leaf Colour Chart (LCC) based N application for increased N use efficiency. Apply about 42 kg of urea per hectare within 0-14 DAT as basal. Take LCC reading from 28 days after transplanting and apply 42 kg urea/ha as and when the reading is less than 3 but in case of Swarna type varieties, N application may be done when the reading is less than 4.
- Apply 20-25 kg $ZnSO_4$/ha in the main field in zinc deficient soils.

Weed management

- In direct seeded rice, pre-emergence application of pretilachlor at 800 g a.i./ha in moist surface soil effectively controls the first thrust of grassy weeds and sedges in direct seeded rice.
- Pre-emergence application of pretilachlor at 800 g a.i./ha + one hand weeding at 30-40 DAS or Mechanical weeding with finger weeder at 15-20 DAG + one hand weeding at 30 DAG take care of most of the weeds.
- Post-emergence herbicide application of bispyribac sodium 30 g a.i./ha or Azimsulfuron 35g a.i./ha within 20 days after seeding is recommended where pre-emergence herbicides could not be applied due to dry soil conditions.
- In transplanted rice, pre- emergence application of pretilachor at 1.0 kg a.i. ha^{-1} on 3 DAT + weeding with Twin row rotary weeder at 40 DAT
- **Apply Bensulfuron methyl + Pretilachlor(Ready-mix) granule (Londax Power/Erase Strong @ 10 kg/ ha) at 8-10 days after planting (at 2-3 leaf stage of weeds) to suppress the early emergent broad spectrum of weeds either in saturated soil or with 2-3 cm standing water after mixing with sand @ 30 kg/ha.**
- **In transplanted field, spray Azimsulfuron 50 DF @ 70 g/ha at 15 days after sowing (at 3-4 leaf stage of weeds) for controlling weeds. Spray it by mixing with 350 liters of water. Add surfactant (625 ml/ha) available with chemical for increasing the efficacy of the herbicide.**
- In absence of pre emergence herbicide application, 2,4-D sodium salt (Fernoxone 80% WP) 1.25 kg/ha dissolved in 625 litres with a high volume sprayer, three weeks after transplanting or when the weeds are in 3 - 4 leaf stage.
- Early post emergence application of Bispyripac sodium 50 g a.i. ha^{-1} (2-3 leaf stage of weeds) + Hand weeding on 45 DAT.
- Alternatively, hand weed twice at 20 and 40 days after transplanting.
- Maintain 3-5 cm of standing water in the field at the time of herbicide application for ensuring effective weed control.

Plant protection

- Protect the crop from insect pests and diseases with regular monitoring of pest attacks and by following need based pesticide application as suggested for HYVs.
- While spraying pesticide, use 500 liters of water/ha in case of power sprayer. Keep the field bund clean to minimize disease and pest attack.
- Yellow Stem Borer: Rynaxypyr 20SC @ 150ml/ha or Triazophos 40EC @ 1250 ml/ha or Acephate 75SP @ 750g/ha or Chlorpyrifos 20EC@ 2500ml/ha should be applied as foliar spray at brood emergence.
- Leaf folder: Triazophos 40EC @ 625ml/ha or Thiamethoxam25WG @ 100g/ha or Neem oil @ 5ml/litre of water with 2% detergent liquid.
- BPH/WBPH: Imidacloprid 17.8SL @125ml/ha or Thiamethoxam25WG @ 100g/ha or Ethofenoprox10EC @ 500ml/ha or Neem oil @ 5ml/litre of water with 2% detergent liquid.
- Gundhi bug: Apply dust formulation of Methyl parathion at the rate of 25 kg/ha or foliar spray of Ethofenprox 10 EC 2 ml/ltr.Monitoring should be done for incidence of Blast, Sheath Blight, Bacterial Leaf Blight (BLB), Bacterial Leaf Streak (BLS) and Sheath rot in rice. If warranted, adopt the following control measures:
- Bacterial leaf blight / streak: Spray with Plantomycin @ 1g/liter of water using 500 liters of water per hectare or Streptocycline (150 mg) + Copper oxychloride 1g/litre of water twice at an interval of 8 days.
- Blast: Spraying of Carbendazim 50 WP @ 2g/litre or Tricyclazole 75 WP @ 0.6 g/litre of water may be done for controlling the disease. Otherwise, spraying of leaf extracts of Bael (25 g fresh leaves) or Tulsi (25 g fresh leaves) or Neem (200 g fresh leaves) per litre of water can help in reducing the incidence of disease.
- Sheath blight: Spray with effective fungicides like Sheathmar 3L (Validamycin 3L) @ 2ml/l of water) or Rhizocin 3L (Validamycin 3L) @ 2ml/l of water) or Contaf 5 EC (Hexaconazole 5EC) @ 2ml/l of water or Thifluzamide 24SC @ 1ml/l of water or Bavistin 50WP (Carbendazim 50WP) 2.5 g/l of water.
- Sheath rot: Spray Carbendazim 50WP (Bavistin)@2g/litre, Propicanozole (Tilt 25EC) @1ml/litre or Hexaconazole (Cantaf 5EC)@1 ml/lit.
- False smut: Spray with 0.25% Carbendazim or 0.25% Captafol or 0.4% Mancozeb twice at 7 days interval at boot leaf stage and drain out water from the field after grain formation.
- For controlling viral diseases such as tungro and grassy stunt, remove the infected plants and control the insect vector by applying Furadan at the rate of 30 kg/ha.

Harvesting, drying and storage

- Harvest the crop when 80% of the grains in panicles are ripened with a reaper or combine harvester.
- If harvested manually, thresh immediately after harvesting and dry gradually under shade up to 12% moisture content for seed purpose and 14% for milling.

B.2.2. Rainfed Shallow lowland (Flash Flood prone)

In this ecology, Sub1 gene introgressed varieties can be grown. It is suitable for the shallow lowlands and medium lands, where the crop is usually affected by flash floods and submerged completely for 12-14 days during *Kharif* season. It is not recommended for the areas where the flood water comes and stays for more than 15-20 days.

Dry seed bed

- Plough the nursery field and level it properly. Make raised seed beds of 1.0 m width with convenient length, keeping a gap of 40 cm between the beds. Nearly one-tenth of the main field is required as seed bed.

Seed Selection and Seed Rate

- Prepare salt solution by dissolving 600 g of common salt in ten liters of water, which will be adequate for 30-35 kg of seeds.
- Pour the seed in the salt solution, remove the floating materials and then wash the selected seed in fresh water.
- Use a seed rate of 30-35 kg/ha for transplanting and 60-70 kg/ha for direct- seeding.

Seed Treatment

- Dry sowing: Treat the seed with Bavistin @2.0g/kg of seed.
- Wet sowing: Soak the seed for 8-10 hours in a solution prepared by dissolving 1.5 g Streptocycline and 20g Captan in 20 litre of water, which is sufficient for 10 kg of seed, and then drain the water. Dry the seeds in shade before sowing.

Sowing time

- For direct-seeding, optimal time of sowing is the first fortnight of June.
- For transplanting, sow the seeds in nursery by the 1st week of June.

Nursery Management

- Soak the seed for 24 hours, drain the water and then cover the seed with gunny bags for effective germination.
- Sowing the sprouted seeds in nursery beds and keep the beds moist for first 5-7 days.

- Maintain a thin layer of water after the seedlings are of about 2.5 cm height.
- Follow the need based application of Carbofuran @ 1.0 kg a.i./ha.
- Top dress the nursery bed with 100 kg N/ha seven days before uprooting.

Land Preparation

- Plough the land by using a tractor-drawn or bullock-drawn plough in dry condition during pre-monsoon rain or immediately after the harvest of the previous crop.
- Puddle the field twice at 7-10 days interval for better weed control and nutrient availability.
- Level the land with a leveler to maintain uniform water level throughout the plot.

Stand establishment

- Transplant the seedlings by 1st week of July at 20 × 15 cm spacing using 2-3 seedlings/hill or maintain 35-40 hills/m^2 for random planting.
- Gap filling should be done 7 days after transplanting. Second gap filling can be done if necessary by splitting the existing tillers.
- In case of delayed planting, follow closer spacing (15 × 15 cm) and use 5-6 seedlings per hill with higher dose of basal N application.
- In absence of nursery treatment with Carbofuran, seedling root dipping in a solution of 1 ml Chloropyriphos (20 EC) in 1 litre of water overnight before planting helps in controlling rice whorl maggot, stem borer etc.

Fertilizer Management

- Apply NPK @ 60:40:40 kg/ha. Soil test-based fertilizer application especially for P and K is preferred over the blanket dose.
- Apply half of the N, entire amount of P and two-third ofK as basal and the remaining N in two equal splits at 3 weeks after transplanting and at panicle initiation. Also apply the remaining one-third of K at panicle initiation.
- If possible, the field should be drained prior to top dressing of nitrogen and then irrigated after 24-36 hours.
- Apply $ZnSO_4$ @ 25 kg/ha in zinc deficient soils.

Weed Management

- In transplanted rice, pre- emergence application of pretilachor at 1.0 kg a.i. ha^{-1} on 3 DAT + weeding with Twin row rotary weeder at 40 DAT
- **Apply Bensulfuron methyl + Pretilachlor(Ready-mix) granule (Londax Power/Erase Strong @ 10 kg/ha) at 8-10 days after planting (at 2-3 leaf stage of weeds) to suppress the early emergent**

broad spectrum of weeds either in saturated soil or with 2-3 cm standing water after mixing with sand @ 30 kg/ha.

- **Spray Azimsulfuron 50 DF @ 70 g/ha at 15 days after sowing (at 3-4 leaf stage of weeds) for controlling weeds. Spray it by mixing with 350 liters of water. Add surfactant (625 ml/ha) available with chemical for increasing the efficacy of the herbicide.**

Water Management

- Keep the field under saturated condition for a week after transplanting for better seedling establishment.
- Thereafter, maintain a water level of 3-5 cm during the entire crop growth period until 15 days after milk formation stage. However, the field should be drained prior to top dressing of fertilizer and irrigate after 24-36 hours.

Insect and Disease Control

- Soak the seedlings in a solution of 1 ml Chlorpyriphos (20 EC) in 1 litre of water overnight before transplanting.
- Use Carbofuran at 30 kg/ha against stem borer and leaf folder.
- If sheath blight appears, avoid N application at panicle initiation stage. Spray Validamycin at 3.0 ml/ltr or Propiconazole (25%) at 1.0 ml/ltr in 500 ltr of water/ha after appearance of the disease symptoms or immediately after first top-dressing.
- Need based plant protection measures may be taken as specified for Shallow lowlands.

Harvesting, Drying & Storage

- Harvest the crop 30-35 days after flowering when stalks are still green to avoid grain shattering. Moisture content of paddy grain should be 20-24% at time of harvest.
- Thresh the produce immediately after the harvest and dry the grains in shade up to 12% moisture content for seed purpose and 14% for milling.
- Grains can be milled in traditional huller but for higher price use rubberized sheller for milling.

B.2.3. Rainfed Semi-deep/Deep water lowlands

Semi-deep/deepwater rice varieties are grown in waterlogged condition where water remains standing with a depth of 75-100 cm for more than a month during growth period. In India, this ecology is around 5% of total rice area and mostly located in the eastern region of the country. The production and productivity from this crippled ecology is very low due to many abiotic and biotic stresses. Variety with traits like tolerance to water logging, moderate elongation ability, kneeing ability, tolerance to yellow stem borer and bacterial leaf blight and high yield are the desirable features of a genotype in this handicapped ecology.

Seed selection

- Select genetically pure seed of the variety having more than 80% germination.
- Select the seeds from a healthy crop with well filled grains free from insects and disease attack.

Land preparation

- Plough the land immediately after the harvest of wet season rice, preferably with a mould board plough.
- One or two summer ploughings after pre- monsoon rain during April-May and ploughing before sowing makes the soil to a fine tilth.
- Use rotavator to get a fine tilth for ensuring uniform germination.
- Properly level the land to get high germination, easy to control weeds and proper-crop stand.

Sowing time and stand establishment

- The optimum time of sowing is from last week of May to first week of June.
- Sowing should be done after receiving pre-monsoon rain for proper plant stand establishment before accumulation of water in the deep water rice fields.
- Dry direct seeding may be practiced in rainfed shallow low lands with 50 kg seeds per hectare using seed drill before onset of monsoon.
- Line seeding (8-10 seeds/hill at 20 x 15 cm spacing) behind the country plough with seed rate of 80 kg/ha in first week of June when the cumulative rainfall reaches 60 to 70 mm.
- Treat the seeds with Agrosan GN or Ceresan (dry) or Bavistin at the rate of 2 gm/kg of seed before sowing.
- In areas where direct sowing is not feasible due to early water accumulation, transplanting in the first fortnight of July with 4-6 seedlings per hill at 20 cm × 15 cm spacing is to be practiced.
- In case of crop failures planting with colonel tillers removed from established direct seeded crop/aged seedlings yields better. Mixed cropping of long and early duration varieties in alternate rows 15 cm apart help in increasing total yield upto 19% and acts as an insurance against crop failures.
- If there will be early flash flood and accumulation of water in the field leading to mortality of plants, gap fill the field by aged seedlings or with colonel tillers removed from the surviving plants.

Nutrient management

- Apply N: P: K at the rate of 40:20:20 kg/ha in case of poor soil fertility status (based on soil test results). Apply half N, full P and three fourths K as basal in the furrows in the line sown rice with farm yard manure at the rate of 5 t/ha.

- Apply 10 kg of N as top dressing after weeding on line sown rice and the rest N and K fertilizers at panicle initiation stage, if water recedes.

Weed management

- Spray herbicide bispyribac sodium at the rate of 30 g a.i/ha in direct seeded rice for control of major grasses, sedges and broad leaf weeds. This is a post-emergence herbicide and it can be applied after 12 days of sowing at 2- 3 leaf stage.

Plant protection

- For controlling sheath rot disease soak the seed in 0.05% to 0.1% Bavistin for 30 minutes before sowing. After raising the crop, minimize the disease by foliar spray of 0.05% to 0.1% Bavistin, 0.4 % Dithane M-45 or 0.1% Hinosan.
- Rice tungro disease is a problem in this ecosystem at times for which tungro tolerant varieties may be used.
- Apply Streptocyclin (150 mg) + Copper Oxychloride (1 g) or foliar spray of Plantomycin 1 g in one liter of water after noticing the disease.
- For controlling sheath rot disease, treat with Bavistin 50 WP 2 g/kg of seeds. In standing crop, the disease can be minimized by foliar spray of Mancozeb 2.5 g/ltr or Bavistin 2 g/ltr or Benomyl 0.5 g/ltr of water.
- Spraying for control of pests is not feasible. Use of biocontrol is preferable. Release of *Trichogramma japonica*, an egg parasite @ 50,000 numbers/ha is recommended for control of stem borer, the major pest of deepwater rice before flowering. In case the water recedes early during flowering, apply Monocrotophos @ 0.5 kg ai/ha on the basis of ETL (one moth/m^2) to control stem borer.
- If water level reduces apply granular insecticides Carbofuran 3G at the rate of 33 kg/ha or foliar spray of Carbosulfan at the rate of 2 ml/ltr if moth population is observed, on the basis of economic threshold level (One egg mass/m^2 or 5% dead heart). Use approx 500 litre of spray solution/ha to control the pests and diseases.

Harvesting, drying and storage

Harvest the crop at 25-30 days after flowering. Thresh immediately after harvesting and dry gradually under shed up to 12% moisture content for seed purpose and up to 14% moisture for milling.

B.2.4. Coastal Saline / Inland Saline - Alkaline Ecology

Land preparation

- An initial ploughing after the harvest of wet season rice should be followed by puddling twice using non-saline water.

- In areas having salinity problem at the beginning, ponding of water before transplanting helps in leaching of soluble salts, but this practice is feasible only when adequate fresh water is available.
- **Seed selection and treatment**
- Seed should be properly cleaned, dried and stored in air tight containers.
- Before seeding, Seeds should be dipped in 2% salt solution to remove floating materials and partially filled grains and weed seeds.
- Selected seed is then washed in fresh water, dried and treated with Bavistin at 2.0 g/kg of seed.
- 35-40 kg seeds are required to transplant one hectare of land
- **Nursery management**
- Wet seed bed should be raised in less saline fields as far as possible. An area of 400 m^2 is required for transplanting one hectare of land.
- Field should be ploughed twice followed by puddling in the first fortnight of December. Seed bed of about 1.0 meter width with convenient length are then prepared with channel in between two seed beds. Pre-germinated seeds (sprouted) are sown at 30-40 g/m^2.
- Incorporation of well decomposed farm yard manure (FYM) or *Azollla* compost at rate of 50 q/ha during initial land preparation and application of 100 kg each of nitrogen (N), phosphorus (P_20_5) and potash (K_2O)/ha before sowing are recommended for robust and healthy seedlings under stress situation.

Crop establishment

- Early transplanting by the first fortnight of January using 25-30 days old seedlings at 15 cm × 15 cm is recommended. Delayed transplanting significantly reduces crop yield due to increasing salinity and atmospheric temperature during the reproductive stage.
- In general 2-3 seedlings/hill are planted. Gap filling, if required shou1d be done within 7-10 days after transplanting.

Nutrient management

- Application of urea at 80 kilogram of nitrogen/ha in three splits at 40+20+20 kg as basal, active tillering and panicle initiation stage, respectively, is recommended.
- Azolla dual cropping along with application of urea at 30 kilograms of nitrogen/ha as basal and 20 kilogram of nitrogen at tillering is also as effective as the recommended dose of 80 kg nitrogen as chemical fertilizer. About 10-15 kg phosphorus through single super phosphate should be applied in three equal splits at weekly intervals starting from the day of inoculation.
- Phosphorus and potassium at 40 kg/ha are recommended. In case of *Azolla* dual cropping, the phosphorus fertilizer used for *Azolla* is a part of that recommended. The left over phosphorus along with two third of potassium should be applied at final puddling. The rest one third of potassium should be given along with nitrogen during final top dressing.

Weed management

- Manual weeding twice at 20-25 and 40-45 DAT controls weed effectively but it needs huge investment in labour cost.
- Spraying of early post-emergent herbicide, pyrazosulfuron ethyl at 200 g/ha during 3-5 days after transplanting controls the weed effectively. The post-emergent herbicide, Almix is found effective at 20 g/ha applied 18 -20 days after transplanting when infestation of sedges and broadleaf weeds are quite high as happened during dry season. Spraying should be done in thin film of water after draining out of excess water from crop field. The recommended dose of herbicide should be mixed in 500 litre of water for one hectare of land.

Insect-pests and disease control

- Stem borer is the most important insect-pest. Generally two broods are coming during January-February and March-April. Application of Furadan at 33kg/ha or Cartap at 25 kg/ha twice during 20 and 50 days after transplanting protects the crop. Spraying of monocrotophos (1.5 lit/ha) or Imidachloprid (500 ml/ha) after mixing in 500 liter of water is found effective when sprayed after appearance of 1-2 yellow stem borer moths/one egg mass are found in 1.0 square meter area.
- Another important insect during dry season is brown plant hopper generally appears during the month of February-March. It can be controlled by spraying monocrotophos (1.5 lit/ha) or Imidachloprid (500 ml/ha). Spraying should be done at basal portion of the plant for effective control.

Harvesting and storage

- Do roughing at 95-100 days after transplanting, especially in seed production fields to avoid seed mixtures.
- Drain out the water from the field 15 days before harvesting to avoid lodging.
- Harvest the crop at physiological maturing stage i.e., when 80% of the grains in panicles got matured to avoid shattering loss.
- After threshing and proper cleaning, dry the grains under sun until 14% moisture content and pack it properly before storing.

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