RAISING PRODUCTIVITY & PROFITABILITY OF RICE-BASED CROPPING SYSTEMS IN ODISHA THROUGH RICE CROP MANAGER

Rice Crop Manager in Odisha was adapted, developed, evaluated, and verified for use, in collaboration with the International Rice Research Institute (IRRI), Odisha University of Agriculture and Technology (OUAT) and the National Rice Research Institute (NRRI) between 2012 and 2015, supported by the Bill and Melinda Gates Foundation-funded project 'Cereal Systems Initiative for South Asia' (CSISA).

This endeavor is being further enhanced in collaboration with the Department of Agriculture and Farmers' Empowerment (DoA&FE), Odisha University of Agriculture and Technology (OUAT) and National Rice Research Institute (NRRI).

The DoA&FE supports the Rice Crop Manager (RCM) research and dissemination project, which has the objective of further developing and enhancing the RCM for irrigated and rain-fed environments and its dissemination to promote balanced and timely nutrient and crop management practices among the rice farmers of Odisha.

http://webapps.irri.org/in/od/rcm/

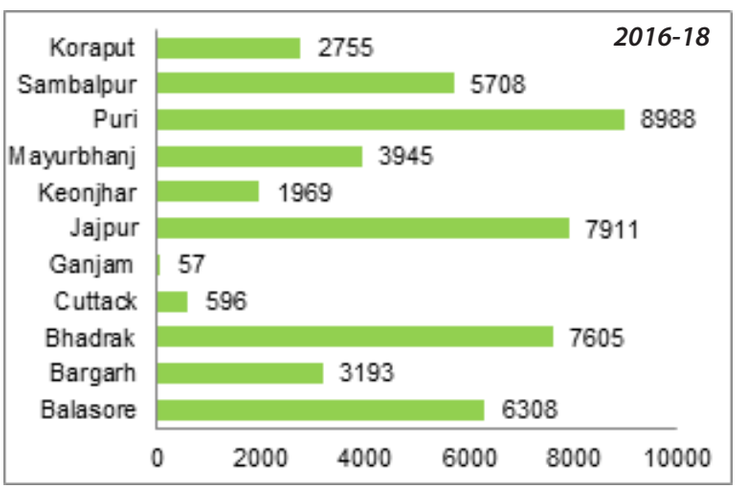
Three Key Aspects of the Rice Crop Manager

DISSEMINATION

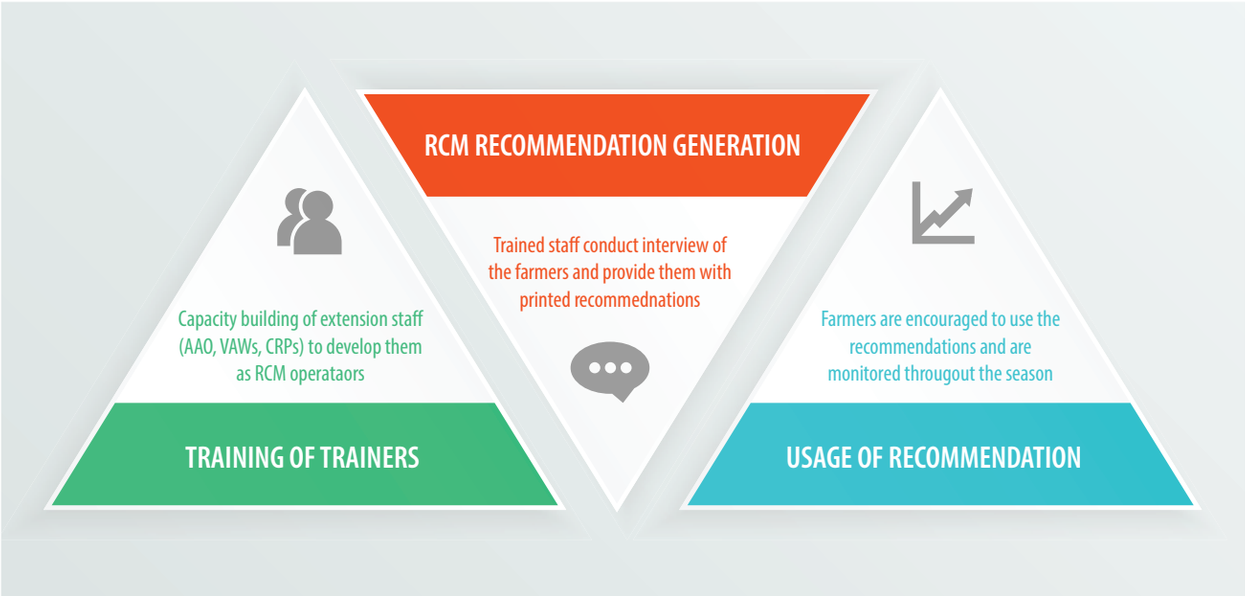
Rice Crop Manager dissemination is being undertaken by the Department of Agriculture and Farmers' Empowerment (Government of Odisha), in collaboration with NGOs and private sector partners, with technical support from IRRI through the maintainence, upgradation of RCM and capacity building of key stakeholders in the rice value chain, such as department of Agriculture officials, department officials, NGO partners, private sector partners, and dealers. Till date 70,000 recommendations have been generated for rice crop cultivating farmers in Odisha.

10% of the farmers receiving the recommendations generated from the Rice Crop Manager are also being monitored to assess how best the RCM can be streamlined and made more efficient for end-user continually.

Farmers with printed Rice Crop Manager (RCM) recommendations for Rice cultivation at Sakhigopal, Puri



The Dissemination Process



Capacity Building of Extension Staff

IRRI organized 65 hands-on trainings during the season of Kharif 2017 and 26 trainings during Rabi 2017-18 for the field staff of the Department of Agriculture and NGO partners in selected districts.

These trainings were organized at district levels for Assistant Agriculture Officers (AAOs) and at block levels for Village Agriculture Workers (VAWs) and Community Resource Person (CRPs) and a total of 1636 participants from 11 districts, were oriented on the operation and use of RCM.

Taking the next step towards reinforcing the intervention, they were also asked to provide at least 50 RCM recommendations per season per Village Agriculture Worker (VAW).

Hands-on training on Rice crop Manager at Deputy Director of Agriculture Office, Puri

Sustainability and Scale-Up

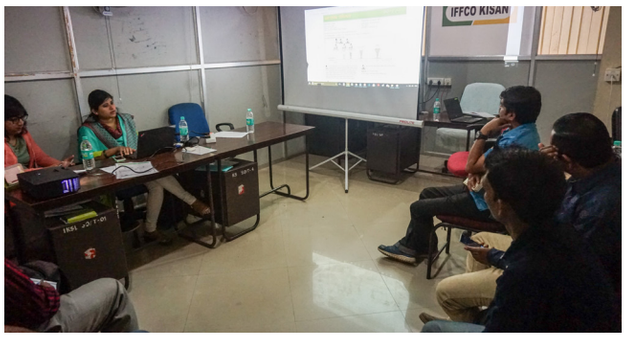
RCM Kendras (Centres), have been established at the agriculture district and block offices as well as NGOs of the selected districts in order to ensure easy access to RCM recommendations by farmers in the longer run.

The RCM Kendras are equipped with IT facilities; laptop, printer and data card for accessing the internet. Trained staff of the Do-FE provides recommendations to the farmers who visit these kendras, on nutrient and crop management practices best suited to their typical conditions.

RCM Kendra at block and District DoA offices are equipped with laptop, printer, internet facility and reference materials for disseminating RCM recommendations

Input Dealer Outlets as Dissemination Centers

A pilot project has been started in the Rabi season of year 2017-18 with dealers of the Indian Farmers Fertiliser Cooperative (IFFCO) to explore the potential of including agri-input dealers as a channel for RCM dissemination. Thereon, hands-on training was provided to selected dealers at the IFFCO State office, in Bhubaneswar, and the dealers are now providing RCM recommendations to the farmers who visit their outlets for buying varied agri-inputs.



Hands-on training to dealers of agri-inputs at the IFFCO office in Bhubaneswar, is carried forth to their outlets. Here dealers interview visiting farmers using the RCM app.

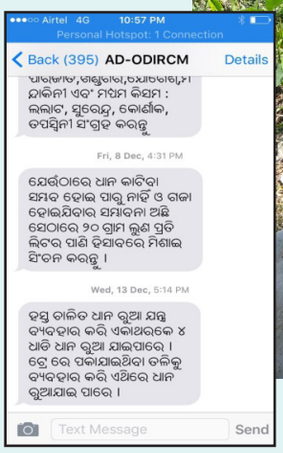
Awareness Generation Through Farmer Meetings

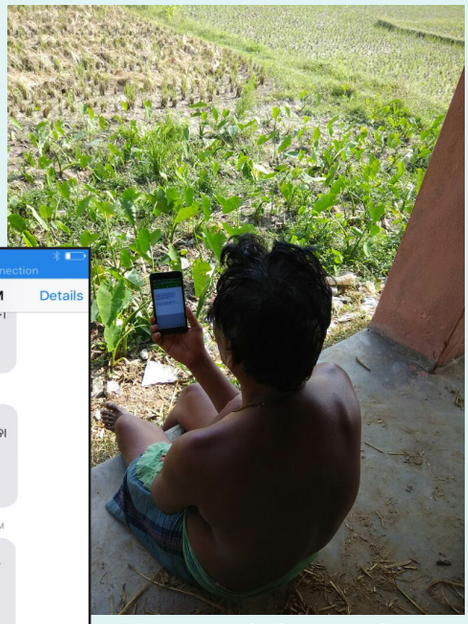
Several meetings were conducted throughout the season to generate awareness among farmers on nutrient and crop management. They were motivated to use the RCM recommendations provided to them, so that they could judge the impact of RCM recommendations for themselves.

Meeting with farmers in Jajpur district, Odisha to create awareness

SMS and Voice Calls to Farmers for Nutrient & Crop Management Recommendations

Crop advisories were sent to over 6000 farmers during Kharif 2017 through SMSs and voice calls made to them. This was done in collaboration with the Indian Farmers Fertilizer Cooperative-Kisan (IFFCO-K) and Precision Agriculture Development.

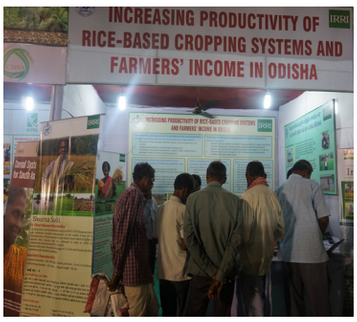




A farmer reads the crop advisory received on his mobile phone

Awareness Generation Through Agricultural Fairs

By way of exhibitions at agricultural fairs, where there is assured good footfall of farmers, the benefits of Rice Crop Manager are explained to farmers and on-the-spot they are even provided nutrient and crop management recommendations, based on their replies to the questionnaire.



Farmers receiving RCM recommendations at the state agricultural fair in Bhubaneswar

RESEARCH

Pertinent research is being undertaken to enhance the efficiency and effectiveness of RCM for irrigated and rain-fed environments .

Adaptive Trials on Using GIS-based Yield Monitoring for Developing Better Yield Targets

Adaptive trials are being carried out using Geographic Information System tools (GIS) to increase precision in setting the target yields, as well as to reduce human error.

Some of the key findings are :

	Target yield (t/ha)		Actual yield (t/ha)		Yield difference between Actual yield and Target yield (t/ha)	
	GIS based	RCM based	GIS based	RCM based	GIS based	RCM based
Minimum	3.00	4.50	4.00	3.82		
Maximum	5.50	5.70	7.28	7.20		
Mean	4.33	5.05	4.98	4.79	0.65	-0.26
Standard error	0.19	0.06	0.19	0.21		
RSQ	0.07	0.42				
RMSE(t/ha)	1.17	0.78				
NRMSE (%)	25.69	13.27				
Agreement	74.31	86.73				

Table: Target yield and actual yield using GIS based and RCM based target yield approach (n=170)

- Setting target yields using GIS tool was found to be approximately 74 per cent accurate which is on the safer side, considering conditions and environment of the areas studied.
- By using GIS based target yield approach, the savings in cost of fertilizer was around 1,882 INR/ha as compared to the farmer's based target yield. Further study at a broader level can surely help to use the GIS tool for estimating target yields for Site Specific Nutrient Management (SSNM) uisng the app.

Development and Validation of Crop Manager for Rice-based Systems in Rain-fed Environments

With the use of the Rice Crop Manager and Stress-Tolerant Rice Varieties, the yield gain from IRRI's practice over farmer's practice has been 1123 Kg/ha which was higher by approximately 36 per cent, amounting to a net benefit of around 16,845 INR/ha.

Treatments	Grain yield (t/ha)	Grain Yield difference RCM over FFP	Grain Yield difference IRRI practice over Farmer practice
Farmer fertilizer practice + Farmer variety.	3.12	692 Kg/ha	1123 Kg/ha
Rice Crop Manager + Farmer variety.	3.82		
Farmer fertilizer practice + Stress tolerant variety	3.51	735 Kg/ha	
Rice Crop Manager + Stress tolerant variety	4.25		

Table: Represents the Grain yield (t/ha) using Rice Crop Manager over farmer's fertilizer practice in farmer's variety and Stress tolerant variety

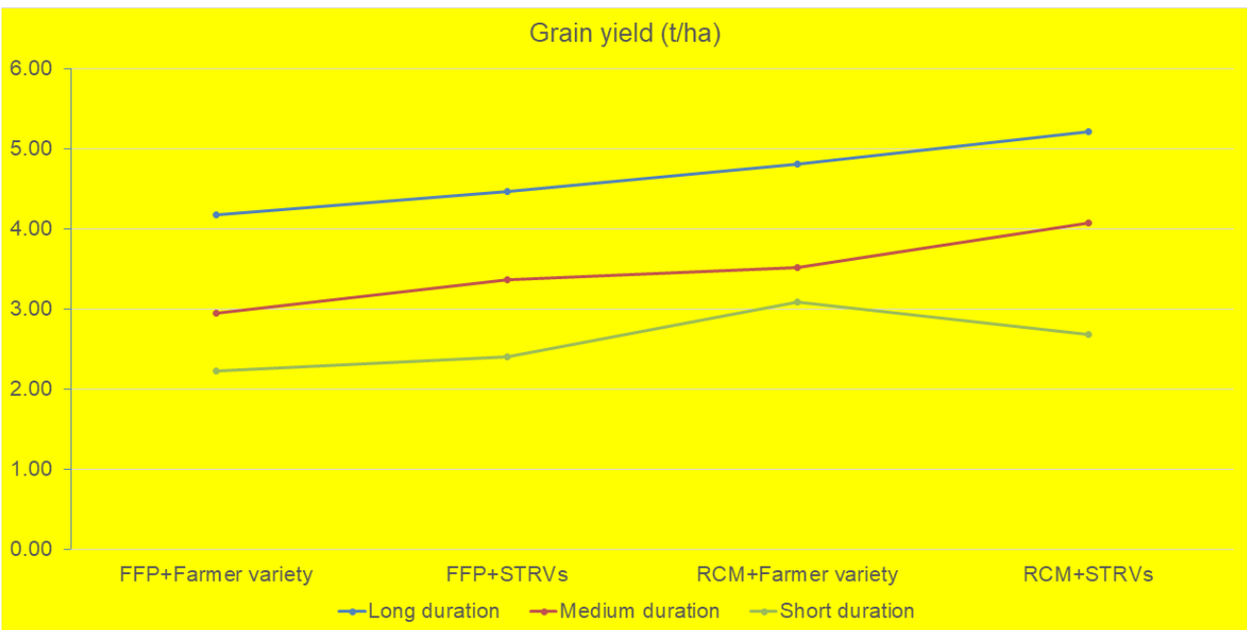


Figure: Represents the grain yield (t/ha) in RCM and FFP in crop duration

Recently Established Studies to to Increase Zinc Use Efficiency & Profitability

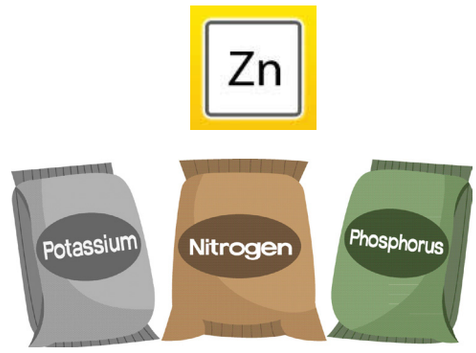
On-farm trials have been established across different districts of Odisha namely Sambalpur, Bhadrak, Balasore and Puri in Rabi season, covering 60 farmers with the following treatments:

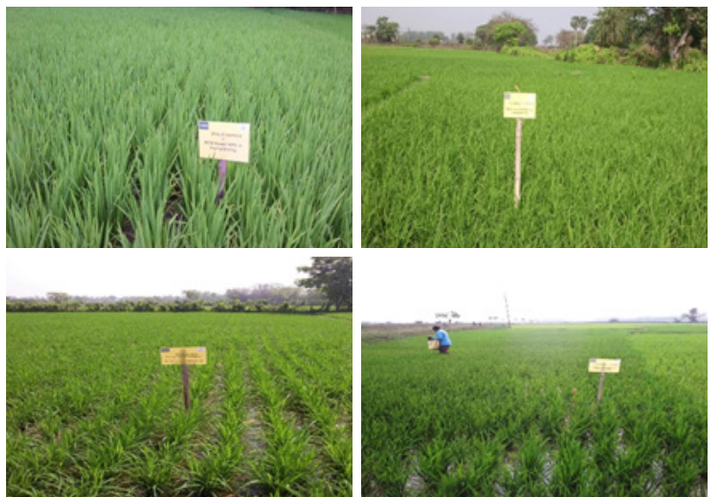
a. Zinc in nursery + RCM based Nitrogen, Phosphorus, Pottasium (NPK) in transplanting

b. Compost in nursery + RCM based NPK in transplanting

c. No Zinc and compost in nursery + RCM based NPKZn in transplanting

d. Compost in nursery + RCM based NPK in transplanting





Expanding Scope of RCM Beyond Rice Crops for Nutrient Management Module for Rice Pulse Systems in Odisha

18 on-farm trials have been established across different districts of Odisha state in the Rabi season.

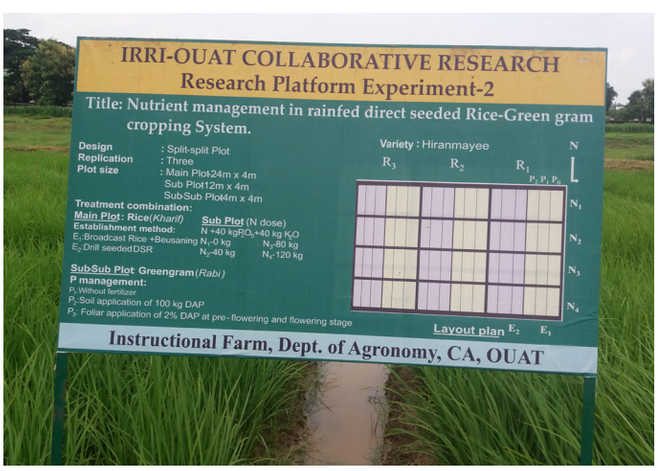
Improving Profitability & Productivity of Rice-based Systems by Inclusion of Weed Management in RCM

In Kharif 2017 and Rabi season 17-18, a total of 31 on-farm trials and one on-station trial have been established across different districts of the Odisha namely Puri, Jajpur and Cuttack, in collaboration with National Rice Research Institute, Cuttack.

Farmer's practice (Fertilizer management & Weed management)

Collaborating For Doing Better Research & Optimal Use of RCM

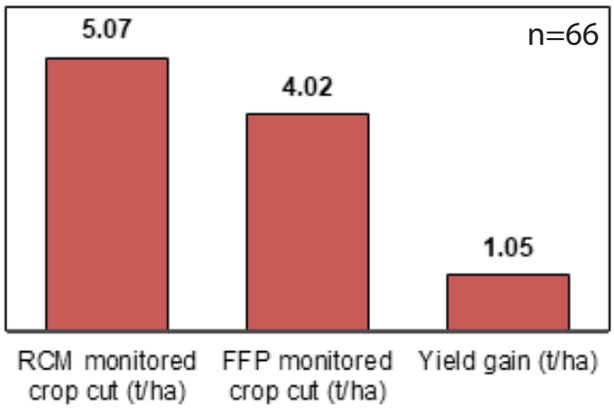
IRRI is collaborating with partners like OUAT, to improve productivity and resource-use efficiency of rice-rice systems in different establishment methods; working towards optimization of nutrient management for rice-based cropping system, and towards optimizing fertilizer application amount and timing for rain-fed rice in Odisha.



IRRI-OUAT Experimental Farm at OUAT, Odisha.

Experiential Lessons From Field Learning Demonstrations

Several meetings were conducted throughout the season to generate awareness among farmers on nutrient and crop management. They were motivated to use the RCM recommendations provided to them, so that they could judge the impact of RCM recommendations for themselves.



Field days with key stakeholders

SOCIO-ECONOMIC STUDIES

Socio-economic studies are also being conducted under t eproject with the following objectives :

- To identify the best-fit dissemination model for RCM in terms modes (printed/sms/both etc) and delivery channels.
- To analyze the impact of RCM, in terms of productivity, cost,and environmental impact.

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