

Translating soil research for adoption: Using Innovative pathways for scaling

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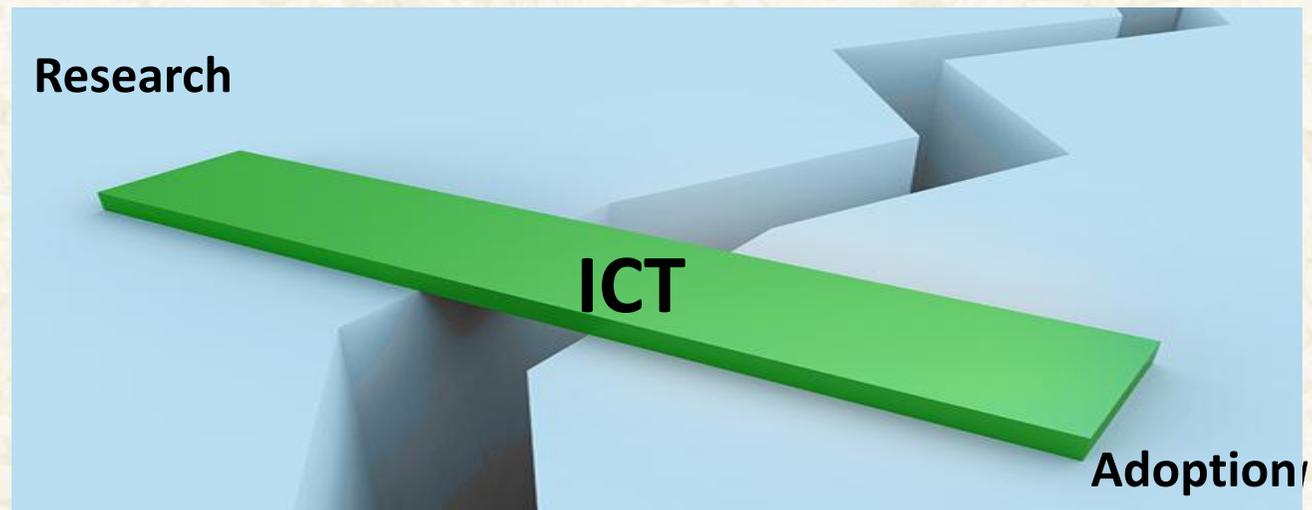
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**Sustainable Impact Platform
International Rice Research Institute (IRRI)**

After 20+ years of investment in soil fertility management and IPNM, why has change not been incremental?

*'The greatest impediment to solving these problems is not a lack of innovation. Rather, it is our **inability to scale up solutions that we know work.**' Ross, 2014*

We know that many new technologies 'work', but we don't know if they can be sustainably be scaled. Innovation needs to be linked to scaling pathways and end users....



Rice Based systems

Rice is a critical staple crop in SA & SEA

Small holder farmers growing rice have

- **Fragmented, small and have highly variable land holdings**
- **Geographically isolated**
- **Suffer from information asymmetry**
- **Lack of extension facilities**
- **There is a gap between technology development & dissemination**



Our objective

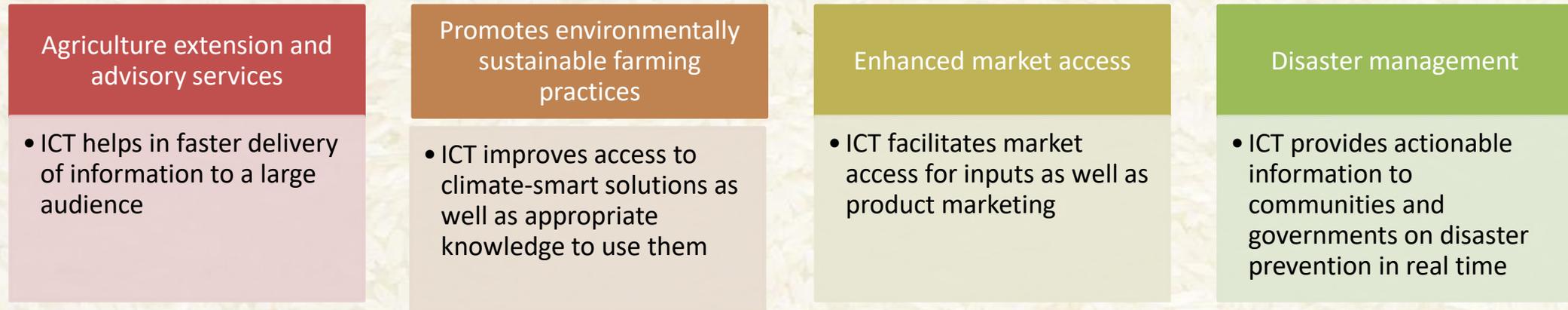
Develop computer- and smartphone-based tools for providing small-scale farmers with field-specific crop and nutrient management

Our approach

- **Use best available science to develop tools**
- **Use recent advances in Information and Communications Technology (ICT)**
- **Verify and release tools through national agricultural organizations**
- **Ensure availability of tools for wide-scale use by public and private sectors**

Potential of digital tools

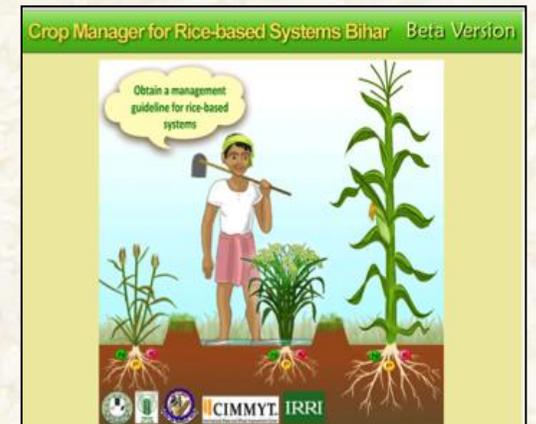
- ICT is helping the farmers by facilitating access to improved crop advisories, to markets through real-time data on market prices, weather forecasts, information on pests, seed varieties and planting techniques.



- Report by Internet and Mobile Association of India (IAMAI) says that by 2025 the number of internet users will be more in rural India, 70% of which belong to farming community.
- ICT can supplement the traditional extension channels in increasing the knowledge base of the farmers.

Source :https://www.researchgate.net/figure/Roles-of-ICT-in-agriculture_fig1_325967200

- **ICT-based tool** grounded in the **principles of Site-specific Nutrient Management**
- Farmers are interviewed using the in-built questionnaire in the tool to generate field-specific recommendation
- **Dynamically adjusted to target yield** – addressing variability among fields w.r.t. **soil, variety, management etc.**
- Actionable nutrient and crop management recommendation, making it **easy to use** by farmers
- **Right timing, sources and amount of fertilizer** (in kg) for a field size is recommended
- Provide recommendation for **stress conditions** (submergence & drought)
- Customized for different countries: Bangladesh, Indonesia, Philippines and States (in case of India)

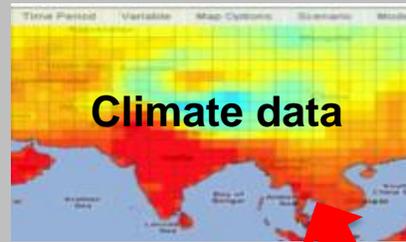


How does it work?

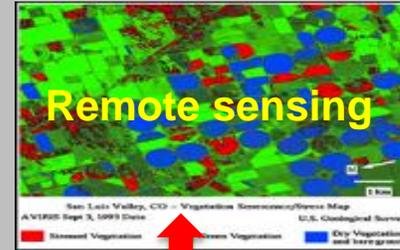
Inputs



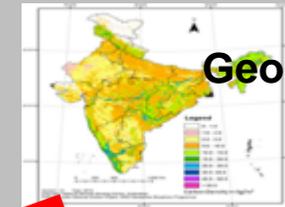
Potential Interfaces



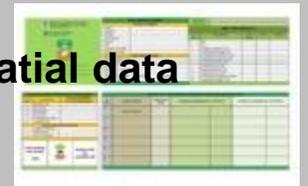
Climate data



Remote sensing



Geospatial data



Crop Manager calculations in cloud-based server

Crop Manager Model:

- Nutrient management calculator
- Decision-making calculator for crop management



Databases and spatial information:

- Variety traits
- Location-specific soil information
- Variety, management and climate-adjusted yield targets

Recommendations & Customized Reports

- SMS
- Printed guidelines

Potential added tools:

- Monitor farmer practices
- Rice Health Care
- SMS Info service
- Financial analysis

Recommendation page

Rice Crop Manager Odisha Version 1.0

Reference Number: 57750 **Date generated: 07 November 2017**
 Name of farmer: Xyz Crop establishment: Manual transplanting
 Field name: Near Pond Variety: Xyz
 Location: Xyz, Darada Panchayat, Basta, Balasore Sowing date: 20 June 2017

Note: Use this recommendation for kharif 2018 only.
Target yield on 1 acre: 22 quintal (dry weight), 5.5 t/ha (14% MC)
Manage rice as shown below:

Apply Pre-emergence herbicide at 2-3 days after transplanting in 3-5-cm standing water in the field. Use butachlor 50 EC at 1.25-1.50 kg a/ha (2.5 to 3.0 liter/ha) or pretilachlor 50 EC 750 g a/ha (1500 ml/ha product dose). If Pre-emergence herbicide is not applied then apply Post-emergence herbicide at 15-25 DAT. Use bispyribac sodium 10 EC at 25 g a/ha (250 ml/ha product dose).

Hand weed before fertilizer application if necessary.

Use raised seedbed for the nursery.

Apply fertilizer as indicated below:

Growth stage	DAT*	Kilograms of fertilizer for 1 acre (0.4 ha)			
		DAP	urea	MOP (Potash)	Zn sulfate
Early	Basal to 10	29	20	18	10
Active tillering	23-27	---	35	---	---
Panicle initiation	40-44	---	35	18	---

*DAT - days after transplanting

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A printed copy of recommendation page specific for the farmer's plot is provided to the farmer after the interview



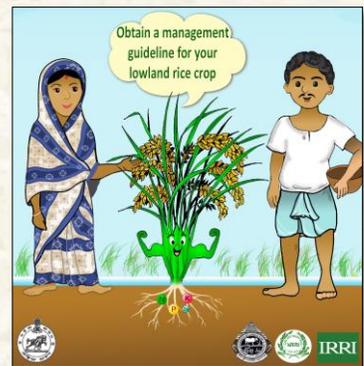
The recommendation can also be converted to customized SMS and/or voice calls and sent to farmer's registered number



Dissemination process



Research trials



Development of application



Capacity building of extension staff

Usage of recommendation



Farmers interview and recommendation generation

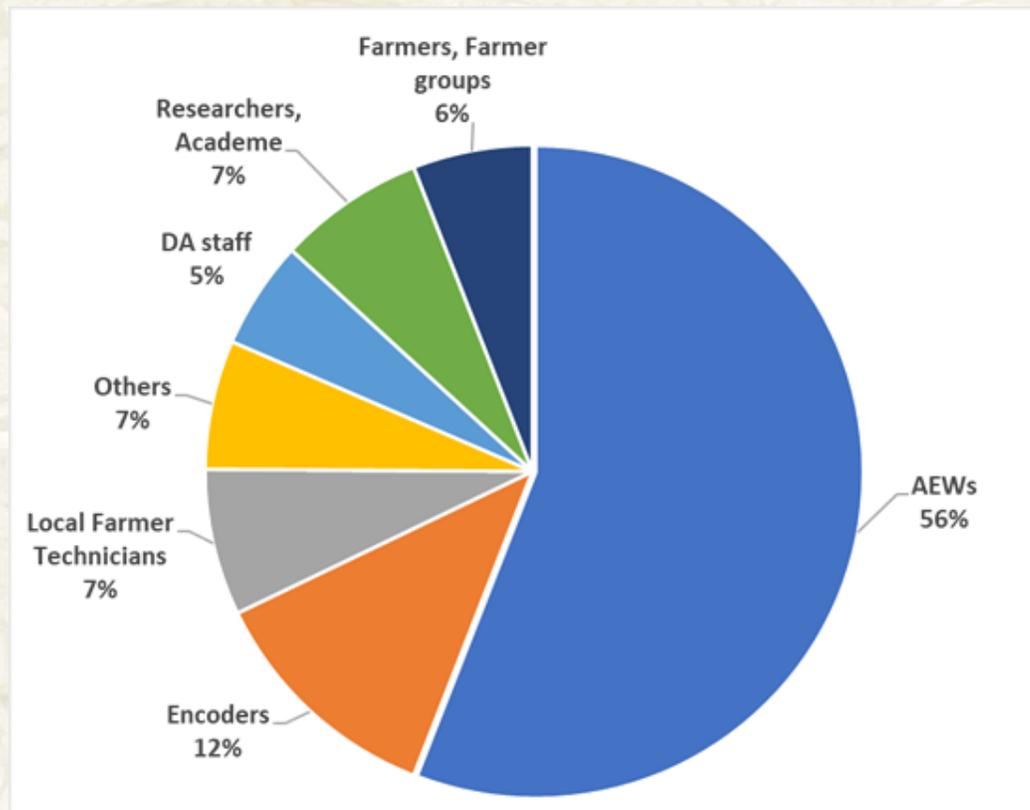


Capacity building

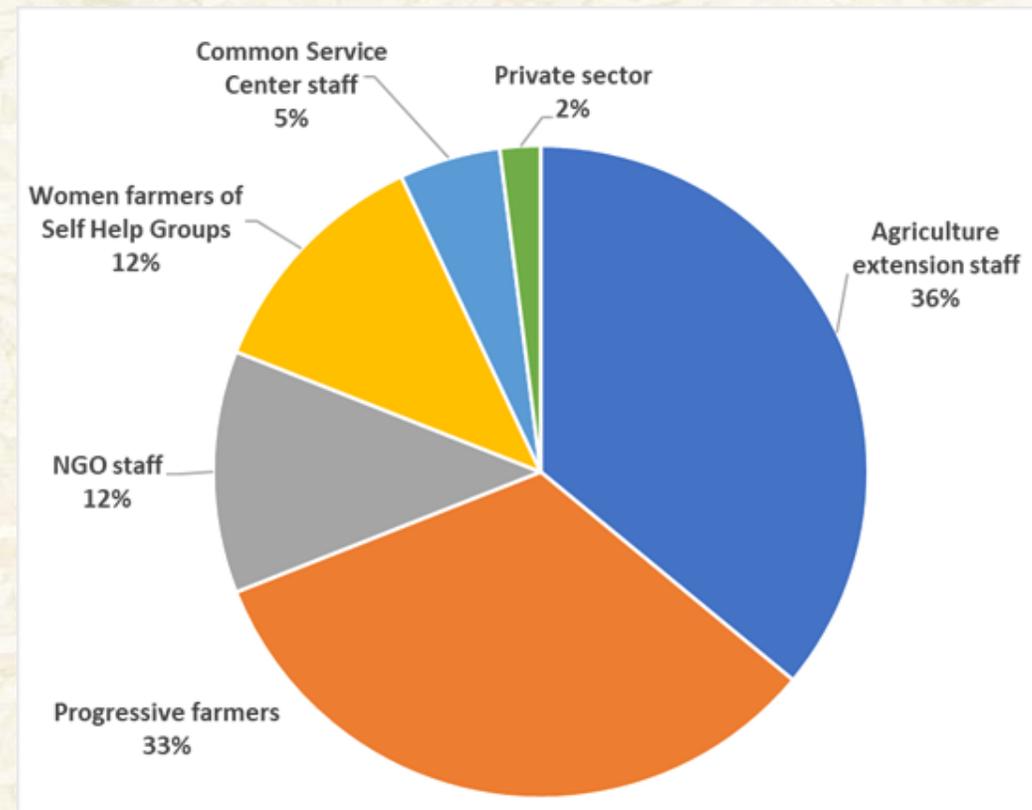
- Hands-on-training of extension staff, private partners, rural youth and farmers was done to train them on use of RCM including how to bookmark and add shortcut on home screen, how to share via email, how to take screenshots, how to connect to printers and take print outs
- Learning : Basic digital literacy is required for scale up of digital tools

Who were trained to operate RCM ?

Philippine context

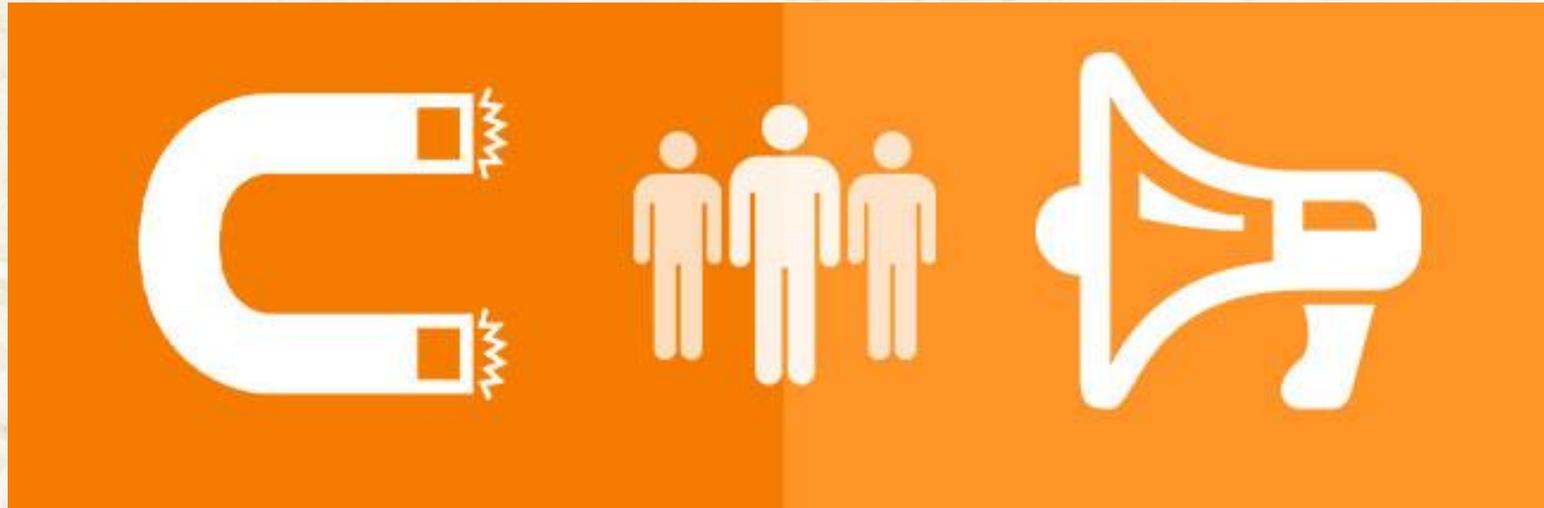


India context



Distribution Channels

The distribution channels can be classified as Outbound or Inbound channels. The outbound channels actively search for farmers, interview farmers and provide printed recommendations to the farmers to follow the advisories in their field. While farmers actively seek out the Inbound channels to get recommendations. Farmers are usually aware of the presence of inbound channels



Inbound Channels:

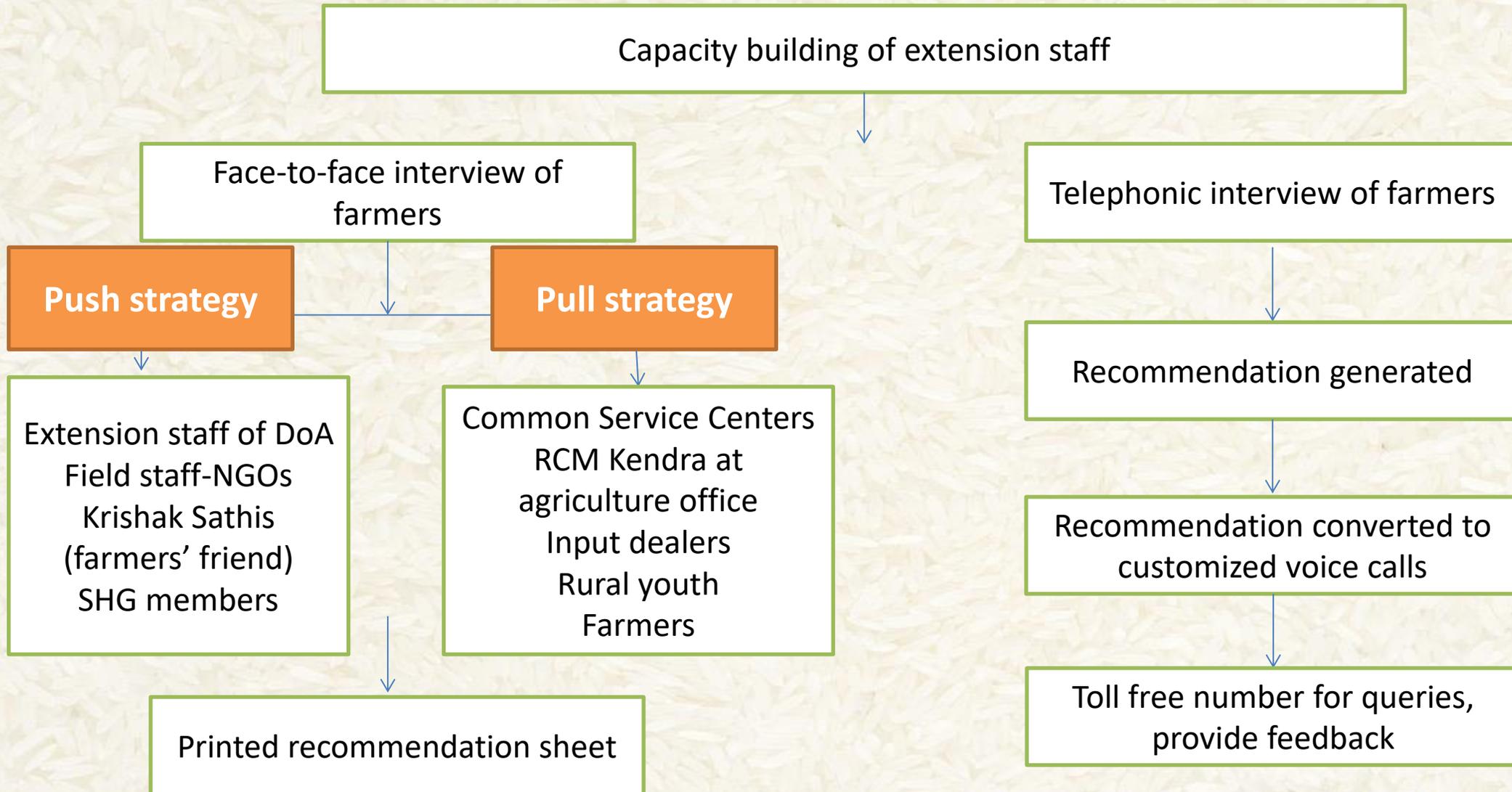
- RCM Kendras at DoA block office
- Common service centers
- Individual Dealers
- ICT Devices

Outbound Channels

- Department of Agriculture (DOA)
- NGO's
- SHG members
- IRRI Staff

Long-term use-case: Utilize outbound channels to actively drive farmers towards inbound channels

Channels and modes





Communication strategies for awareness



Demonstrations



Posters



Field visits



State Agriculture Fairs



Advertisement in newspapers



Field Days



Audio-conferences

Rice Science for a Better World

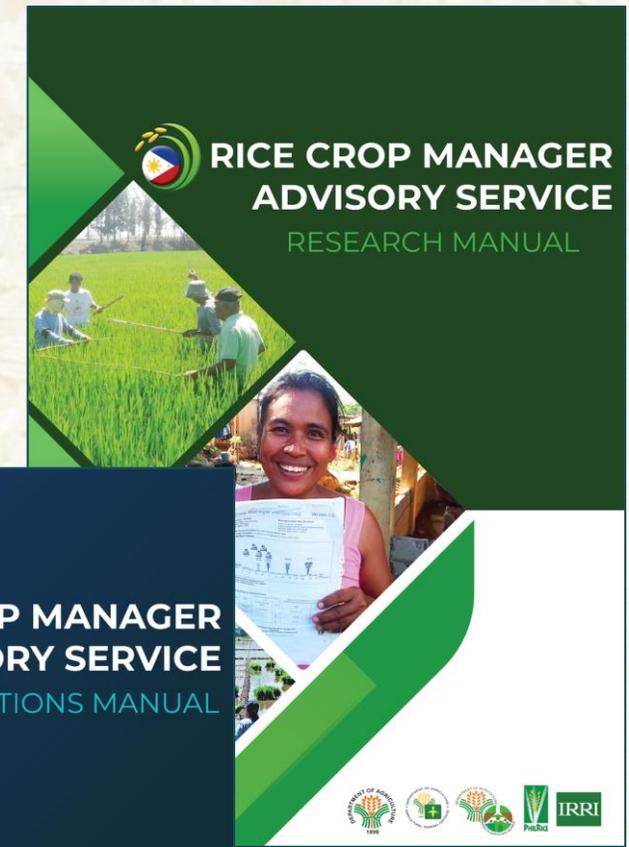
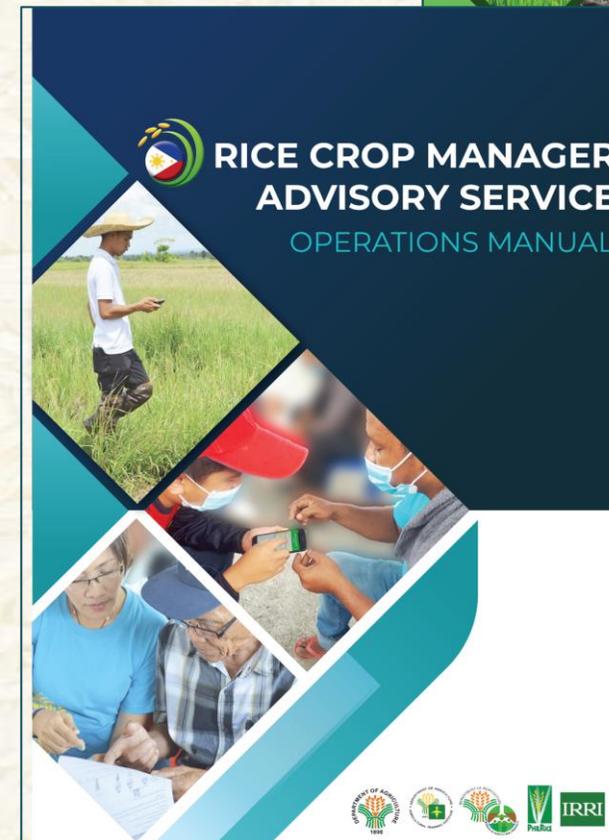
Awareness and training materials

- In Odisha, **4200** extension staff have been trained through **508** hands-on training method in the past four years on how to operate RCM.
- In Bihar, entrepreneurs were trained to provide RCM recommendations to farmers by charging a nominal fee.
- In Varanasi, **500** people including extension staff, farmers and scientist have been trained
- Training manual, brochure and one-pager have been developed along with slides as training materials.



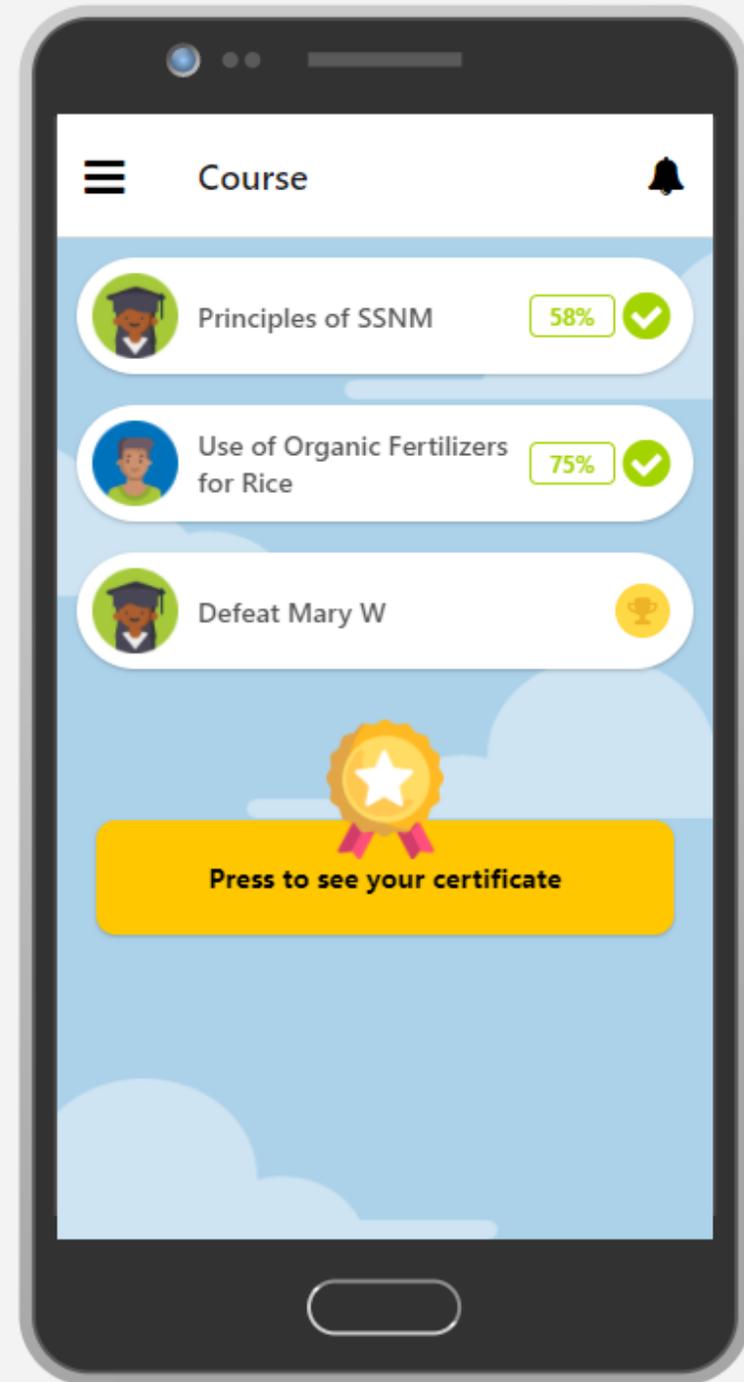
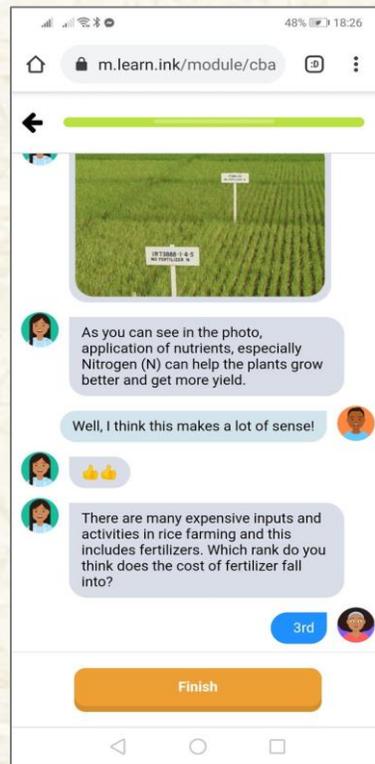
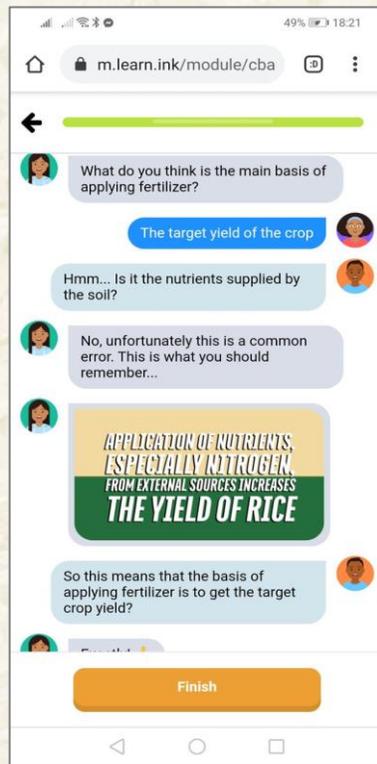
Awareness and training materials

- RCMAS Operations and Research Manuals are drafted and soon to be finalized for printing and distribution
- Available training material formats: print, ppt slides, video
- SSNM topic is part of the training program since 2018 (TOT) and 2019 (regional roll-out: annual)
- Trained participants are required to register and verify emails using RCM User Registration
- As of July 15, 2021: **5,126** verified users in RCMAS db



Mobile phone-based interactive microcourse for SSNM

<https://m.learn.ink/course/eb917c4b-32a9-4e47-9545-146af1ca0164>



Rural youth and women farmers engagement

Learnings:

- Farmers want their son/daughter who use smartphones to learn these digital tools
- Rural youth in the village were interested to learn RCM and they also provided recommendations to neighboring farmers
- Women farmers play a crucial role in agriculture yet they do not get the same access to information and opportunities to learn-digital tools help them in getting information on their finger tips



Learnings from socio-economic studies

- RCM coverage is dominated by marginal (52.5%) and small (28.0%) farmers.
- Majority of the farmers preferred printed recommendations along with reminder messages for receiving RCM
- Indicative savings per hectare should be printed on the recommendation sheet to give clear indication on benefits
- Suggested strategies by farmers for improved adoption : On farm comparative demonstrations, follow up after provision of RCM recommendations, interactive sessions with experts

Farmers' perspectives

- Plot-specific knowledge on fertilizer management is not available through any medium. RCM recommendations are filling that gap
- RCM recommendations are easily accessible and understandable
- Clear indication on type, amount and timing of fertilizer application in the recommendation
- Variety specific recommendation helps in checking over/under application of fertilizers
- Progressive farmers prefer a mobile app which works in offline mode
- Farmers prefer a supply based approach and door step delivery



Video

Development of tools is a dynamic process: What will make the present RCM more beneficial to the farmers????

Technical:

- ✓ Continuous modification & refinement of algorithms for changing agricultural practices: DSR, non-puddled transplanting , Machine transplanting, system approach
- ✓ Develop algorithms framework to cater for temporal and spatial variation especially in rainfed environments
- ✓ Make the tool holistic and dynamic with additional information on crop management e.g. weed-insect-pest Management
- ✓ Develop framework for more scientific and automated yield targeting to decrease human error and increase accuracy

Development is one part, the second is scaling!!!

What will make the present RCM more adaptable and scalable????

Critical background factors to be considered:

- Limited internet connectivity in villages
- Limited use of smart phones
- Non-availability of printing facilities affects recommendation delivery
- Lack of motivation/incentive among DoA staff
- Provision of recommendation at door step is time and resource consuming process
- Behavioural change is not easy

Lessons Learned during the process:

- ✓ Identification of most efficient dissemination pathways
- ✓ Offline module, decrease in time for interview,
- ✓ Integration with existing portals,
- ✓ Business Models
- ✓ Massive awareness creation about RCM, existing Kendras/CSC and availability of recommendations from the same

Stakeholders and Beneficiaries



Acknowledgements

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CIMMYT

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Thank You



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