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Impact from a long-term investment of the fertilizer industry in research on site-specific nutrient management (SSNM) for rice

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Investment of the fertilizer industry

- **US$ 1.75 million over 16 years (1997 – 2012)**
- **Provided to IRRI through IFA, IPI, and IPNI**
- **Used to develop and disseminate improved nutrient management for rice across Asia**
- **Implemented through the Irrigated Rice Research Consortium (IRRC)**

Was this a good investment?

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IRRI International Rice Research Institute (IRRI)

Los Baños, Philippines

Home of the Green Revolution

Established 1960
www.irri.org

- **Nonprofit independent research and training organization.**
- **Mission is to reduce poverty and hunger, improve health of rice farmers and consumers, and ensure environmental sustainability.**
- **Conducts research through partnerships and strengthening of national agricultural research and extension systems**

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IRRI Irrigated Rice Research Consortium (IRRC)

(1997 – 2012)

- **Partnership of IRRI with research and extension organizations across Asia**
- **Provided a platform to facilitate the development, dissemination, and adoption of natural resource management technologies for irrigated rice across Asia**
- **Technologies included**
  - ❖ **Nutrient management**
  - ❖ **Water savings**
  - ❖ **Crop protection**
  - ❖ **Post production**
  - ❖ **Crop establishment**
  - ❖ **Rodent control**

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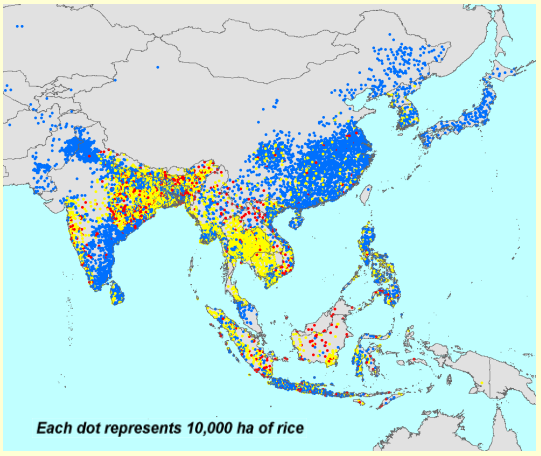
Major rice ecosystems in Asia



Irrigated rice in Asia

- **~50% area,**
- **~75% production**
- **Main stable food**
- **Major user of fertilizer**
- **Fertilizer is ~ 20% of input cost**

- Irrigated (flooded)
- Rainfed lowland (flooded)
- Rainfed upland (not flooded)

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Investment of the fertilizer industry in the IRRC supplemented investments from others

- **Investment in the IRRC from 1997 to 2012:**
  - **Swiss Agency for Development and Cooperation (SDC) = US$ 11.9 million**
  - **Total = US$ 18.5 million**
  - **Investment in nutrient management ~ US$ 6.6 million**
- **Investment from the fertilizer industry over 16 years:**
  - **US$ 1.75 million**
  - **10% of total investment in IRRC**
  - **Used on nutrient management**
  - **30% of total investment in nutrient management**

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Rice farmers often do not apply fertilizer effectively

- Asia are small and variable
- 'Best' management can vary among field
- Blanket recommendations typically given to farmers

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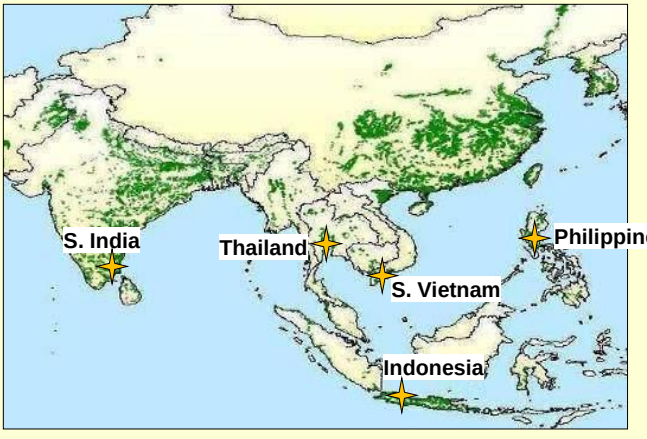
IRRI started collaborative research from 1995 to develop and disseminate site-specific nutrient management (SSNM) for rice



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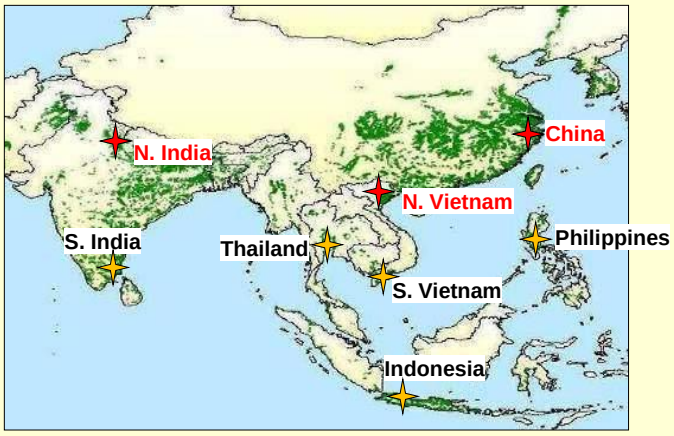

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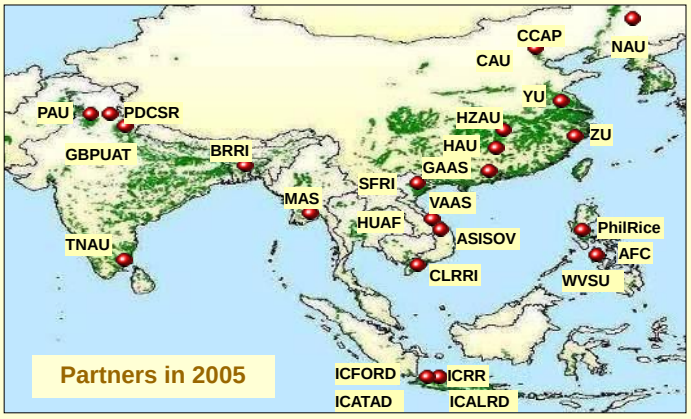
Fertilizer industry investment in 1997 allowed expansion to three additional locations

Partnerships expanded and emphasis on dissemination of SSNM increased



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Support from the fertilizer industry supplemented other support for SSNM activities across countries

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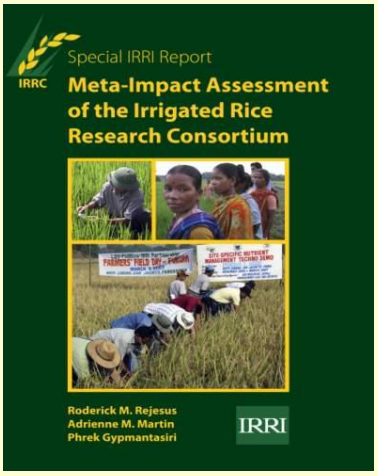
IRRC Meta-Impact Assessment in 2012



- Used existing documents and data, and short field visits
- Considered all IRRC technologies
- Focused on 4 of 10 IRRC countries
  Bangladesh, Indonesia, Philippines, Vietnam

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http://books.irri.org/9789712202971_content.pdf

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Economic benefits of all IRRC technologies to rice farmers/national economies

1997-2012

- Total investments of US$ 18.5 million resulted in economic benefits of US$ 70.5 million

At 2016 (benefits 4 years to future)

- Rate of returns to total IRRC research investments range from 25% to 43% (or benefit-cost ratios from 4:1 to 16:1)

Projected benefits in 4 years > 10 times total investment

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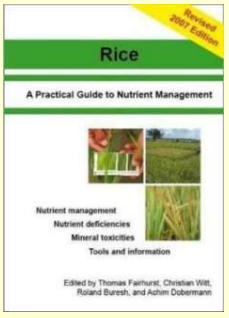
Scientific impact from investment in nutrient management

Developed SSNM concept

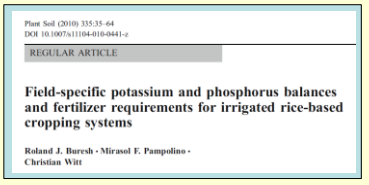
- **SSNM now widely accepted**
- **SSNM now used with other cereal crops**



SSNM web site:
www.irri.org/ssnm

461 publications from IRRC

- **133 (or 29% of total) on nutrient management**



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Environmental impact from investment in nutrient management

Documented impact of SSNM on reduced greenhouse gas emissions

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Impact on national partners from investment in nutrient management

Built national capacity and trained across Asia

433 IRRC training activities from 2005 to 2011

- **201 (or 46% of total) on nutrient management**

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Key finding of Meta-Impact Assessment – influence assessment

The IRRC, including activities in nutrient management:

- **Was instrumental in shaping research and extension priorities of partner countries**
- **Influenced national research and extension agendas through capacity strengthening**

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Economic impacts for farmers from investment in nutrient management

Developed and disseminated new tools

Leaf Color Charts (LCC)

- ~ 1 million distributed to farmers
- LCC copied and distributed by others

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Impacts from fertilizer industry investment far exceed economic benefits in Bangladesh

2005-2012

- Department of Agricultural Extension promoted LCC
- ~ 600,000 distributed to rice farmers
- Total economic benefits of US$ 22.8 million

At 2016 (benefits 4 years to future)

- Projected total economic benefits of US$ 76.3 million
- Benefits far exceed the total 16 year investment in nutrient management of the IRRC of
  - US$ 1.75 million from fertilizer industry
  - US$ 6.6 million total for nutrient management

Projected benefits for only Bangladesh already exceed investment of fertilizer industry > 10 times

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Economic benefits to rice farmers/national economies beyond Bangladesh

- LCC taken up on used in other countries
- Tools in addition to LCC developed and taken up in multiple countries
  - *Videos*
  - *Quick guides*
  - *Computer and mobile phone based decision making tools*
- Principles of SSNM incorporated as a component in national rice programs

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Additional benefits from investment in nutrient management

Developed and disseminated new tools (2)

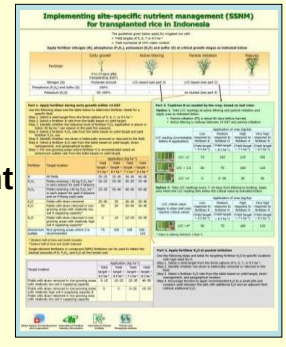
Videos

- ~ 50,000 views on YouTube for 'Tales of Ryza the Rice Plant'

  http://bit.ly/ryza_tales

Quick guides

- Used to disseminate Improved management
- Now used with other cereal crops



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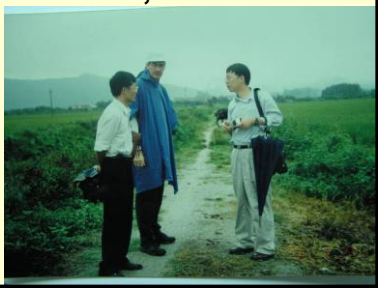
Additional benefits to national rice programs from investment in nutrient management

- Principles of SSNM incorporated as a component in national rice programs
  - Integrated Crop Management (ICM) in Indonesia
  - 'Three Reductions, Three Gains' program (3R3G) and now 'One Must Do, Five Reductions' program (1M5R) in southern Vietnam
  - 'Three Controls' in Guangdong Province, China
    - Collaboration started in 2002
    - Now government recommended technology
    - Increases yield by 10%
    - Uses more efficient N management
    - Expanding to other provinces
    - Not included in IRRC Meta-Impact Assessment

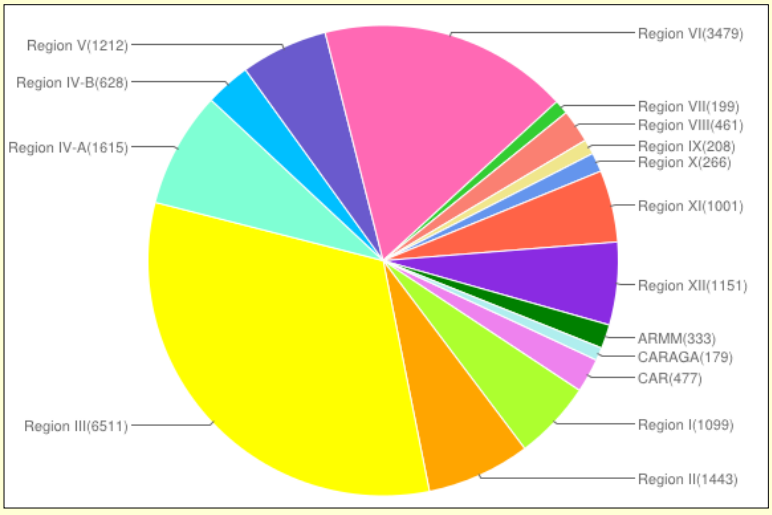


Investment of fertilizer industry enabled development of *Nutrient Manager for Rice*

- Uses scientific principles of site-specific nutrient management (SSNM)
- Used by extension worker, crop advisor, or service provider to interview farmer
- Aims to increase income of farmer by US$100 per ha per crop
- Provides customized recommendation for a farmer's field through mobile phone or computer

www.irri.org/nmrice

About 20,000 *Nutrient Manager* guidelines provided in the Philippines in 2012



Not included in IRRC Meta-Impact Assessment

Summary of IRRC Meta-Impact Assessment

Investment in nutrient management led to

- **Scientific impacts**
- **Environmental impacts**
- **Impacts on capacity and priorities of national rice programs**
- **Economic benefits**

Economic benefits on nutrient management in Bangladesh

- **Total US$ 22.8 million in 2012**
- **Estimated to total US$ 76.3 million by 2016**
- **Exceed all investment of US$ 6.6 million across countries**

Impacts under estimated because key countries like China and new technologies like Nutrient Manager not considered

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Nutrient Manager for Rice will soon be replaced by Rice Crop Manager

Philippines – November 2013

Bangladesh – November 2013

Indonesia – Early 2014

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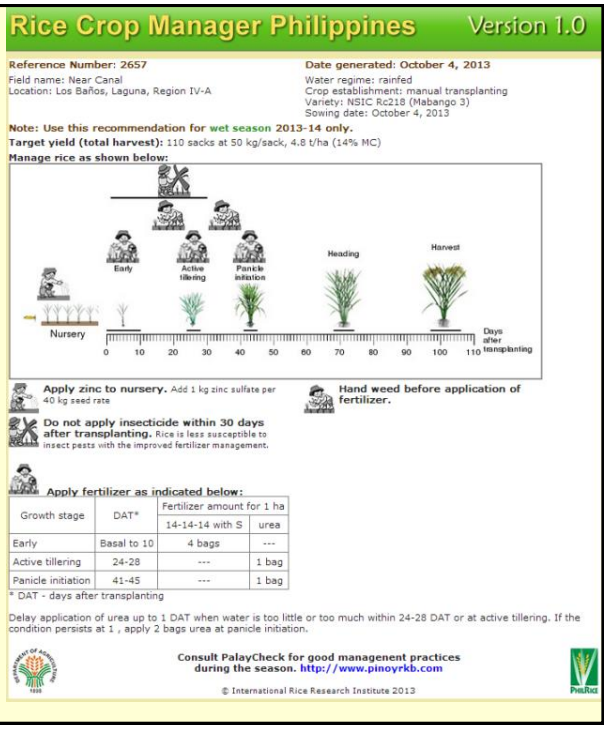
RCM Philippines output

- Nutrient management
  - Adjust N timing based on water in rainfed rice
- Crop protection
- Zinc application
- Seedling age
- Seed rate for wet seeded rice
- Controlled irrigation



Rice Crop Manager Philippines Version 1.0

Reference Number: 2657
Field name: Near Canal
Location: Los Baños, Laguna, Region IV-A

Date generated: October 4, 2013
Water regime: rainfed
Crop establishment: manual transplanting
Variety: NSIC Rc218 (Mabango 3)
Sowing date: October 4, 2013

Note: Use this recommendation for wet season 2013-14 only.
Target yield (total harvest): 110 sacks at 50 kg/sack, 4.8 t/ha (14% MC)
Manage rice as shown below:

Apply zinc to nursery. Add 1 kg zinc sulfate per 40 kg seed rate

Hand weed before application of fertilizer.

Do not apply insecticide within 30 days after transplanting. Rice is less susceptible to insect pests with the improved fertilizer management.

Apply fertilizer as indicated below:

Growth stage	DAT*	Fertilizer amount for 1 ha	
		14-14-14 with S	urea
Early	Basal to 10	4 bags	---
Active tillering	24-28	---	1 bag
Panicle initiation	41-45	---	1 bag

* DAT - days after transplanting

Delay application of urea up to 1 DAT when water is too little or too much within 24-28 DAT or at active tillering. If the condition persists at 1 , apply 2 bags urea at panicle initiation.

Consult PalayCheck for good management practices during the season. http://www.pinoyrkb.com

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Crop Manager is under development and testing before release in other countries

For South Asia, as part of CSISA

For Southeast Asia

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Acknowledgment

- The fertilizer industry for their 16-year investment to IRRI on improving nutrient management for rice
- The following for patient support
  - International Fertilizer Industry Association (IFA)
  - International Potash Institute (IPI)
  - International Plant Nutrition Institute (IPNI)
- Luc Maene for his foresight in recognizing from the onset the opportunity for return on a long-term investment

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