# Research findings

## *II* Feeding the rice crop's needs: A Filipino farmer's experience

*F.G. Palis[(1)] and G. Gabinete[(2)].*

### Rice crises

The global rice crisis that has spiralled with the soaring prices of other commodities has placed our Asian people in a difficult situation. Our Asian consumers are struggling to meet the high prices of various everyday items, particularly rice, the staple food of Asia, the continent which accounts for half of the world's population. The rice producers, or farmers, on the other hand are facing formidable challenges to increase rice production and make it a profitable enterprise. The increasing price of fertilizers presents a particular challenge to rice producers. In the Philippines, the sharp increase of fertilizer prices has challenged farmers to be creative, resourceful, and adaptive in their practices associated with nutrient management.

### The farmer

This is a story of a Filipino rice farmer, Mr. Johnny Tejeda, who took the risk of deviating from the traditional way of applying fertilizers by practicing site-specific nutrient management (SSNM), a new way of applying fertilizers. SSNM is a fertilizer best management practice, which provides guidelines for "feeding" rice with nutrients, as and when needed (Fig. 1). By applying need-based nitrogen (N), phosphorus (P), and potassium (K) fertilizer, farmers can achieve higher profits from optimized fertilizer use and reduced incidence of pests and diseases.

**Plate 1.** A proud farmer, Mr. Johnny Tejeda, showing his rice crop following the SSNM recommendations. Photo by Lorelei dela Cruz.

Dr. Roland Buresh, a soil scientist of the International Rice Research Institute (IRRI) has affirmed that "SSNM can enable rice farmers to increase their profit by optimally supplying their crop with essential nutrients."

Fondly called Johnny, Mr. Tejeda is a 46 year-old rice farmer with 1.3 hectares of land in Cordova Norte, Tigbauan, Iloilo, Philippines. The province of Iloilo is one of the top five rice-producing provinces in the country, and is the rice granary of the central Philippines. The municipality of Tigbauan is a 30-minute drive from Iloilo city, which is composed of 52 villages with a total population of 57,000. Ninety percent of the municipality's approximately 9,000 hectares is devoted to agriculture with about 4,550 hectares in rice and an average farm size of 0.5 hectares.

"Life is so tough nowadays," says Johnny. "The gasoline cost is so high that it shoots up the cost in preparing the land for rice cultivation. Fertilizer inputs are so expensive," he adds. In 2007, the price of urea was Philippine pesos (PhP) 850, but now it is PhP 1,950. NPK fertilizer was PhP 700 in 2007, but now it is PhP 1,840. "Indeed farmers need to be resourceful, creative, and updated with new cost-reducing technologies particularly related to fertilizer management practices," continues Johnny.

Filipino farmers generally believe fertilizers are "vitamins" to the plants helping protect the plants from illness or diseases (*malayo sa sakit*). They consider fertilizers also as food (*pagkain*) to plants and thereby essential to make the plants grow fast and healthy. Otherwise, they believe that plants are "malnourished" without fertilizers. This approach has led Filipino farmers often to associate fertilizers with N, with more attention being given to urea, as it is perceived that N results in good

(1) *Post-doctoral Fellow and Anthropologist, Crop and Environmental Sciences Division International Rice Research Institute (IRRI), DAPO Box 7777, Metro Manila, Philippines.*

(2) *Professor, West Visayas State University, Iloilo City, Iloilo, Philippines.*

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**Table 1.** Amount of fertilizer applied (in bags/ha and nutrients, kg/ha) before and after use of SSNM by Mr. Johnny Tejeda, 2007 wet season.

*Number of bags/ha per application*

| | Before SSNM | | | After SSNM | | | |
|---|---|---|---|---|---|---|---|
| | 1st (20 DAS) | 2nd (40 DAS) | Total bags | 1st (12 DAS) | 2nd (28 DAS) | 3rd (38 DAS) | Total bags |
| Urea | 2 | 2 | 4 | 0 | 1.5 | 1.5 | 3 |
| 14-14-14* | 1 | 1 | 2 | 3 | 0 | 0 | 3 |
| Total bags applied | 3 | 3 | 6 | 3 | 1.5 | 1.5 | 6 |

*Amount of nutrients per application, kg/ha*

| | Before SSNM | | | After SSNM | | | |
|---|---|---|---|---|---|---|---|
| | 1st (20 DAS) | 2nd (40 DAS) | Total nutrients | 1st (12 DAS) | 2nd (28 DAS) | 3rd (38 DAS) | Total nutrients |
| N | 53 | 53 | 106 | 21 | 35 | 35 | 91 |
| $P_2O_5$ | 7 | 7 | 14 | 21 | 0 | 0 | 21 |
| $K_2O$ | 7 | 7 | 14 | 21 | 0 | 0 | 21 |

* 14-14-14 is a typical NPK fertilizer used in the Philippines.

growth and health to the plants. And for farmers, healthy plants with good growth are associated with the greenness of the rice plants.

Direct sowing of rice seed, rather than transplanting is a common practice in Iloilo. Planting time for the wet season is usually during the months from May-July, depending upon the availability of rain, and harvest is during August to October. The dry season on the other hand is from October-November to February-March. Iloilo farmers usually apply N fertilizer twice in a season.

Johnny used to apply fertilizer twice a season, at 20 and 40 days after sowing (DAS) in both wet and dry seasons. On a per hectare (ha) basis, he normally applied two bags of urea and one bag of NPK (14-14-14) at both 20 DAS and 40 DAS giving a total 106 kg N/ha, 14 kg $P_2O_5$/ha, and 14 kg $K_2O$/ha (Table 1).

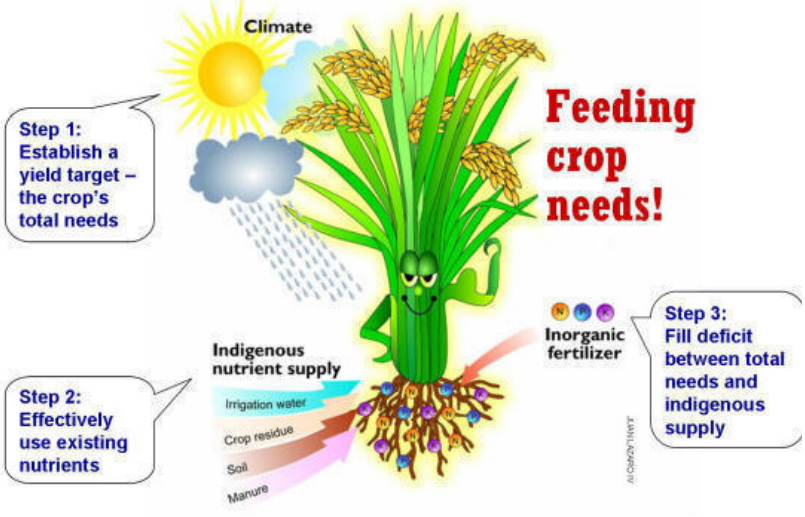


**Fig. 1.** A diagrammatic presentation of the site-specific nutrient management (SSNM) approach (IRRI, 2006).

His normal yield in each season was about four to five metric tons per hectare of un-milled rice grain expressed at 14 per cent moisture content.

"SSNM has really helped me a lot," exclaims Johnny. "Imagine, when I practiced SSNM during the last 2007 wet and dry season, my yield markedly increased. Since then, I have continued practicing SSNM." The increase in yield was independently verified by a field technician who harvested grain from crop cut in the fields in both seasons. The yield of air dried, un-milled grain increased from 4.1 mt/ha with the farmer's fertilizer practice up to 6 mt/ha with SSNM in the wet season. In the dry season the increase with SSNM was from 4.6 mt/ha up to 6.5 mt/ha.

In 2007, IRRI scientists led by Dr. Buresh in collaboration with Dr. Greta Gabinete, a professor at the West Visayas State University established an SSNM demonstration in Johnny's and a neighboring rice field for farm validation. An individual demo plot was 100 $m^2$. According to Johnny, while the experiment was on-going, he quietly imitated the SSNM practice in the remaining large portion of his field of about 1.2 ha. His farm neighbor, who was an agricultural technician, told him that SSNM validation experiments had worked in other villages. This farm neighbor gave him the SSNM recommendations. Believing his farm neighbor, he took the risk because of the rising prices of fertilizers, the increasing cost of living, and an opportunity of improving his rice yield.

With SSNM, Johnny applied fertilizer three times, as a replacement to his usual two applications. His first application was at 12 DAS using three

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bags 14-14-14 (NPK). His second and third applications were at 28 and 38 DAS using 1.5 bags urea per hectare for each application. In effect, before and during SSNM, he used a total of six bags of fertilizer per hectare, but the nutrient composition and timing of application differed (Table 1).

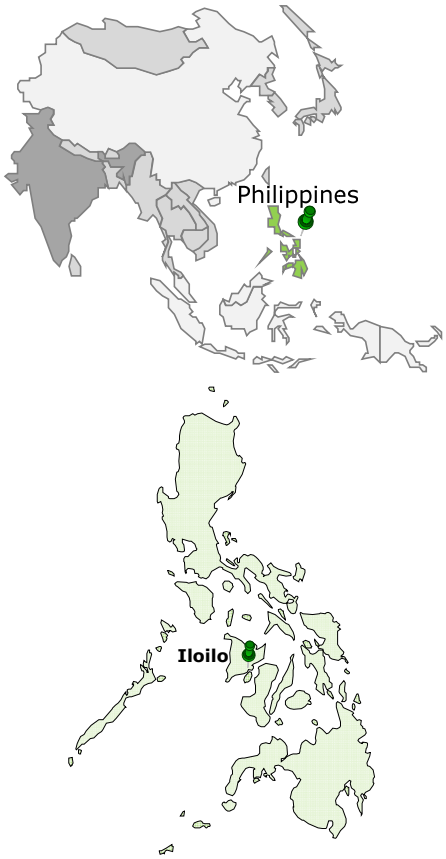
When asked what he could say about the SSNM technology, Johnny replied:

*When I first practiced SSNM in the 2007 wet season, I was not able to sleep well for around 10 days after my first fertilizer application. I observed that the color of my rice plants was not green and they were not growing well compared to most farmers' fields; although, growth and color of the leaves were comparable with the neighboring SSNM demo plot and the experimental plots in my field. Before I slept, I kept on thinking and wondering why it seemed that there was no fertilizer response on my rice crop. I was really frightened and anxious that my crop might fail. So, within those 10 days, I was uneasy and kept moving around the rice fields in the village, comparing the growth of the rice plants. But 10 days after the second fertilizer application, I was so amazed because the growth stand of my rice crop was far better than those farmers' fields not applying the SSNM recommendations. The stems were so hard and the roots were so deeply rooted. Also, my plants were not infested with pests and diseases and did not lodge. Those plants that had accelerated growth and bright green leaves after the first fertilizer application had lodged long before harvest and were infested with pests and diseases. I realized that SSNM enabled the rice crop take a balanced food or diet before "vitamins" or urea were supplied.*

Johnny proudly and confidently stood before his field with a smile showing the good stand or foundation of his crop (Plate 1). At this stage, he is just waiting for his harvest in the second week of August 2008. Plate 2 shows him ready to harvest his crop with eagerness and expectation to get another high yield. He further reported that many of his neighboring farmers are now starting to follow SSNM. He recounted:

*Actually, when my neighboring farmers saw the good performance of my crop after my second application, they kept on asking me what SSNM is about. At the same time, they monitored my field whenever we do our small group discussion in the farm surroundings. We farmers normally discuss or converse about many things on the farm, especially dealing with our rice crop. My constant interaction with the researchers doing experiments in my rice field, and with the agricultural technician, enriched me with knowledge about SSNM that I happily shared with my co-farmers during our "huntahan" in the farm or spontaneous farm discussion. At harvest time of the 2007 wet season, it was known in my village that, my yield was high, increasing from 120 to 184 bags of fresh un-milled grain from my field, making my neighboring farmers eager to imitate me in using SSNM.*

**Plate 2.** Johnny checking his field for harvest. Photo by Artyel Gabinete.




Map of the region and the Philippines with the site.

**About SSNM**

The concept of SSNM for rice was developed in the mid-1990s and has been systematically transformed and refined since 2000 in collaboration with national agricultural research and extension (NARES) through the Productivity and Sustainability Workgroup of the Irrigated Rice Research Consortium (IRRC). Research identified a mismatch between the timing used by farmers to apply N fertilizer and the growth stages at which the rice plant needs supplementary N. This lack of synchrony between N supply and plant N need resulted in luxuriant vegetative growth and a crop architecture that is favorable for

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diseases and insect pests. This is further confounded by insufficient use of K. SSNM provides farmers with guidelines for managing N, P, and K that fit local conditions and are easily understood by farmers and extension workers. More so, it ensures that farmers obtain good returns for their cash investment in fertilizers.

The rolling out of SSNM is really timely for the global rice crisis and the high fertilizer prices, particularly in the Philippines. The Philippine government has incorporated SSNM from the current 2008 wet season into the national agriculture program, in line with the country's Rice Self Sufficiency Plan which is in partnership with IRRI. The dissemination of SSNM will be facilitated by the development of new "Nutrient Manger for Rice" software that enables extension workers and farmers to rapidly develop nutrient management guidelines for specific fields based on a farmer's response to about ten easy-to-answer multiple choice questions. In the province of Iloilo, SSNM is currently piloted by extension workers in 20 municipalities. The "Nutrient Manager for Rice" software was field tested in mid 2008, and it is set for release on CD in the local language in September 2008.

The adoption of SSNM technology in the Philippines may have started with our farmer Johnny, but with the implementation of SSNM in the country coupled with government support in mobilizing extension staff, hopefully SSNM will be adopted by thousands if not millions of Filipino farmers.

**Acknowledgment**

The process that systematically established the scientific basis for SSNM, evaluated and refined SSNM in farmers' fields through partnerships across Asia, and is now disseminating improved nutrient management for rice across Asia was made possible through more than a decade of support from the Swiss Agency for Development and Cooperation (SDC), the International Fertilizer Industry Association (IFA), the International Potash Institute (IPI), and the International Plant Nutrition Institute (IPNI). The authors greatly acknowledge Dr. Roland Buresh, key scientist for the validation and refinement of the SSNM technology, for patiently teaching them the logic and science behind SSNM to effectively reconcile farmer and scientific knowledge on nutrient management. Likewise, the assistance of Ms. Lorelei dela Cruz and Mr. Artyel Gabinete in the conduct of the fieldwork are greatly appreciated.

**References and additional reading**

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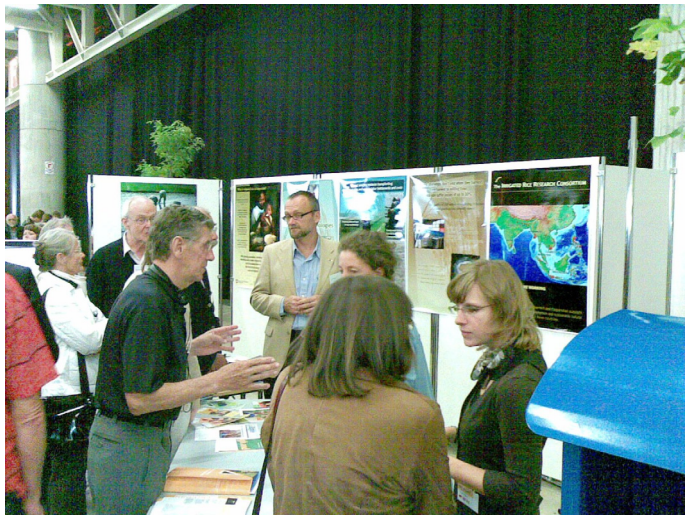
A rice drum seeder in Fribourg, Switzerland?

At the Annual Development Cooperation Conference 2008 - Forum Fribourg, organized by the Swiss Agency for Development and Cooperation (SDC), 22 August 2008, a drum seeder was presented at the International Rice Research Institute (IRRI) exhibition. SDC is the main supporter of the Irrigated Rice Research Consortium (IRRC) at IRRI. Photo by IPI.



Dr. Achim Dobermann (center, light colored suit), Deputy Director General for Research, IRRI, talks to visitors of the IRRC activities in SE Asia at the IRRI exhibition corner in Fribourg. Later, Dr. Dobermann delivered a talk titled "Our daily portion of rice – Results of Swiss Cooperation with the International Rice Research Institute IRRI". Photo by IPI.