System of Rice Intensification (SRI):

Practices and Results in the Philippines

by Roberto S. Verzola

Coordinator, SRI-Pilipinas

Contact: SRI-Pilipinas 108 V.Luna Road Extension, Sikatuna Village, Quezon City 1101

(rverzola@gn.apc.org, 0919-608-7073)

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Abstract

This paper traces briefly the origins of the System of Rice Intensification (SRI) in Madagascar. It then reviews the range of practices and results from field trials of SRI in the Philippines, based on the reports from groups, institutions and individuals which have tried SRI and on personal interviews with SRI practitioners and researchers. The current average yield of SRI trials is about 6.4 tons/ha, 114% more than the national average of 3.0 tons/ha. Return on investment (ROI) ranges from 78% to 452%. Worldwide, yield gains from SRI have ranged from 14% in China to 209% in Gambia. Aside from increased yield gain, the SRI effect results in phenotypically distinct plants which produce 30, 50 or even 70 tillers with correspondingly vigorous root growth. The government hybrid rice program already includes some of the management practices that SRI has shown to be productive, like single seedlings and wider planting distances. This suggests that some of the reported hybrid rice yield gains are due to the SRI effect and not to changed genetic potential. The paper proposes: 1) a scientific conference on SRI, 2) more research on SRI practices, 3) nationwide verification trials, 4) widespread farm-scale trials, and 5) a review of the government rice program to include SRI in the DA budget.

Introduction

The System of Rice Intensification (SRI) was developed by a Jesuit agriculturist Fr. Henri de Laulanie and Madagascar colleagues working with him in the 1980s and the 1990s, as they

studied ways to increase the low yields of Madagascar farmers. From Madagascar's poor soils which yielded usually an average of 2 tons/ha., SRI methods coaxed yields of 6, 8 and even 10 tons/ha, while reducing the farmers' cost for water, seeds and external inputs. In 1990, Fr. de Laulanie and his colleagues set up an NGO called Association Tefy Saina ('to improve the mind') to develop SRI further and to promote it among Madagascar farmers.

After learning the dramatic yield gains reported for SRI, the Cornell International Institute for Food, Agriculture and Development (CIIFAD) began working with Tefy Saina in 1994. For three years, CIIFAD director Prof. Norman Uphoff and other Cornell researchers withheld judgment, seeking to understand the mechanisms of SRI and to assess farmers' results. During that time, Prof. Uphoff chose not even to mention SRI in public, lest Cornell's name be associated with what might turn out to be a hoax (personal communication, March 18, 2004).

At the end of three years, when farmers who had gotten 2 t/ha were averaging over 8 t/ha, and some had yields in the 12-14 t/ha range, Uphoff was satisfied that an important new opportunity was at hand that could contribute to food security, reducing poverty, agricultural modernization, and environmental conservation, and he began trying to get SRI evaluated in all the major rice-growing countries.

Today, SRI effects have been demonstrated in at least 19 countries in Africa, Asia and Latin America. Yield gains have ranged from 14% in China, where yields are already very high to begin with, to over 200% in The Gambia, where the low national average leaves a lot of room for improvement. Table 1 summarizes available information about SRI yield gains throughout the world.[1]

[1] A recent report from the Sichuan Academy for Agricultural Sciences found that compared with the usual hybrid rice yield of 8.65 t/ha with standard methods, SRI methods as adopted from Madagascar gave 10.42 t/ha, a 20.4% increase, while adaptations of these methods to suit local conditions, different spacing, etc., gave 13.39 t/ha average yield, a 54.8% increase (Zheng et al., 2004).

In the Philippines, SRI was first tried in 1999 as discussed below. Starting in March 2002, there has been a series of three annual national SRI workshops hosted by the Philippine Rural Reconstruction Movement at its headquarters in Quezon City, which Prof. Uphoff has been able to attend with 50-70 participants from Isabella to Mindanao, more rapid spread of SRI has begun in the Philippines. Today, a national debate is emerging on whether SRI should get as much support from the government as the hybrid rice program. It is therefore important to look closely at this method of growing rice.

Table 1. Average conventional and SRI yields from 13 countries (tons/hectare)[2,3]

Country	No. of data sets (No. of farmers)	Average Comparison Yield (t/ha)	Average SRI Yield (t/ha)	Maximum SRI Yield (t/ha)	% Increase due to SRI
Gambia	1 on-farm (10) 1 on-station	2.3 [2.0-2.5]	7.1 [6.8-7.4]	8.8 [8.3-9.4]	209%
Madagascar	11 on-farm (3,025) 3 on-station	2.6 [1.5-3.6]	7.2 [4.2-10.35]	13.9 [5.6-21.0]	177%
Myanmar	121 farmers field school trials	2.0	5.38 [2.0-15.3]	15.3	169%
Sri Lanka	6 on-farm (275) 2 on-station	3.6 [2.7-4.2]	7.8 [7.0-13.0]	14.3 [11.4-17.0]	117%
Sierra Leone	8 on-farm (160)	2.5 [1.9-3.2]	5.3 [4.9-7.4]	7.4	112%
Nepal	13 farmers field school trials	4.2 - FP [3.0-5.2] 6.27 - IP [3.8-8.5]	8.5 [7.5-11.0]	11.0	102%
India	On-farm trials (134)	4.0 [2.0-6.0]	8.0 [3.2-16.2]	15.3 [14.3-16.2]	100%
Philippines	4 on-farm (47) 1 on-station	3.0 [2.0-3.6]	6.0 [4.95-7.6]	7.4 [7.3-7.6]	100%
Cambodia	3 on farm (427)	2.7 [2.0-4.0]	4.8 [3.4-6.0]	12.9 [10.0-14.0]	78%
Cuba	17 on-farm trials	4.3 [1.6-7.6]	7.4 [3.0-12.0]	13.3 [12.0-14.0]	72%
Indonesia	2 on-farm 5 on-station	5.0 [4.1-6.7]	7.4 [6.2-8.4]	9.0 [7.0-10.3]	48%
Bangladesh	4 on-farm (261) 6 on-station	4.9 [4.4-5.0]	6.3 [5.25-7.5]	7.1 [5.6-9.5]	29%
China	7 on-station w/ hybrid varieties	10.9 [10.0-11.8]	12.4 [9.7-15.8]	13.5 [10.5-17.5]	14%

Uphoff's note: The summary numbers are unweighted averages of data reported from a variety of on-farm and on-station trials, giving a representative range of outcomes to date where SRI methods have been utilized mostly as recommended.

[2] Uphoff, Norman. Paper for International Year of Rice Conference, FAO, Rome. Feb. 12-13, 2004, from the Cornell International Institute for Food, Agriculture and Development, Ithaca, NY.

Materials and methods

SRI-Pilipinas is a network which brings together farmers' groups, NGOs and researchers who are trying out, practicing or promoting SRI. As coordinator of this network, this author has been collecting reports of SRI trials now going on in many parts of the country and interviewing SRI practitioners and researchers. From these reports, certain initial conclusion may be made about the effectiveness of SRI under Philippine conditions.

Reports on SRI trials include: 1) the ATI-Kabacan field day report of Oct 2002; 2) the BIND report, 3) the Jaranilla report; 4) two NIA reports, and 5) a thesis by Mulu Osbech for her master's degree in agronomy from U.P. Los Banos. These are supplemented here by the author's interviews with Mr. Vic Tagupa of Xavier University; Mr. Salvio Makinano in the Bohol Provincial Agriculturist's Office; Mr. Ismael Mata of ABRAMS; Mr. Isagani Serrano of PRRM; Mr. Bernie Aragoza of the Office of the Governor of Cavite; and Ms. Au Corrales of PhilRice.

Results and discussions

In the Philippines, SRI was first tried in 1999 by the Consortium for the Development of Southern Mindanao Cooperatives (CDSMC), resulting in a yield of 4.6 tons/ha. In 2000, Director Edwin Acoba of the Agricultural Training Institute (ATI) learned about SRI from an international conference he attended in Indonesia. He gathered his researchers and encouraged them to try it out. Only one it seems, did. Supervisor Noë Ysulat of the ATI in Kabacan in Mindanao tried SRI, and he got 7.2 tons/ha the first season and 7.6 t/ha the next. In his third season, summer 2002, using three different PhilRice varieties, he got an average of 12 tons/ha! Director Acoba was so impressed with the results that he made plans for a large-scale SRI trial in Cotabato that would cover 1,000 hectares. He had already identified a funder for the project and

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[3] Uphoff, Norman. *International Journal on Sustainablility*. Vol. 1 No. 1. 2003.

was making the detailed arrangements when, sadly, cancer took his life in April 2002.

Table 2 contains many of the results so far, including contact information for purposes of verification and further data gathering. While the information is not uniform in its details (some yield estimates are based on actual farmers' field harvests, others are from plot-sized trials; some are based on documented reports, others are oral reports in interviews and meetings), the total data set gives the reader a good idea of the yields coming from SRI as currently practiced in the Philippines. The average yield calculated by Uphoff from SRI experience reported by Gasparillo (2002) was 6 tons/ha. In this paper, with more and more diverse SRI experience to consider, we can say that average SRI yields in the Philippines are currently 6.4 tons/ha, which is a yield gain of around 114% over the current national average. This relatively high yield gain puts the Philippines ahead of India, Nepal and Sierra Leone, but behind Sri Lanka.[4]

Even if potential measurement or extrapolation errors are factored in, the magnitude of the yield increases cited suggests that there is indeed an "SRI effect," i.e., substantial yield gains can be expected when SRI practices are implemented. Furthermore, the reported yield gains come not only from farmers groups and NGOs, but also from government agencies; from farmers' fields as well as experimental plots. The reports by ATI Kabacan, NIA-SPISP, BIND, Pabinhi and OPI, in particular, are well documented and cannot be lightly dismissed.

Given the present average yield in the Philippines of 3 tons/ha, the data suggest that a 50% yield gain should be easily attainable, and a doubling of yield is quite possible, when SRI is implemented correctly. The actual yield gain from the "SRI effect" will of course vary based on the variety used, local conditions, and how well the SRI practices are implemented.

[4] SRI is spreading rapidly in the Indian state of Andhra Pradesh, having just been introduced in summer 2003, with 300 on-farm comparison trials. SRI yields averaged 8.34 t/ha, compared with a state average of 3.87 t/ha. The average from SRI trials was over 10 t/ha in 5 of 16 districts with a highest yield of 16.2 t/ha (Dr. Alapati Satyanarayana, Director of Extension, Andhra Pradesh Agricultural University, personal communication).

Table 2. Results from SRI Trials throughout the Philippines (tons/hectare)[5]

SRI Trial by	Trial plot/ field area (hectares)	SRI Yield Range (tons/ha)	Average SRI Yield (tons/ha)	Contact Person
ATI-Dept of Agriculture Kabacan, Cotabato (2002)	0.5	11.6-12.5	12	Noë Ysulat[6] 0919-406-8084
Xavier U Coll of Ag – SusAg Center, Cagayan de Oro		7-11		Vic Tagupa 0916-510-4452
Gratia Plena, Nueva Ecija		?-9.8		Ross Quinn[7] 0919-558-9851
Natl Irrigation Adm-SPISP, Negros Occ.	0.05	6.3-9.2	7.7	Dr. Roger Lazaro[8] 0927-414-8456
Natl Irrigation Adm-SPISP, Agusan del Sur	1.0		8.9	Dr. Roger Lazaro[9] 0927-414-8456
ABRAMS, Negros Occ.	11		8.0	Ismael Mata 0920-815-0749
Department of Agronomy, UPLB, Laguna (wet season)	.04	4.5-8.1	7.6	Dr. Oscar Zamora[10] 0919-461-7711
Department of Agronomy, UPLB, Laguna (dry season)	.04	2.5-4.4	4.6	Dr. Oscar Zamora[11] 0919-461-7711

[5] Unless otherwise noted, all data on this table were obtained through personal communication by the author with the contact person.
[6] Personal interview with Noë Ysulat on March 20, 2004. See also Ysulat, Noë. *System of Rice Intensification Field Day Report*. Agricultural Training Institute (ATI), Department of Agriculture, Kabacan, Cotabato. October 23, 2002.
[7] Outreach Philippines, Inc (OPI). *Report of Trial on System of Rice Intensification (SRI)*, 630 Sampaguita St., Milbuena Subidivision, Magsaysay Sur, Cabanatuan City 3100, Nueva Ecija, Tel: 044-463-5585. 2003.
[8] Adla-on, Allyn S., Flor L. Magballo, Rene Q. Nombre and Joel A. Basiao (interpreters of narrative accounts from participating farmers). *Water-saving, High-yielding TPQM and SRI Trial Runs and Demonstrations*. National Irrigation Administration – Southern Philippines Irrigation Sector Project. 2004.
[9] Salazar, Carlos S. and Roger C. Lazaro. *System of Rice Intensification Trial Run in Caraga Region, Mindanao*. National Irrigation Administration – Southern Philippines Irrigation Sector Project (NIA-SPISP). 2004.
[10] Mulu, Dobech. *Effect of Seedling Age, Spacing and Season on Phyllochrons, Yield and Components of Yield with SRI* (Masters' Thesis). Department of Agronomy, University of the Philippines Los Banos. 2004.
[11] Masters' Thesis, Mulu

Broad Initiatives for Negros Devt, Negros Occ.: farmers' fields, irrigated, 2002-03	5.6	3.8-6.0 18 farms; 12 varieties	4.0	Boni Sanchez[12] 0919-660-9031,
BIND: Negros Occidental, farmers' fields, rainfed, 2003	1.5	2.1-4.6 5 farms; 5 varieties	3.3	Boni Sanchez[13] 0919-660-9031
BIND, Negros Occidental, test plots, irrigated, 1999-2003	0.16	2.4-7.4 5 varieties; 3 spacings	4.4	Boni Sanchez[14] 0919-660-9031
Phil Rural Reconstruction Movement, Bataan	1.0		7.4	Gani Serrano 0917-810-3241
PABINHI, Guimaras 2002 cropping	0.58		4.1	Rene Jaranilla[15] 0920-290-0321
PABINHI, Guimaras 2003 cropping	0.58		7.1	Rene Jaranilla 0920-290-0321
Office of the Provincial Agriculturist, Bohol		4-8.9	6	Salvio Makinano 0919-694-0493
Office of the Governor, Cavite (on-farm trials)		4-6		Bernie Aragoza 0920-910-9152
PhilRice, Nueva Ecija (PhilRice test plots)		3.9-5.3		Au Corales 0919-393-1325
Panay Rural Devt Center, Iloilo (2003, 1st cropping)	0.7		5.1	Chito Tionko 0919-558-1348
Panay Rural Devt Center, Iloilo (2003, 2nd cropping)	1.0		4.1	Chito Tionko 0919-558-1348

[12] Broad Initiatives for Negros Development (BIND). *Mainstreaming SRI in Negros Occidental*, Door 1, Adela Arcade, Don Vicente Bldg ., Locsin St., Bacolod City, Negros Occidental. 2004.
[13] Ibid.
[14] Ibid.
[15] Jaranilla, Rene, Dionito Enaño and Gerry Garingalao. *System of Rice Intensification: PABINHI Farmers' Experience (Powerpoint Presentation)*. 2003.

Consortium for the Devt of Southern Mindanao Cooperatives (1999)			4.95	Felee Delfin[16] 0920-212-3813
Community One Resource Devt, Nueva Ecija			4.7	Felee Delfin[17] 0920-212-3813
Outreach Philippines Inc., Nueva Ecija	.126	4.46-4.51	4.5	Felee Delfin[18] 0920-212-3813
CONSERVE, Pres. Roxas, Cotabato (1999)	.05		3.5	SEARICE[19] 922-6710
TOTAL AREA	23.926 hectares	AVERAGE YIELD	6.44 tons/ha.	

The most common SRI practices in the Philippines include the following:

1. Early transplanting at the two-leaf stage, when seedlings are around 8-12 days old.
2. Wider spacing (25 x 25 cm up to 40 x 40), and one seedling per hill.
3. Minimize trauma during transplanting; do not remove the seed sac or the soil from the roots, avoid root damage; finish transplanting within 30 minutes.
4. No continuous flooding during the vegetative growth stage. SRI water management practices may be grouped in two: a) keep the soil moist, not flooded, throughout the growing season, or b) alternately wet and dry the fields every few days but never more than a week of flooding.
5. Control weeds and aerate the soil with a rotary weeder, every 10-14 days.
6. Use compost in place of inorganic fertilizers.

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[16] Outreach Philippines, Inc (OPI). *Report of Trial on System of Rice Intensification (SRI)*, 630 Sampaguita St., Milbuena Subidivision, Magsaysay Sur, Cabanatuan City 3100, Nueva Ecija, Tel: 044-463-5585. 2003.
[17] Ibid.
[18] Ibid.
[19] CONSERVE. *2000 CONSERVE Annual Report*. Conserve, Poblacion, Pres. Roxas, Cotabato. 2000.

The SRI effect

The SRI effect can be seen not only in the yield gains, but also in the rice plants themselves. Plants grown under SRI practices manifest a very different phenotype. They show profuse tillering, with 30 or more tillers not uncommon, and some plants producing 50, 80 or even more tillers. An SRI plot by farmer Ponciano Daga-as of Bgy. Tugas, Candijay, Bohol, for instance, showed most plants having more than 40 tillers each. One rice plant had 67 productive tillers. Another had 63, out of 74 tillers.[20] In other countries, up to a hundred tillers have been reported.

The profuse tillering under SRI is accompanied by an equally vigorous root growth. This effect can be easily observed by uprooting a plant towards the end of its growth stage. Rice plants grown under flooded conditions show a sparse unhealthy root system, with as much as three-fourths degenerated by the time flowering starts due to the hypoxic soil conditions. Rice plants grown under SRI, on the other hand, show vigorous and deep root growth. With experience and practice, according to an agronomist, one can even learn to distinguish by sight which plants were grown under SRI and which were grown conventionally.[21]

Gains in productivity, profitability

As important as the yield gains from SRI, however, are the cost reductions. Productivity is improved from several perspectives. The SRI practice of planting singly and with wide spacing reduces seed costs dramatically because the typical seed requirement with SRI is only 5-10 kg/hectare, compared to 40 kg/hectare or more under conventional transplanting practices. Direct seeding requirements can go as high as 100 kg of seed per hectare.

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[20] Daga-as' SRI plot was visited by the author and Bohol Agriculture official Salvio Makinano on April 17, 2004.

SRI also reduces water costs because the soil needs only to be kept moist, or kept alternately wet and dry, rather than flooded for the entire growing season. The lower water requirement is borne out by a NIA study which showed that fields under an SRI regime had 33% less water requirements compared with fields under a conventional regime.[22]

Furthermore, SRI reduces external inputs costs by encouraging the farmer to use readily available organic materials like leaves, straw and animal manure for compost instead of expensive inorganic fertilizers.

Whether SRI always requires more labor is still a matter of debate. Skeptics claim that SRI is too labor-intensive to be acceptable to farmers.[23] In particular, mechanical weeding with a rotary weeder requires more labor than simply flooding the field throughout the growing season or spraying herbicides. However, farmers who have mastered SRI methods report that SRI actually requires somewhat *less labor* once one becomes familiar with its techniques. Statistical analysis of Cambodian SRI experience made by GTZ consultants confirmed that SRI can reduce labor requirements slightly, compared to conventional approaches.[24] There are also innovative approaches to weed control. BIND, for instance, has been experimenting with mulching instead of weeding, with very good effect.[25] Farmers are continually making innovations in SRI to reduce its labor requirements, so that no final assessment on this point is possible at present. With the reduction in seed, water and external input costs, plus the 50-100% yield gain from SRI, the farmer is bound to improve his profitability dramatically when using SRI methods.

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[21] This comment was made by Dr. Maxwell Whitten, FAO consultant who visited the PABINHI office in Los Banos, Laguna on April 12, 2004 in the course of a fact-finding mission for FAO on SRI in selected Asian countries.
[22] Magballo, op cit.
[23] See, for instance, the comments of DA Sec. Luis Lorenzo and DA Rice Program Director Frisco Malabanan, which appeared in Manila Times, p. B2. April 19, 2004.
[24] Anthofer, Jurgen, Vanny Kuon and Kosal Oum. *Potential of the System of Rice Intensification in Cambodia* (Powerpoint presentation). GTZ. 2004. A survey of 154 SRI farmers, randomly selected by the NGO CEDAC in December 2002 found that 71% said that SRI required less labor from them; only 6% said it required more labor.
[25] BIND, op cit.

Improved profitability for the farmer under the SRI approach is borne by the experience of some local SRI practitioners.

Rene Jaranilla, for instance, estimated that his costs of production with conventional methods was P12,310/ha, givng a negative net income of P3,310 with a ROI of -27%; with SRI, his costs were only P7,510/ha with a net income of P9,890 (ROI=132%).[26] In addition to SRI, Jaranilla practices nature farming through the use of indigenous microorganisms, which helps reduce expenses in his farm.

SRI as practiced by three farmer field school groups working with NIA had SRI costs per hectare nearly three times the conventional costs (P30,945 SRI vs. P10,948 conventional), but their SRI profitability was nonetheless more than three times greater than the conventional approach (P24,054 vs. P7,592).[27] The ROI with SRI was 78%, while the conventional approach had an ROI of 69%.

What is not often accounted for in studies like these are the environmental and health costs of the use of agrochemicals, e.g. accumulate of nitrate in the groundwater. When better yields can be obtained without requiring use of inorganic fertilizers or herbicides, there is an even higher social return on investment as an added and especially welcome bonus.

The most interesting result of all was the trial conducted by ATI Kabacan, comparing a hybrid variety, PSBRc 72H with two inbreds PSBRc 82 and PSBRc 18. A summary of the findings is given in Table 3 and Table 4:

[26] Jaranilla, op cit.
[27] Magballo, op.cit.

Table 3. Production Analysis from ATI Trials of SRI, Cotabato, Summer 2002

Variety	**PSB Rc 72H**	**PSBRc 82**	**PSB Rc 18**
Date sown	July 8, 2002	July 8, 2002	July 8, 2002
Date harvested	October 27, 2002	October 22, 2002	October 27, 2002
Distance of spacing	25x25 cm	25x25 cm	25x25 cm
Plants per hill	1	1	1
Hills/m^2	16	16	16
Panicles/hill (ave.)	20	25.8	31
Grains/panicle (ave.)	191.26	155.86	159
Grains/hill (ave.)	3,825	4,822	4,921
Yield/m^2 (kg)	1.16	1.25	1.2
Yield (t/ha)	**11.6**	**12.5**	**12.0**

Data from: *SYSTEM OF RICE INTENSIFICATION (SRI) FIELD DAY REPORT,* ***October 23, 2002, Agricultural Training Institute, Department of Agriculture, at University of Southern Mindanao, Kabacan, Cotabato, Mindanao, Philippines*****,** page 27.

It is interesting to see in Tables 3 and 4 that under an SRI regime, hybrid and inbred yields were practically the same, with the inbreds showing a slight edge in yield and a bigger edge in ROI.

Table 3. Economic Analysis from ATI Trials of SRI, Cotabato, Summer 2002

Variety	**PSB Rc 72H**	**PSB Rc 82**	**PSB Rc 18**
Area (ha)	1	1	1
Crop Year	July-Oct. 2002	July-Oct. 2002	July-Oct. 2002
Inputs: seeds, agrochemicals, fertilizers (inorganic)	3,700	3,320	3,320
Other expenses: land preparation/leveling, transplanting, fertilizer application, spraying, irrigation fee, sacks	5,830	5,830	5,830
Non-cash expenses: harvester, thresher	14,848	16,000	15,360
Total Expenses	**24,378**	**25,150**	**24,510**
Yield (kg)	11,600	12,500	12,000
Income @ 8 pesos/kg	**93,800**	**100,000**	**96,000**
Net Income	**68,422**	**74,850**	**71,490**
ROI	280%	298%	292%

Data from: *SYSTEM OF RICE INTENSIFICATION (SRI) FIELD DAY REPORT,* ***October 23, 2002, Agricultural Training Institute, Department of Agriculture, at University of Southern Mindanao, Kabacan, Cotabato, Mindanao, Philippines*****,** page 28.

Claims for yield gains of rice hybrids over the best inbreds usually range from 15-20% in official publications to 100-200% in newspaper accounts.[28] However, the recommended management practices for hybrid rice include single seedlings per hill and wider spacing between

[28] See, for instance, Roderick de la Cruz, "DA sold on Gloria hybrid rice; cites SRI as an option." *Manila Times*, April 19, 2004, where DA Uundersecretary Frisco Malabanan was quoted saying " the best technology so far is the scientific planting of hybrid rice, which could double or even triple the yield of farmers."

hills, which are SRI practices. This suggests that at least a portion of the yield gains from hybrid rice comes from the management practices and a possible 'SRI effect' instead of the genetics. How much of the yield gain is due to management practices and how much due to genetics is a matter for further study and can be the subject of experimentation.

Considering that the government has budgeted P800 million for the commercialization of hybrid rice and will borrow another US$200 million from China to promote the use of hybrids, while nothing is being allotted for the evaluation and promotion of SRI, this issue may become of major importance as knowledge about SRI spreads.

Summary and conclusion

SRI has been validated in at least 19 countries, and is spreading in at least a dozen. It is providing yield gains of between 14% to 209%, on top of the reduced costs that come from the use of less seeds, less water and no chemical fertilizers. In the Philippines, SRI yields have ranged from 3.3-12 tons/ha, under trials done by both farmers and researchers in farmers' fields as well as on experimental plots. Available data suggest that most farmers can get 50-100% yield gains from SRI with lower costs of production and less water use.

SRI produces a very distinct and more productive phenotype marked by a very high tillering rate together with vigorous root growth. Both combine to provide more grains per square meter compared to conventional planting methods. Because SRI plants are commonly more resistant to pests and disease, as well as to abiotic stresses like drought and storms, risk is reduced as well as cost. In addition to the yield gain, SRI may be able to reduce farmers' labor requirements once they master its methods. Such a rare combination of greater yields with lower costs is bound to have dramatic impact on farmers' incomes.

Given the potentially huge benefit that can be gotten from successfully implementing SRI, this paper therefore suggests the following steps to the PSSST and the government:

1) Hold a scientific conference to compile and assess the state-of-the-art in SRI practices, principles and theory.

2) Conduct research on the responses of yield and profitability to variations in the different SRI practices (transplanting age; plant spacing, variations in water management, different compost formulations, etc.) as well as to different varieties. The highest yields with SRI thus far have come with high-yield varieties or hybrids; however, traditional varieties are producing 6-12 t/ha in Sri Lanka, with higher returns to farmers because of their higher market value. So yield and profitability should be assessed jointly.

3) Conduct nationwide verification trials on SRI and its impact on the yield and profitability of hybrid rice, modern inbreds, and traditional varieties.

4) Conduct farm-scale trials on SRI to further develop it as an option to Filipino farmers. Evaluate variations and particularly farmer innovations in the recommended SRI practices to adapt them to local conditions.

5) Review the government rice program and incorporate in the budget of the Department of Agriculture an allocation for SRI research, evaluation and promotion that is proportional to its potential contribution to our national rice self-sufficiency program and to the profitability of the Filipino farmer.

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