Water Saving-High Yielding TQPM & SRI Trial Runs and Demonstrations[1]
In the Magballo-Balicotoc-Canlamay Integrated Irrigation Sub-project

I. Background Information

The Magballo-Balicotoc-Canlamay Integrated Irrigation Sub-project (MBCIIS) in the Southern Philippines Irrigation Sector Project (SPISP) of the National Irrigation Administration (NIA) with loan funds from the Asian Development Bank (ADB) is located in the upper barangays of the Municipality of Ilog and City of Kabankalan. The subproject site is about 123 kms. south of Bacolod City, the capital center of the Province of Negros Occidental. Its service area is comprised of some 737 hectares presently planted to sugarcane and rice with small patches of corn and vegetables. There are 554 households-beneficiaries, which were organized into Turn-out Service Area Groups (TSAGs) in each sitio, then into an Integrated Farmer Irrigators Associations (IFIAs) in each barangay, and later into the Magballo-Balicotoc-Canlamay Federation of Integrated Farmer Irrigators' Associations (FIFA).

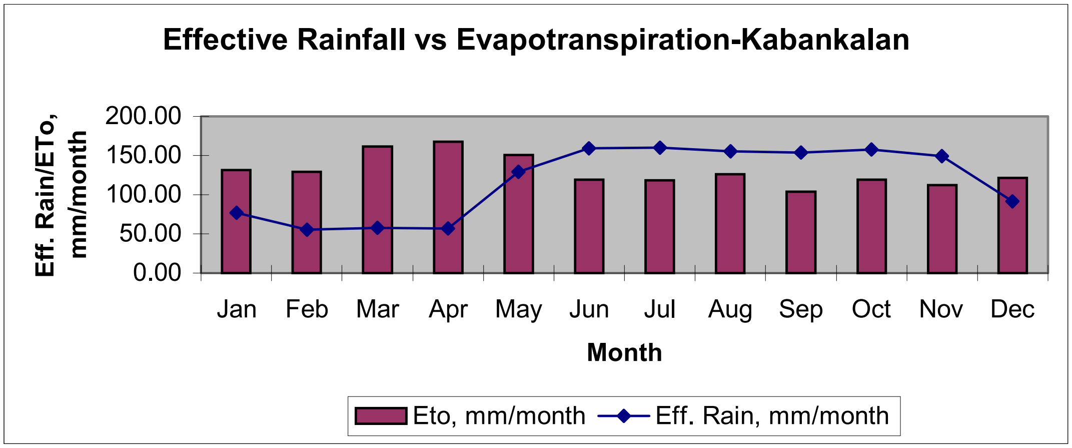
With the completion and favorable results of the recently concluded Community Review and Endorsement (CRE), the subproject is now on its Detailed Design phase. The partner-households who have been actively involved in every undertaking since the feasibility study phase are more than eager to participate and contribute in actually data gathering, analyzing the results and deciding on final development option or strategy selection. Construction of the project civil works is targeted to commence in the middle of this year (2004).

The proposed irrigation scheme comprises the combination of one dam-reservoir, three run-of-the-river-diversion dams, and five pump-set irrigation systems. With these interventions, the present sugarcane fields will gradually be converted into either vegetables or rice farms. Consequently, concerns for the high cost of pumping, if rice crop would continue to be pursued, pushed through the establishment of pilot demonstration farms for introduction to options and capability development thereof. The option on rice cultivation that promises not only at least a two-fold increase in the present rice crop yield but also a 50% savings in pumped irrigation water were concurrently pursued along with the crop diversification. Two alternatives, i.e. the System of Rice Intensification (SRI) as well as the Total Quality Production Management (TQPM) were tried. SRI, similar to the Margate System of Rice Production popularized in the Philippines some 30 years ago, was introduced by Dr. N. Uphoff who visited the province and presented a paper at the Irrigators' Association Congress held in Bago, Negros Occidental in 2003. TQPM is an effort of the Agricultural Training Institute (ATI). It applies some booster inorganic fertilizer after land preparation, followed by the application of organic fertilizer.

The high cost of pumping, if rice crop would continue to be pursued even in the pumped irrigation water schemes, is a major concern. The Effective Rainfall-Evapotranspiration hydro-climatological data from this (Visayas) region indicated a more uniformly distributed amount of rainfall throughout the year, that is slightly different from the

[1] An interpretation of the narrative accounts from the participating farmers from the Magballo-Balicotoc-Canlamay Integrated Irrigation Schemes to the concerned Institutional Development Officers, headed by Ms. Flor Magballo, and Technical Staff, under the leadership of Engr. Joel A. Basiao, of the subproject and shared with the SPISP Central Project Management Office staff and the Consortium of Consultants.

Mindanao area. There are certain consecutive periods when rainfall is negligible in amount thus creating the necessity of irrigation. The presence of excess rainfall, however, also warrants drainage, particularly for diversified crops. The plot of the effective rainfall and evapotranspiration using the hydro-climatological records compiled for the municipality of Kabankalan as well as from the CLIMWAT database and the CROPWAT Computer Software from FAO (19__) are shown below.



Note that the months starting with December through May showed that the ETo far exceeds the available effective rainfall as a source of water. During these months therefore provision of aeration in the soil may not be a problem; it would be natural but the irrigation water-pumping requirement could be considerable. Any water-saving strategy such as those offered by SRI and/or TQPM would therefore be important. However, during the rest of the wetter months from Jun through November the effective rainfall is far greater than the ETo. Irrigation water supply during this period may be applied very sparingly indeed but drainage of the excess rainfall must be considered if aeration needs to be achieved. Pumping cost, nevertheless, would not be a considerable expense then. Water-saving results from studies from China by Mao Zhi (19__) are shown below. The savings in percolation lost during the drying-out period can be significant when compared

Irrigation Method	Eto	Percolation	Totals
Strategy	Mm	Mm	mm
Shallow Flooding	765.40	514.90	1280.30
Water Saving	688.80	169.30	858.10
Difference (Saving)[2]	66.60	345.60	422.20
(%)	8.70%	67.12%	32.98%

[2] Computed using given data from: Environmental Impact of Water-Saving Irrigation for Rice, by Mao Zhi, Department of Irrigation and Drainage Engineering, Wuhan University of Hydraulic and Electrical Engineering, Wuhan, China.

to the deep water flooding of rice fields being practiced in the Philippines. Thus the greatest savings that could be achieved would be the percolation losses that only apply during the short period time that the soil is saturated or with standing water.

II. The System of Rice Intensification (SRI)[3]

The concepts of SRI was first heard by the Sub-Project Management Office (SPMO) staff from BIND, an NGO operating within the Province, but it was not taken seriously until Dr. Norman Uphoff personally shared the technology with over 600 farmer-representatives during the Irrigators' Associations Congress in Bago City last March 12, 2003. The SPMO staff became more interested with SRI when Dr. Uphoff subsequently made a special effort to visit the sub-project's pilot techno-demo farms and discussed the system again, for a second time, with the farmers of Brgy. Magballo, Balicotoc and Canlamay.

Enthusiastic farmers immediately embraced the concept and a few discussed seriously how to try the technology at least on a small scale. The federation which had been trained to learn from actual experience suggested that SRI be gradually adopted in the area through trial farms. So a series of meetings wase undertaken that came up with a plan on how SRI will be started in the project area. The plan suggested that SRI would be initially tried along with the Total Quality Productivity Management (TQPM) in a small trial farm in Brgy. Balicotoc in the succeeding first cropping season. The farmer representatives of four groups collectively undertook activities in the trial farm with TSAGs overseeing its management and doing data-gathering with the federation president keeping the records. To provide support to the farmers, the SPMO assigned one staff member to pursue the study with them during the establishment and operation of trial farms.

The results of this initial trial were presented to the farmers and were used as inputs to the feasibility study. Everyone was impressed by the initial results obtained so the federation planned to continue the trial run during a second cropping season, however the rice plants did not survive the drought. The federation decided that SRI and TQPM will be continued during the dry season cropping only in Brgy. Magballo, where a communal irrigation system exists. This cropping season, a total of 2.04 has. were planted following SRI, and some of rice plants are now in their vegetative stage.

The federation set out to achieve the following objectives:

1. To determine the actual reduction of irrigation water utilization and its effects on rice growth that can be achieved with SRI.
2. To see if further increases in yield per hectare can be obtained even with larger field plots.
3. To produce chemical-free rice that can demand a higher price with the claim that the taste would be better.
4. To eventually reduce the cost of inputs while maximizing the utilization of available manpower.
5. To reduce the cost of weeding through a hand-pushed rotary weeder.
6. To improve soil fertility with the return of microorganisms.

[3] This report is best read in conjunction with an accompanying power point presentation that contains pictures.

III. Farming Operation Practices and Activities Undertaken

A. Cultural Practices

1. Variety Selection – The first trial farm at Barangay Balicotoc used Hybrid PSBRC72H instead of the commonly used variety in the community. This variety had not been planted in the area before. In Brgy. Magballo, farmers opted to use PSBRC18, which is very common to them.

2. Raising of Seedlings. Generally, the seedlings were raised following the SRI concept but the materials for raising seedlings varied from one participating farmer to another farmer. During the first trial, the seedlings were grown on half-split bamboo trunks; in the second attempt, plastic sheet were used. Other participants settled for sack cloth cut into small squares. The utilization of sack cloth was so far the most practical and economical base on which to use the medium consisting of soil mixed with compost and carbonized rice hull ash.

3. Land Preparation. The farmers followed their usual practices of land preparation, using a rotavator with hand-drawn small tractor machine, followed by animal-drawn peg-tooth harrowing and leveling with the peg-tooth harrow embedded in a banana trunk. This farm operation lasted for about 3 to 4 weeks.

4. Transplanting. Seedlings were transplanted at the age of 8-12 days and at three distances for the first trial farm; the three spacing were 25 x 25, 35 x 35 and 45 x 45 cms. In the succeeding trial demo farms the spacing distances adopted by the participating farmers with suggestions from the agronomist of the Consultants' Consortium were 30 x 30, 40 x 40 and 35 x 17.5 cms. . The later spacing is an expressed desire from the participating farmers that somehow assure them that there would be more plants in the area with less risk. Further the one weeding by mechanical means in one direction is being supplemented by manual weeding.

5. Fertilization. The farmers used purely organic fertilizer applied as basal at the rate of 100 bags/ha. for the first trial farm while in the succeeding trial demo farms the farmers adopted a lower rate of 60 bags/ha. to see if this reduction would have a negligible effect on yield.

7. Pest Control. So far, none of the farms applied chemical pesticide, as farmers did not observe any occurrence of pest infestation.

8. Weeding. Weeding was done four times using an improvised mechanical rotary weeder at 10-15 days interval . This method is supplemented by manual weeding to get rid of weeds growing close to the rice plant and not accessible or missed by the mechanical weeder.

B. Water Management. Water management in the first trial farm was difficult as it was carried out during the rainy months. The intermittent application of irrigation water was attempted with a fixed interval, but the rainfall keeps varying the schedule. In the present trial demo farms, which is during the drier season, irrigation water is applied every 15 days interval. This practice might change later depending on the observations of the farmers.

C. Harvesting and Threshing. Native scythes were used in harvesting cutting stalks about 4 inches above the ground. A custom-hired small thresher did the palay threshing.

IV. Data Collection

Initially, data gathering followed the principle of Agro-Eco System Analysis (AESA) introduced by the agricultural extension technicians during the season-long Farmers Field School (FFS). Weekly observations were done on randomly selected sample plants that are strategically spread in the trial farm. Plant height, number of leaves, number of tillers, presence of pest and insects, plant leaf coloring, and symptoms of diseases are among the data recorded by the farmers. These data were then shared with the other farmers in informal meetings, which become the basis of their discussions, evaluations, and eventual individual decision-making.

This cropping season, a workshop was held to develop a simplified system of monitoring, measurement and recording activities that would still yield significant information. The agreed monitoring format is in file.

IV. Production Inputs

The recorded expenditures on a per-hectare basis were: (1) Farmers' practice -- PhP 10,948; (2) TQPM -- PhP 16, 320; and SRI -- PhP 30, 945. The net farm incomes were, respectively: (1) Farmers' practice -- **PhP 7,592**; (2) TQPM -- **PhP 11,130**; and (3) SRI -- **PhP 24, 054**. The summary tabulated information is provided in the power point presentation. Details on the best practice/results from SRI with 35 x 35 cm spacing are provided there.

Additionally, with SRI, the seed requirement was only about 10 kilograms per hectare, while fertilizer used consisted of 100 bags of organic fertilizer bought at the market. Labor input for raising of seedlings, land preparation, transplanting, fertilization, weeding, harvesting and threshing required about 170 man-days. Almost half of the man-days were spent for raising of seedlings and transplanting, or about 45 percent. Man-days spent for land preparation, harvesting and threshing were almost the same for both SRI and the traditional farmers' practices.

Although the cost of seeds used in SRI is lesser, the fertilizer and labor amounts and cost are higher compared to farmers' usual practice of continuously flooded culture planted at random spacing.

V. Other Relevant Findings

Rice Crop Yields. During the first trial farm on small plots, the best rice crop yield recorded were: (1) Farmers' practice with random spacing -- 66.3 sacks/ha or **2.65**

tons/ha;[4] (2) TQPM with 10 x 30 cm spacing -- 91.5 sacks/ha or **3.66 tons/ha**; and SRI with 35 x 35 cm spacing -- 183.3 sacks/ha. or **7.33 tons/ha**.

As of this writing, the participating farmers had completed only one cropping season on small trial demonstration plots. The results showed that SRI provided an edge compared with TQPM and more so compared with the usual farmers' practice. The SRI plots with a spacing of 45 x 45 cm gave a yield of 6.17 tons/ha, while the yield from 25 x 25 cm spacing was about 5.0 tons/ha.[5] The yield from all three planting distances in the SRI plots was generally much higher (from 85% to172 % more) compared to farmers' practice of planting at random spacing with a production of only 2.70 tons/ha, and it was 37 to100% higher than the best yield obtained from TQPM.

Cost of Production and Returns.

The details of the cost of production and returns from 35 x 35 cm. spacing that provided the highest yield of 7.33 tons/ha and the highest net farm income of PhP 26, 512.24 is given below. The summary data for all the trials and categories is given in the power point presentation.

The net income for SRI planted at 25 x 25 cm was almost the same as that with farmers' practice, but at planting distance of 45 x 45 cm, net income was almost tripled, while for 35 x 35 cm spacing, it increased by about four times.

Derived Cost of Production and Returns

Magballo-Balicotoc-Canmalay Integrated Irrigation Su b-Project
Rice Technology Demonstration Farm Result, CY 2003-2004 Wet Season

PRACTICE: SYSTEM OF RICE INTENSIFICATION
DISTANCE OF PLANTING: 35 X 35 CM.

Items	Quantity	Unit	Unit Cost	Unit	PhP
A . Land Preparation:					
1. Land preparation by rotavation	2.00	number of passes	850.00	per pass	1,700.00
2. Plowing	5.00	Man-animal days	150.00	per man-d	750.00
3. Harrowing	1.00	Man-animal days	150.00	per man-d	150.00
4. Leveling	1.00	Man-animal days	150.00	per man-d	150.00
5. Construction of small canal along	3.33	man-days	60.00	per man-d	200.00

4 One sack of palay or paddy rice in this area weighs 40 kgs.

5 The yield from SRI on a one-hectare trial demo-plot carried out in the Caraga Region 13 on the personal farm of the Regional Irrigation Manager, using 40 x 40 cm spacing and organic fertilizer primarily composed of chicken dung, was 8.9 tons/ha (Bong Salazar, personal communication, 2003).

paddy					**2,950.00**

Items	Quantity	Unit	Unit Cost	Unit	PhP
B . Seed/Seedbed Preparation:					
1. Seed tray preparation made of bamboo	2.00	man-days	60.00	per man-d	120.00
2. Application & gathering of compost as medium	7.00	man-days	60.00	per man-d	420.00
3. Seed sowing, care and maintenance	45.67	man-days	60.00	per man-d	2,740.00
					3,280.00
C . Transplanting:					
1. Making of planting guide	0.25	man-days	60.00	per man-d	15.00
2. Transplanting including making of guide to paddies	12.60	man-days	60.00	per man-d	756.00
					771.00
D . Weeding/Cultivation:					
1. Rotary weeding	11.42	man-days	100.00	per man-d	1,141.88
2. Manual weeding	3.00	man-days	60.00	per man-d	180.00
3. Cleaning of dikes	3.00	man-days	60.00	per man-d	180.00
					1,501.88
E . Organic Fertilizer Application (Basal)	1.41	man-days	60.00	per man-d	**84.38**
F . Agricultural Inputs:					
1. Hybrid seeds	9.30	(20 kgs/bag)	1,200.00	per bag	558.00
2. Organic fertilizer	100.13	bags	110.00	per bag	11,013.75
3. Bamboo for seed medium	31.25	pieces	30.00	per piece	937.50
					12,509.25
G . Irrigation					
1. Labor	15.00	man-days	60.00	per man-d	900.00
2. Fuel for irrigation pump	36.00	liters	18.37	per liter	661.25
					1,561.25
			Total		**22,657.76**
H. Post-Harvest Expenses					
1. Harvester/thresher's share of total harvest (10%)	18.33	sacks	300.00	per sack	5,499.00
2. Hauling	165.00	sacks	2.00	per sack	330.00
					5,829.00
			Total Gross Expenses		**28,486.76**
			Total Gross Income		**54,999.00**

Net Income			**26,512.24**

Water Savings Extrapolation. The amount and timing of irrigation water application was initially programmed as required, i.e. maintain 20 mm of standing water for two days with no application the rest of the days in the 10-day interval. Water is allowed to be used up by the rice plants until some cracking of the surface soil is noticed. Since the study period coincided with the rainy or wetter months, rainfall interfered with the irrigation schedule. An extrapolation was attempted and the results are shown in the power point presentation. About a 67% reduction was estimated with SRI. A possible pumping cost saving of about 160% was calculated. In the succeeding attempt, timed during the dry season and in the existing Communal Irrigation System (CIS), a more careful accounting was planned for implementation.

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