Bangladesh

Maximizing Yield of Boro Rice Through Integrated Nutrient Management

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Research shows potential of greatly increasing rice yields in Bangladesh if nutrient management and other improved production practices are adopted.

THE Bangladesh economy is based on agriculture. Maximum economic yield (MEY) management will help to alleviate poverty and improve the plight of resource-poor, marginal farmers by increasing productivity per unit of land. The whole range of production practices, from appropriate plant population to balanced fertilization, is integrated into MEY systems to attain highest net profits.

Agricultural production has not kept pace with population growth in Bangladesh. A major objective of this study was to identify those production practices which will increase unit crop yields, reduce unit costs and, thus, generate sufficient income to allow farmers to continue to farm. These steps are essential to enable food production sufficient for a growing population.

New technology must also arrest soil degradation and help to assure a cleaner environment. The purpose of this research was to determine the maximum attainable yield of Boro rice under appropriate management.

During 1994 Boro season, two field experiments were conducted at BINA Farm, Mymensingh, and in a farmer field at Magura. There were five treatments, replicated four times in randomized block design, with plot size of 4m x 5m. Fertilizer recommendations for targeted yields were based on the site-specific soil tests. Rates of all fertilizer nutrients except nitrogen (N) were applied at transplanting. Nitrogen as urea was applied in three equal splits at land preparation, maximum tillering and at panicle initiation stages. The rice cultivar BR-14 was planted at a spacing of 15 cm x 25 cm.

Results

Rice yields are presented in **Tables 1 and 2**. Grain and straw yields of Boro rice for both locations were significantly affected by different fertilizer treatments. At the BINA Farm, the highest grain yield

Table 1. Combined effect of mineral and organic fertilization on the grain and straw yield of rice (Boro, var. BR14) grown at BINA Farm, Mymensingh, during 1994.

	Fertilizer treatment, kg/ha					Grain yield, t/ha	Straw yield, t/ha	% increase over control	
No.	N	P	K	S	Zn			Grain yield	Straw yield
T_1	0	0	0	0	0	2.62	2.87	—	—
T_2	200	65	166	40	5	7.15	7.73	173	169
T_3	½ of T_2+5 t/ha cowdung					5.92	6.55	126	128
T_4	T_2+5 t/ha cowdung					6.91	8.35	164	191
T_5*	140	43	83	30	4	6.45	6.63	146	131

*Fertilizer recommendation for high yield goal, from current Fertiliser Guide.

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Table 2. Combined effect of mineral and organic fertilization on the grain and straw yield of rice (Boro, var. BR14) grown at Magura farmer's field during 1994.

	Fertilizer treatment, kg/ha					Grain yield, t/ha	Straw yield, t/ha	% increase over control	
No.	N	P	K	S	Zn			Grain yield	Straw yield
T_1	0	0	0	0	0	3.30	3.87	—	—
T_2	180	65	145	30	4	7.37	7.98	123	106
T_3	½ of T_2+5 t/ha cowdung					5.69	6.58	72	70
T_4	T_2+5 t/ha cowdung					7.11	8.50	115	120
T_5*	140	43	83	30	4	6.32	7.13	92	84

*Fertilizer recommendation for high yield goal, from current Fertiliser Guide.

of 7.15 t/ha was recorded with the T_2 treatment (nutrients for targeted yields of 7.5 t/ha based on soil analysis). The highest grain yield of 7.37 t/ha in the farmer plot at Magura was also obtained with treatment T_2. Lowest grain yields of 2.62 t/ha at BINA Farm and 3.30 t/ha in the farmer plot were recorded in control plots where no fertilizer was added. On the other hand, T_4 gave the highest straw yield of 8.35 t/ha at Mymensingh and 8.50 t/ha at Magura. Application of cowdung along with the fertilizer did not produce any additional yield benefit at either location, other than an increase in straw yield at Magura.

Partial budget analysis and marginal analysis on the total products from the two field experiments were also done. Maximum net benefit of Tk.39,438.00 (US$985.00) was obtained on the BINA Farm with treatment T_2, followed by Tk.37,315.00 (US$932.00) for treatment T_5. Marginal analysis of fertilizer response data gave the highest marginal rate of return (MRR) of 1,275 percent with treatment T_5 followed by 338 percent in T_3 and 74 percent in T_2. At Magura, maximum net benefit of Tk.41,756.00 (US$1,044.00) was obtained from treatment T_2, followed by Tk.39,763.00 (US$994.00) with treatment T_4. The highest MRR (631 percent) was recorded with treatment T_5, followed by 230 percent with treatment T_3. For Magura, treatment T_5 . . . with the highest MRR of 631 percent and third highest net benefit of Tk.37,087.00 (US$927.00) . . . would be the most economically viable treatment. At the BINA farm, treatment T_5 was found to be most economically viable, with a 1,275 percent MRR and net benefit of Tk.37,315.00 (US$932.00)

Conclusion

Bangladesh needs to produce 50 million tonnes of paddy rice by 2025, compared to the present level of 25 million tonnes, to feed a population of 200 million. The potential to achieve this level of production is indicated by the yield level of 7 t/ha recorded in our experiments. This will help release some lands currently under rice and divert them to oilseeds and pulses which are major import items of Bangladesh. ■

Note: International articles which appear in *Better Crops with Plant Food* use metric units of measure, such as kilograms and hectares. In general, articles from the U.S. and Canada appearing in this publication use U.S. (formerly called English) units, such as pounds and acres. The units can be converted from one system to the other using multiplication factors provided in the publication. See page 23.