

PERFORMANCE OF SUPER GREENFIELD ORGANO-CHEMICAL FERTILIZER ON THE GROWTH AND YIELD OF WETLAND RICE

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Two field experiments were conducted at the Bangladesh Rice Research Institute (BRRI) farm, Gazipur and at BRRI Regional Station farm, Comilla during the Boro season 2006 to evaluate the performance of the Super Greenfield Organo-chemical fertilizer (SGOF) on the growth and yield of wetland rice. Eight treatment combinations were tested. The application of SGOF in combination with chemical fertilizer significantly increased the plant height, tiller and panicle number, grain and straw yields of BRRI dhan 29 over the control at both Gazipur and Comilla locations. It was observed that the application of SGOF @ 500 kg/ha + Recommended dose of urea produced reasonable higher yield as good as soil test based (STB).

The crop productivity in Bangladesh agriculture is declining due to inadequate and unbalanced chemical fertilizer use in increasing intensive cropping systems (Anonymous, 1996 and Cassman *et al.*, 1995). Another very important factor to consider in improving crop productivity is the soil organic matter. Available reports indicate that most soils of Bangladesh have low organic matter content, usually less than 2 % (Bhuiyan, 1991). The addition of organic materials to soil through farmyard manure, composts, and organic residues has been reduced day by day. It is now believed that the low and declining organic matter content is one of the reasons for the low productivity of many of our soils. Thus, the need for proper soil organic matter management is essential.

The use of organic fertilizer may reduce the need of chemical fertilizer, improves the physical, chemical, and biological properties of the soil and helps increase and maintain the productivity. The SGOF is a nutrient enriched organic fertilizer. It is grey in colour. It contains 4.5% OM, 8% N, 5% P, 12% K, 1% S, 0.2% B, and 0.5% Zn at 6 % moisture content. Experiments were conducted with a view to evaluating the performance of this fertilizer on the growth and yield of wetland rice.

Two field experiments were conducted at BRRI farm, Gazipur and BRRI Regional Station Farm, Comilla during the Boro season 2006. The soil of the experimental fields was clay-loam in texture and slightly acidic in nature (pH

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5.63-6.13). The detailed treatments descriptions for both locations were given in Table 1. The experiments were laid out in a randomized complete block design with three replications. All organic and inorganic fertilizers were applied at final land preparation. Urea was applied in three equal splits: 1/3rd as basal, 1/3rd at early tillering stage and the remaining 1/3rd at 5-7 days before panicle initiation except T₃ and T₈ treatment. In these two treatments, basal urea was not applied. BRRIdhan29 was used as test crop at both the locations. Forty-five day old 2-3 seedlings/hill were transplanted with 20 cm x 20 cm spacing. Necessary intercultural operations were done as and when required. At maturity, the crop was harvested from 5 m² area at the centre of each plot and grain yield was adjusted to 14% moisture content. The straw yields were recorded at oven dry basis.

Table 1. The detailed treatment descriptions of Super Greenfield Organo-chemical fertilizer experiments conducted at two different locations, Boro, 2006.

Treatments	BRR I, Gazipur	BRR I R/S, Comilla
	Nutrients (kg/ha) N-P-K-S-Zn	Nutrients (kg/ha) N-P-K-S-Zn
T ₁ = Native fertility	0-0-0-0-0	0-0-0-0-0
T ₂ = STB (Soil Test Based) dose	140-26-30-17-0	138-12-82-20-0
T ₃ = SGOF @ 500 kg/ha + Recom. dose of urea	SGOF @ 500 kg/ha + 90 kg N/ha	SGOF @ 500 kg/ha + 90 kg N/ha
T ₄ = 50% of T ₃ + 50 % of STB	SGOF @ 250 kg/ha + 45 kg N/ha + 70-13-15-8.5-0 (STB)	SGOF @ 250 kg/ha + 45 kg N/ha + 69-6-41-10-0 (STB)
T ₅ = 75% of T ₃ + 25% of STB	SGOF @ 375 kg/ha + 67.5 kg N + 35-6.5-7.5-4.3-0 (STB)	SGOF @ 375 kg/ha + 67.5 kg N + 34.5-3-20.5-5-0 (STB)
T ₆ = T ₃ + 25% of STB	SGOF @ 500 kg/ha + 90 kg N/ha + 35-6.5-7.5-4.3-0 (STB)	SGOF @ 500 kg/ha + 90 kg N/ha + 34.5-3-20.5-5-0 (STB)
T ₇ = T ₃ + 50% of STB	SGOF @ 500 kg/ha + 90 kg N/ha + 70-13-15-8.5-0 (STB)	SGOF @ 500 kg/ha + 90 kg N/ha + 69-6-41-10-0 (STB)
T ₈ = 20% more than T ₃	SGOF @ 600 kg/ha +108 kg N/ha	SGOF @ 600 kg/ha +108 kg N/ha

Application of SGOF in combination with chemical fertilizer significantly increased the grain yield of rice at both the locations (Table 2). At BRR I farm, Gazipur, the highest grain yield of 6.13 t/ha was obtained with the treatment T₂ (STB dose) followed by the treatment T₈ and T₃ and these treatments were statistically similar with other treated plots except T₄. At BRR I R/S farm, Comilla, the highest grain yield of 7.90 t/ha was obtained with the treatment T₆, which was statistically identical with that of other treatments except the control

(T₁). From the two locations, it was observed that there was no significant difference of grain yield among the treatments (T₂ – T₄). Similar trend was also observed in case of straw yield (Table 2). It is observed from the results that the application of SGOF 500 kg/ha + Recommended dose of urea produced reasonable higher yield as good as STB.

Table 2. Effect of Super Greenfield Organo-chemical fertilizer in combination with different doses of chemical fertilizers on the grain and straw yield of Boro rice (BRRI dhan 29) in two locations of Bangladesh, Boro 2006.

Treatments	Grain yield (t/ha)		Straw yield (t/ha)	
	Gazipur	Comilla	Gazipur	Comilla
T ₁	2.81	4.35	3.00	3.20
T ₂	6.13	7.68	6.19	6.06
T ₃	5.99	7.59	6.04	5.66
T ₄	5.62	7.57	5.75	5.38
T ₅	5.77	7.65	5.86	6.32
T ₆	5.88	7.90	6.03	6.77
T ₇	5.90	7.65	6.20	6.31
T ₈	6.06	7.88	6.15	6.15
LSD (0.05)	0.48	0.65	0.53	0.79
CV (%)	5.0	5.1	5.3	7.9

Table 3 shows the economic analysis of the SGOF trial at BRRI farm, Gazipur and BRRL, R/S farm, Comilla. The application of fertilizer increased the gross and net return in all the treatments at both the locations (Table 3). At Gazipur farm, the gross return from the control plot was only about Tk. 32,600/ha and the application of fertilizer increased the gross return, which ranged from Tk.64,825/ha in T₄ to Tk.70,585/ha in T₂. The highest net return of Tk.63,747/ha was obtained with T₂ followed by T₃ (Tk.62,920/ha). In terms of MBCR, the treatment T₃ i.e. the application of SGOF @ 500 kg/ha recommended dose of urea (90 kg N/ha) performed the best among the tested treatments (Table 3). At BRRI R/S farm Comilla, the gross return from the control plot was only about Tk.48,300/ha and the application of fertilizer increased the gross return, which ranged from Tk.83,770/ha in T₄ to Tk.89,155/ha in T₆. The highest net-return of Tk. 81,541/ha was obtained with T₆ followed by T₈ (Tk.80,913/ha). In terms of MBCR, the treatments T₃ and T₅ performed the best among the tested treatments (Table 3).

In marginal analysis, at BRRI farm, Gazipur, the highest MRR (502 %) was obtained with the treatment T₃ followed by T₂ (104 %) (Table 3). It appears from

the findings that the treatment T₃ (SOOF @ 500 kg/ha + Recommended dose of urea (90 kg N/ha) may be the most economically viable fertilizer management packages for Boro rice cultivation at BRRi farm Gazipur. At BRRi R/S, Comilla, the highest MRR (496%) was obtained with the treatment T₃ followed by T₅ (491 %) (Table 3). From this result, it may be concluded that alike Gazipur, the treatment T₃ (SGOF 500 kg/ha + Recommended dose of urea (90 kg N/ha) is also the best fertilizer management packages for Boro rice cultivation for Comilla region (AEZ-19). From the economic analysis, it appears that the treatment T₃ (SGOF @ 500 kg/ha + Recommended dose of urea (90 kg N/ha) may be recommended for the poor and middle class and T₅ (75% of T₃ + 25% of S/B) for the rich farmers

Table 3. Economic analysis on SGOF trial at two locations, Boro 2006

Treatment	Yield (t/ha)		TVC* (Tk./ha)	Return (Tk./ha)			MBCR	MRR (%)
	Grain	Straw		Gross	Added	Net		
BRRi R/S farm, Gazipur								
T ₁	2.81	3.00	0	32600	-	32600	-	-
T ₂	6.13	6.19	6838	70585	37985	63747	5.56	104
T ₃	5.99	6.04	6040	68960	36360	62920	6.02	502
T ₄	5.62	5.75	6316	64825	32225	58509	5.10	D*
T ₅	5.77	5.86	6170	66490	33890	60320	5.49	D
T ₆	5.88	6.03	7418	67845	35245	60427	4.75	D
T ₇	5.90	6.20	8829	68300	35700	59471	4.04	D
T ₈	6.06	6.15	7034	69825	37225	62791	5.29	D
BRRi R/S farm, Comilla								
T ₁	4.35	3.20	0	48300	-	48300	-	-
T ₂	7.68	6.06	7092	85890	37590	78798	5.30	D
T ₃	7.59	5.66	6057	84390	36090	78333	5.96	496
T ₄	7.57	5.38	6556	83770	35470	77214	5.41	D
T ₅	7.65	6.32	6326	85980	37680	79654	5.96	491
T ₆	7.90	6.77	7614	89155	40855	81541	5.37	125
T ₇	7.65	6.31	9013	85965	37665	76952	4.18	D
T ₈	7.88	6.15	7112	88025	39725	80913	5.59	160

*Total variable cost (TVC) included fertilizer cost (chemical fertilizer and SGOF), fertilizer application cost and labour cost for additional product.

Price (Taka/kg): Urea= 6.50; TSP= 18.00; MP= 14.00; Gypsum= 5.00; Zinc-sulphate=60.00; SGOF=7.20 Labour wage rate = Tk. 140/day

Two additional man-days/ha are required for applying fertilizer and two man-days/ha for per ton additional products including byproducts.

Note: MRR (%) - Marginal rate of return (%); D* - Dominated.

It is concluded that the treatment T₃ (SGOF @ 500 kg/ha + Recommended dose of urea (90 kg N/ha) may be the most economically viable fertilizer management packages for Boro rice cultivation at BRRI farm, Gazipur. The treatment T₃ may be recommended for the poor and middle class and T₅ (75% of T₃ + 25% of STB) for the rich farmers of Comilla region.

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