ORGANIC AND INORGANIC FERTILIZERS ON YIELD OF LOWLAND RICE

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The decline in soil fertility is a major constraint for increasing crop production in Sri Lanka. Majority of the rice growing soils have low amounts of organic matter and are depleted of nutrients[1]. Addition of organic matter is beneficial for maintaining yields and improving soil properties[2]. An investigation was carried out to determine the effects of organic and inorganic fertilizers on yield of traditional and new-improved rice varieties.

The experiments were conducted at the research farm of Rajarata University of Sri Lanka, Puliyankulama in Anuradhapura during 2009 *Yala* (Dry) and 2009-2010 *Maha* (Wet) seasons. The soil of the experiment site was low humic gley with pH (1:2.5 H_2O) 6.12, organic matter content 2.54%, total nitrogen 0.25%, extractable phosphorous and exchangeable potassium 12.46 and 108.93 mg/kg respectively. Experiments were laid out in a split-plot design, with 3 replicates. The main plots were BG 352 and *Kaluheenati* and fertilizer combinations were sub plots. They were T_0 control (no fertilizer), T_1 5 t/ha compost + 625kg/ha rice husk charcoal, T_2- 4 t/ha rice straw + 6 t/ha *Gliricidia* leaves + 350 kg/ha Eppawala Rock phosphate+ 600 liters/ha *Gliricidia* leaf extract (applied fortnightly), T_3 half the quantity of T_2, T_4 5 t/ha phosphocompost,T_5 5 t/ha phosphocompost + 600 liters/ ha *Gliricidia* leaf extract (applied fortnightly) + 625 kg/ha wood ash at panicle initiation stage, and T_6 inorganic fertilizer recommendation of Department of Agriculture (262.5 kg urea, 87.5 kg TSP and 75 kg MOP per hectare). Grain yield, yield components, straw biomass and biological yield were measured. Analysis of variance was carried out using a general liner model and means were separated by Least Square Means.

Organic and inorganic fertilizers positively influenced the biological and grain yield of both varieties (Table 1).The two-way interaction between variety and fertilizer combination was significant ($p<0.05$), indicating the biomass production of the two varieties was different. T_6 significantly enhanced the total biomass of both varieties compared to control treatment. The next highest biomass production was observed in T_2 in both varieties irrespective of the season. In both seasons, biomass production of the improved variety BG -352 was significantly ($p<0.05$), higher than that of *Kaluheenati* (Table 1). T_6 produced the highest grain yield irrespective of the variety and season (Table 1).Variety Bg-352 recorded a significantly higher yield than *Kaluheenati* ($p<0.05$). The interaction effect of inorganic and organic manure with rice variety was not significant ($p>0.05$). Application of an organic manure combination viz., 4 t/ha of rice straw, 6 t/ha *Gliricidia* leaves and 350 kg/ha rock phosphate and *Gliricidia* leaf extract (T_2) produced second highest yield for both varieties. The yield obtained by variety Bg-352 in T_2 was similar to T_6(Table 1).

Variations in biological and grain yield could be attributed to differences in the availability of major nutrients. Inorganic fertilizer offer nutrients, which are readily soluble in the soil solution and thereby readily available to plants. Therefore, T_6 produced the highest biological and grain yield in both seasons. Nutrient release from organic sources is generally slow. The grain yield of $T_2$was higher than that of the control due to a more balanced nutrition from organic fertilizers, especially micro nutrients. The benefits of applying of *Gliricidia* leaves could be attributed to the release of soil nutrients due to organic acids produced during decomposition, in addition to the chelating effect of complex intermediate organic molecules.

Organic manures significantly influence yields of lowland rice. Among the organic manure treatments, 4 t/ha of rice straw, 6 t/ha *Gliricidia* leaves 350 kg/ha rock phosphate *Gliricidia* leaf extract (T_2) can be considered the best, as it produced the highest biological and grain yields in both varieties in both seasons. Moreover, the significantly higher yield obtained from T_2 was an indication of the potential of organic fertilizer combinations to produce higher yields in both new-improved and traditional rice varieties grown in lowland soils.

Table 1.Impact of organic and inorganic fertilizers on biological and grain yield of lowland rice

Treatment	Biological yield, t/ha				Grain yield t/ha			
	Yala-2009		*Maha*-2009/2010		*Yala*-2009		*Maha*-2009/2010	
	Kaluheenati	BG 352	*Kaluheenati*	BG 352	*Kaluheenati*	BG 352	*Kaluheenati*	BG 352
T_0	2.68 a	3.17 a	2.37 a	2.64 a	1.09 a	1.42 a	1.13 a	1.30 a
T_1	3.21 ab	4.06 b	2.82 bc	3.12 a	1.21 ab	1.81 bc	1.41 b	1.55 ab
T_2	3.69 b	4.46 b	2.87 c	4.14c	1.74 d	2.23 c	1.45 b	2.10 b
T_3	3.20 ab	4.19 b	2.61 b	3.47 b	1.46 c	2.00 c	1.33 b	1.76 b
T_4	2.78 ab	3.66ab	2.66 b	2.69 a	1.16 a	1.61 ab	1.33 b	1.34 a
T_5	3.36 b	3.83 b	2.66 b	3.1ab	1.37 bc	1.63 ab	1.34 b	1.60ab
T_6	6.35 c	6.86 c	2.94 c	4.32 c	2.70 e	3.49 d	1.46 b	2.17 b
$P_{(0.05)}$	*	*	*	*	*	*	*	*
CV %	*10.02*	10.17	*3.9*	9.25	*6.8*	11.69	*6.7*	12.97
$P_{(0.05)}$		*		*		*		*
$P_{(0.05)}$		*		*		NS		*

**Significant at P<0.05,* NS *Not significant at P>0.05* ** *Treatments*

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