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INFLUENCES OF LEAF CUTTING ON GROWTH AND YIELD OF RICE

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Rice (O*ryza sativa*) is a vital to more than half of the world's population. It is the most important food grain in the diets of hundred of millions of Asian (Barady 1981). In cereal, grain size or single grain weight is one of the important component for grain yield which is genetically control as well as depending on the environmental factors that influences the process of grain filling during maturation. In the filling process, ears or grain act as a physiological sink.

The source for this sink is provided by themselves and to a much lesser extent by hulls and awns. After the onset of flowering photosynthates that are used more and more for grain filling process (Mengel and Kirby, 1987). According to Yoshida (1981) in rice, all leaves from the flag leaf down to the third leaf from the top export assimilate to the panicle. Evans and Rawson (1970) reported that later stage, the flag leaf in particular provided photosynthates for grain filling. Therefore, a pot experiment was conducted to determine the effect of leaf removal at heading stage for grain yield of rice.

A pot experiment was conducted in the green house of the College of Agriculture, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines. The soil used in the experimental pot was clay loam and each pot contains approx. 10 kg of soil. To determine the effect of leaves cutting on grain yield the trial include four treatments: (i) No leaf cutting (T1), (ii) flag leaf cutting (T2), (iii) 2nd leaf cutting (T3) and (iv) 3rd leaf cutting (T4). The experiment was laid out in Randomized Complete Block Design with three replications. Twenty-eight-day old seedlings of IR 64 were transplanted using three seedlings per hill. Fertilizers at the rate of 90-30-30 kg/ha N-P_2O_5-K_2O were applied in the trial. Irrigation water was maintained throughout the growing period. Leaves were removed at heading stage according to the treatments mentioned. Tiller counting was done every ten days interval. Plant height was measured only at harvest. The crops were harvested at physiological maturity. The harvested rice was threshed, cleaned, dried, weighed and adjusted to 14% moisture content. Yield components- panicles per hill, fertile and unfertile grains per panicle and 1000-grain weight were recorded from the whole plant harvested. Stem and leaves were separated and was oven dried at 80 ^{O}C for 48 hours to estimate the dry-matter production. All the collected data were analyzed using IRRISTAT version 3.1 program for treatment comparisons.

Results indicated that the values of plant height among the treatments ranged from 98.93- 109.40 cm, which found statistically identical. However, comparatively taller plants produced from the treatment when leaves were not removed followed by the treatment with 3rd leaf cutting.

Highly significant differences of grain yield were observed among the treatments. The highest grain yield obtained from the treatment when the leaves were not clipped followed by the treatment of third leaf clipping (Table 1). The lowest yield was produced from the treatment with flag leaf removal. Panicles per hill were also found significantly different among the treatments. Fertile spikelets are an obvious prerequisite for higher grain yield (Jenning *et al*. 1978). However, the lowest fertile grain and the 1000-grain weight obtained from the treatment with flag leaf removal. Evans and Rawson (1970) reported that flag leaf in particular provides photosynthate for grain filling. The uppermost leaves receive higher quantity of sun light (Sarkar *et*

al. 1998) and higher photosynthetic activity as compared to lower leaves (Salo and Kim 1980). As the flag leaf was removed in the treatment where the crops were deprived having sufficient amount of photosynthates, which increases unfertile grains and fertile grains were not filled properly resulted lower grain yield. Results also showed that in absence of flag, 2nd and 3rd leaves produce 55, 64 and 87% grain yield respectively, which indicated that the contribution of flag 2nd and 3rd leaves in grain yield are flag >2nd >3rd. Oritin (1984 b) reported that the contribution of two upper most leaves (flag and 2nd) to grain yield was about 70% whereas Yoshida (1981) mentioned that the contribution of flag leaf alone in grain dry matter accumulation at about 73%.

Total dry-matter (DM) production and harvest index (HI) plant were found highly significant different among the treatments (Table 2). However, the higher DM and HI produced from the no leaf clipping and 3rd leaf cutting treatments. The lowest dry-matter obtained from the treatment with flag leaf removal. The higher plant height and grain yield might have enhanced for higher dry-matter production per plant.

Results indicated that the grain yield contributed the highest percentage in dry matter production per plant followed by stem and leaf. Furthermore, the treatment with flag leaf cutting produced the lowest harvest index. Based on the results from the study it could be suggested that the contribution of flag leaf is the highest followed by second leaf in grain filling as well as yield of rice.

Table 1. Grain yield and yield contributing parameters as affected by different leaf cutting treatments, CLSU, Philippines

Treatments	Grain yield(g/hill)	Panicle/hill(No.)	No.of grain /panicle		1000-grainwt.(g)
			Fertile	Unfertile	
No leaf cutting	45.62 a	21 a	82 a	23 c	26.49 a
Flag leaf cutting	25.25 d	18 b	57 d	32 a	24.61 c
2nd leaf cutting	29.61 c	18 b	65 c	27 b	25.31 bc
3rd leaf cutting	39.81 b	19 b	77 b	26 b	25.85 ab
CV (%)	1.1	5.3	3.1	4.9	1.9

Means followed by a common letter are not significantly different at the 5% level by DMRT

Table 2. Grain yield and yield contributing parameters as affected by different leaf cutting treatments, CLSU, Philippines

Treatments	Leaf DM(g/plant)	Stem DM(g/plant)	Grain yield DM(g/plant	Total DM(g/plant)	Harvestindex
No leaf cutting	0.420	1.51 a	2.17 a	4.100 a	0.53 a
Flag leaf cutting	0.407	1.40 b	1.40 c	3.207 d	0.44
2nd leaf cutting	0.406	1.45 c	1.65 c	3.506 c	0.47
3rd leaf cutting	0.402	1.50 a	2.10 b	4.000 b	0.52
CV (%)	ns	1.5	1.3	1.5	1.2

Means followed by a common letter are not significantly different at the 5% level by DMRT

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