EFFECT OF LAYOUT TRIMMING AND UREA FERTILIZER DOSE ON PRODUCTIVITY OF RICE (*ORYZA SATIVA* L.) VARIETIES CIHERANG SYSTEM SALIBU (RATOON MODIFICATION)

Safruddin Safruddin
Department of Agriculture, University of Asahan, Indonesia

Abstract. This study aims to determine the effect of layout trimming and urea fertilizer dose, and their interaction on the growth and yield of rice (*Oryza sativa* L.) varieties Ciherang on salibu system. The study was conducted by using Split Plot Design factorial. First factor is Urea fertilizer application consists of 4 levels. Ie. A0 = 0 kg ha^{-1} (control), A1 = 125 kg ha^{-1}, A2 = 250 kg ha^{-1}, A3 = 375 kg ha^{-1}. Second factor is trimming layout consists of 3 levels. Ie. B0 = 5 cm from the base, B1 = 10 cm from the base, B2 = 15 cm from the base. Position trimming very significant effect on high Clump aged 4, 8 and 12 weeks after planting (WAP); the number of tillers per Clump aged 4, 8 and 12 WAP; the number of panicles per Clump; the production of dry grain. Urea fertilizer very significant effect on high Clump aged 4, 8 and 12 WAP; the number of tillers per Clump aged 4, 8 and 12 WAP; the number of panicles per Clump; the production of dry grain. Interaction trimming positions and urea fertilizer significant effect on the number of tillers per Clump age 8 WAP.

Keywords: trimming, urea, rice, ratoon, salibu

INTRODUCTION

According to Central Bureau of Statistics Indonesia, the Indonesian people rice consumption reaches 139 kg per capita or with Equivalents 32.665 million tonnes, is the highest in the World. While the national rice production Approximately 38.098 million tonnes. To achieve a surplus of 10 million tonnes in anticipation of population growth of 3% from 235 million people, is worth the effort to increase productivity (Statistics Indonesia, 2013). On the other hand, diversification efforts are still not optimal due to various things; technical, social and economic. Productive rice conversion to non-agricultural sector is difficult to be stopped, it is most effect on national rice production. To stimulate increased national rice production, needed several strategies, among others: 1) the expansion of planting areas by printing new rice fields, 2) an increase in the productivity of land and 3) the expansion of harvest area through increased harvest index. Salibu system of rice cultivation (ratoon modified) can spur increased rice production by increasing the harvest index (Amang and Sawit, 2001).

Contributions increase national rice production, especially in the agro-ecosystem of wetland more prominent contribution by optimizing the productivity and stability (Suryana, A. 2005). Among the technologies produced through research, high yielding variety contributed significantly to the increase in rice production, high technology component interaction yielding variety, fertilization and irrigation will be able to contribute a yield increase reached 75%. Efforts to increase rice production leads to increased land productivity through increased harvest index of 2 to 3 can even four harvests in one year, this can be achieved with the system salibu (Ruskandar, 2007).

This study aims to determine the effect of layout trimming and urea fertilizer dose, and their interaction on the growth and yield of rice (*Oryza sativa* L.) varieties Ciherang on salibu system.

METHOD

This research was conducted in the Sipaku village, Simpang Empat Subdistrict, Asahan District, Province North Sumatra. Altitude ± 10 masl with an average rainfall of 169 mm per month (Indonesian Statistic, 2013). The study was conducted from July to September, 2014.

The materials used for this study are Rice crop has been harvested Varieties Ciherang, Fertilizer (Urea, SP-36, KCl), Plastic, wood, Insecticides santador 25 g l^{-1} (the active ingredient lambda cyhalothrin 0.5 to 1 ml l^{-1}), Fungicides seromyl and 35 g l^{-1} (active ingredient metalaxyl 0.5 to 1 ml l^{-1}). The tools used are sickle, handsprayer, ruler, scale, stationery, calculator and lable of research plot.

The study was conducted by using Split Plot Design factorial, with 2 factors. First factor is Urea fertilizer application consists of 4 levels. Ie. A0 = 0 kg ha^{-1} (control), A1 = 125 kg ha^{-1} (12,5g per plot), A2 = 250 kg ha^{-1} (25g per plot), A3 = 375 kg ha^{-1} (37,5 g per plot). Second factor is trimming layout consists of 3 levels. Ie. B0 = 5 cm from the base of the stem, B1 = 10 cm from the base of the stem, B2 = 15 cm from the base of the stem.

Land area of research is measured as a whole and then divided according to the research plan. Then making a research plot with a size of 100 cm x 100 cm by 36 plot, divided into 3 replicates with 12 plots in each replication. Distance between treatments of 50 cm and 100 cm distance between replications. The number of crops per plot as many as 16 plants and plant samples as many as four plants. Making the plot begins to dispose of rice straw to give the distance between plots and between replications. Then throw tiller to keep the same number of tillers initial order, namely by leaving five puppies in one clump.

Immediately after harvesting rice in fields flooded as high as ± 5 cm for 3 days. Trimming is done by using a sickle with a height of appropriate treatment. To maintain the accuracy of the treatment of urea fertilizer is carried out using plastic insulation before fertilizing first with a height of 15 cm from the ground. Watering is done by the system every 3 days later. Irrigated land about 3 cm and for the next 2 days no water addition. If conditions do not allow water, watering can be done lapse of 5 days. Starting from panicle formation phase until the charging seeds, flooded land continues. 10 days before harvest drained soil.

Fertilizer application done in 3 phases. The first 10 days after harvest (20% N, 50% P, 50% K), the second 21 days after harvest (40% N, 50% P, 50% K) and third 35 HSP (40% N), the application is done broadcast and stepped between the clumps of rice evenly. To paralyzing land in the expanse of rice fields is done by stomping - stomp the ground between clumps of rice. Weed control and the lifting of the rice plant pests and diseases do as much as 2 times that prior to fertilizing the second and third, when weed growth is fast enough, then the weeding can be done up to three times.

Harvesting can be done at the age of ± 90 HSP or yellowing of grain has reached 80%. To further ensure the rice is ready for harvest is by pressing the grains, when the grain is already hard contain the most appropriate time for harvesting. Observation variables are high clump of rice (cm), number of tillers per clump of rice, number of panicles per clump rice, and production of dry grain per plot (kg m^{-2}).

RESULTS AND DISCUSSION

High clumps rice. Table 1 shows that the position of trimming 15 cm (B2) has a height of 90.46 cm highest clumps are significantly different from the treatment of B0 and B1. Urea fertilizer dose of 375 kg ha^{-1} (A3) has a height of 91.97 cm clumps highest is significantly different to the treatment A0, A1, and A2. Interaction trimming positions and urea fertilizer had no significant.

Table 1.
Different Test Results On average Effect Trimming Position and Urea Fertilizer Dosing On High Clump Rice (cm) Age 12 Weeks After Planting.

A/B	B_0	B_1	B_2	Average
A_0	86,67	87,92	88,08	87,56 a
A_1	87,75	89,25	90,00	89,00 a
A_2	89,50	90,08	91,00	90,19 b
A_3	90,92	92,25	92,75	91,97 c
Average	88,71 a	89,88 b	90,46 c	CV (A) = 1,15% CV (B) = 0,43%

Description: Number followed by the same letter in the same column or row showed no significant effect on the level of 5% According HSD Test

The number of tillers per clump of rice

Table 2 shows that the position of trimming 5 cm (B0) has the highest number of tillers per Clump is 31.35 which is significantly different from the treatment of B1 and B2. Urea fertilizer dose of 375 kg ha^{-1} (A3) has the highest number of tillers per Clump 32.06 which is significantly different from the treatment A0 and A1, but no significant effect with treatment A2. Interaction trimming positions and urea fertilizer had no significant.

Table 2.
Different Test Results On average Effect Trimming Position and Urea Fertilizer Dosing On The Number of tillers per clump of rice Age 12 Weeks After Planting

A/B	B_0	B_1	B_2	Average
A_0	29,08	28,33	28,50	28,64 a
A_1	30,92	29,67	28,67	29,75 ab
A_2	32,08	29,58	29,67	30,44 bc
A_3	33,33	32,50	30,33	32,06 c
Average	31,35 b	30,02 a	29,29 a	CV (A) = 3,38% CV (B) = 3,33%

Description: Number followed by the same letter in the same column or row showed no significant effect on the level of 5% According HSD Test

Number of panicles per clump of rice. Table 3 shows that the trimming positions 5 cm (B0) has the highest number of panicles per Clump is 16.92 which is significantly different from the treatment of B1 and B2. Urea fertilizer dose of 375 kg ha^{-1} (A3) has the highest number of panicles per Clump 18.86 which is significantly different from the

treatment A0, A1, and A2. Interaction trimming positions and urea fertilizer had no significant.

Table 3.

Different Test Results On average Effect Trimming Position and Urea Fertilizer Dosing On The Number of Panicles per Clump of rice Age 12 Weeks After Planting

A / B	B_0	B_1	B_2	Average
A_0	14,50	13,00	12,42	13,31 a
A_1	15,00	13,92	13,17	14,03 a
A_2	18,17	16,25	15,08	16,50 b
A_3	20,00	18,92	17,67	18,86 c
Average	16,92 c	15,52 b	14,58 a	CV (A) = 3,50 % CV (B) = 3,42 %

Description: Number followed by the same letter in the same column or row showed no significant effect on the level of 5% According HSD Test

Production of Dry Grain per Plot (kg m^{-2}). Table 4 shows that the position of trimming 5 cm from the base of the rice crop (B0) has the highest production of dry grain is 0.52 kg which is significantly different from the treatment of B1 and B2. Urea fertilizer dose of 375 kg ha^{-1} (A3) has the highest production of dry grain is 0.63 kg which is significantly different from the treatment A0, A1, and A2. Interaction trimming positions and urea fertilizer had no significant.

Table 4.

Different Test Results On average Effect Trimming Position and Urea Fertilizer Dosing On Production of Dry Grain per Plot (kg m-2) Age 12 Weeks After Planting

A / B	B_0	B_1	B_2	Rataan
A_0	0,37	0,33	0,32	0,34 a
A_1	0,48	0,40	0,38	0,42 b
A_2	0,55	0,50	0,45	0,50 c
A_3	0,68	0,63	0,58	0,63 d
Rataan	0,52 c	0,47 b	0,43 a	KK (A) = 7,53% KK (B) = 4,97%

Description: Number followed by the same letter in the same column or row showed no significant effect on the level of 5% According HSD Test

Treatment (B0) shows the lowest number at each age clump observations. This is consistent with the statement (Harminto, 2003), that the new shoots appear increasingly to the base or closer to the roots is difficult to receive water and other nutrients so that the process of capillarity impact of the shoots will be lower than the shoots that appear thereon.

DISCUSSION

According to Hartman and Kester (1983), the main rod contains reserves of nutrients so plants that have higher rod means having a backup more nutrients. The nutrient reserves can be used as a source of energy on the growth of shoots. The more nutrients available

reserves, the source of energy is also increasing, which means the growth of shoots be the better, and the longer shoots. As seen in treatment (B2).

In a variable number of tillers per Clump rice, treatment (B0) has the highest number of tillers. This is due to the shoots that appear closer to the ground more quickly pull out the roots resulting in faster forming tillers (new individual), because rice has a pattern of tillers multiple, the tillers were first grown after having 4-5 leaves will grow tillers again (tillers secondary). The results of previous research Heny and Nintya (2006) on the effects of the growth of lateral shoots of plants Patchouli (*Pogostemon cablin* Benth.) after pruning shoots at different sections stating that the growth of shoots over the response to the segment closest to the trimming. Trimming shoots rod causes stunted growth apical shoots, but the original lateral shoots grow dormant, so the plants are not too high and have a lot of branches on the plant. This is according to the results of research conducted Siagian and Adinugraha (2006) in plants Merawan (*Hopea odorata*) shows that the higher the position trimming lead to decreased levels of rooting, the higher the position of the shoot will affect the roots.

In a variable number of panicles per clump rice, the best results obtained in the treatment (B0). This is because the treatment (B0) also obtained the highest number of tillers, the number of tillers correlated with the percentage of the number of panicles (productive tillers). This is consistent with the statement Jones and Synder (1987), that the number of tillers less a limiting factor for the formation of sink. Thus, if the number of tillers bit then it can not produce the maximum number of panicles and the result would be decreased. Number of panicles per square meter is a component of the most important results, which determines 89% of the variations in results.

In the variable dry grain production, treatment (B0) obtained the highest production. According to research Schnier (1990), the more the number of panicles, the more grains of rice formed to increase the yield of grain production. This is consistent with the statement Ismunadji (1998), there is a correlation between the grain yield by the number of productive tillers, number of grains per panicle, and percentage of empty grain low, the production per unit area will increase. Cutting length can affect the number of tillers, periods of growth, vigor ratoon and grain yield (Susilawati, 2011).

In the treatment of (A3) obtained by high clumps, the number of tillers per Clump, and the number of panicles per Clump better at any age observations, because in this treatment needs of N as a nutrient that is essential in the growth process more fulfilled. This is consistent with the results of research Sofiati (2009), about the effect of fertilizer N, P and K on the growth and yield of lettuce (*Lactuca sativa*) which states that the element Nitrogen is the most dominant effect on plant growth compared to other elements. When N ample and good growing conditions, the protein will be formed. In conditions of low carbohydrate stored in the vegetative part, the protoplasm will be more established.

Explanation Marsono and Sigit (2002), the application of urea fertilizer was instrumental in supporting the growth of shoots, because urea fertilizer in which there are elements of N which was instrumental in the vegetative growth of the plants. In another study, when the N element provided high chlorophyll formed will increase. Chlorophyll has an essential function in the process of photosynthesis which absorbs energy from sunlight and then do translocated to all parts of the plant (Handayunik, 2008). Salibu or ratoon rice growth is highly dependent on the composition and level of fertilizers. Fertilizer N is an element that can accelerate growth such as height and number of productive tillers (Susilawati, 2011). This is why treatment (A3) has a better vegetative growth compared with other treatments.

Shortage of N will disrupt the grain filling phase, resulting in many empty grains in the panicle. This looks at the treatment level (A0) who obtained the lowest dry grain production. Yoshida (1981), said nitrogen is the principal element forming the main constituent of protein and protoplasm, chloroplasts, and enzymes. The role of nitrogen associated with photosynthetic activity, so that nitrogen is very important in the metabolism and respiration.

CONCLUSSION

Position trimming very significant effect on high Clump aged 4, 8 and 12 weeks after planting; very significant effect on the number of tillers per Clump aged 4, 8 and 12 weeks after planting; very significant effect on the number of panicles per Clump; very significant effect on the production of dry grain.

Urea fertilizer very significant effect on high Clump aged 4, 8 and 12 weeks after planting; very significant effect on the number of tillers per Clump aged 4, 8 and 12 weeks after planting; very significant effect on the number of panicles per Clump; very significant effect on the production of dry grain. Interaction trimming positions and urea fertilizer, only a significant effect on the number of tillers per Clump age of 8 weeks after planting.

REFERENCES

1. Amang, B. and M. H. Sawit, 2001. Policy and National Food; Lessons From the New Orde and the Orde of Reformation. Edisi Press. Bogor.
2. Andi Irmadamayanti and Irwan Suluk Padang. 2012. Growth and Yield Performance of Some Varieties,Rice Rawa In Central Sulawesi. BPTP Central Sulawesi.
3. Andoko, A. 2010. Organic Rice Cultivation. Penebar Swadaya. Jakarta.
4. Harahap. Z. and T.S. Silitonga. 1993. Improved Rice Varieties *cit*. Ismunadji Partohardjono, M Syamdan A Wigjono, 1998. Rice Book 2. Puslitbangtan Bogor.
5. Harminto. 2003. General Biology. Publishing Center Universitas Terbuka. Jakarta.
6. Hartman. H.T. and D.E. Kester. 1983. Plant Propagation Principles and Practices. Printice Hall of India Private Lyd. New Delhi. P.25-29.
7. Salisbury, F. B, and CW. Ross.1995. Plant Physiology, Volume 2. Translator Lukman and Sumaryono, D.R. ITB Bandung. 173 p.
8. Heddy. S. 1989. Plant Hormones. Publisher CV Rajawali. Jakarta. p: 90-93.
9. Jones, D.B. and SYNER G.H. 1987 Seeding rate and row spacing effects on yield and yield components of ratoon rice. Agronomy Journal 79: 36-38.
10. Ruskandar A. 2007. Distribution of New Varieties in West Java. News Agricultural Research and Development. Vol 29 (3). 2007.
11. Schnier, HF, Ding M. Kuhn SK De Datta, Mengel K, Wijangco E, and Javellana C. 1990. Nitrogen economy, and canopy Dioxyde carbon assimilation of tropical lowland rice. Agronomy Journal 82: 451-459.
12. Susilawati. 2011. Agronomy ratoon genotypes. Genotype Rice Potential For Tidal Land. Post Graduate Dissertation Institut Pertanian Bogor, 94 Page.