Shade Intensity Respons on Growth of Local Rice Varieties

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ABSTRACT

responses to shading gradients may play an important role in establishment success of local rice varieties. Low radiation caused by industrial development and environment change has become a limitation in crop production in Indonesia. This study aims to evaluate shade intensity respons on growth of local rice varieties. This study was conducted in Balai Pengkajian Teknologi Pertanian, Pagar Merbau, Deli Serdang, North Sumatra. The research used completely randomized design with two factors. The shade intensity (N) were 25%, 50% and no shade intensity as a control. Whereas Local Rice Varieties were Sigodang, Kukubalam and Ramos. The result indicated that local rice varieties showed significant effect on the growth and production variable such as penicle length where kuku balam variety was the highest among the varieties, followed by ramos then sigodang. Similarly 1000-grais weight and number of filled grains was fond on kuku balam as the highest. Local rice varieties showed significant effect on number of empty grains where sigodang variety was the highest, followed by kuku balam then ramos on local rice varieties and shade intensity. The shade intensity showed no significant effect on each observations. Therefore, knowing the right of local rice varieties under shading stress are important for plant breeders.

Keywords: rice, local, variety, shade

Introduction

Indonesia is the largest rice growing country in world. However, its productivity per unit area by world standard is low. In order to increase rice productivity, high yielding and disease resistant varieties should be developed . Indonesia, which has a population of 237 million people (2010 census) with main meals majority (95%) of the population is rice. Rice consumption is about 137 kg / capita / year, the predicted demand for rice in 2020 to the people of Indonesia reached 35.97 million tons / year. Where the vast rice fields in Indonesia reached 8.061 million hectares consisted of 4.896 million hectares of irrigated rice and non-irrigated rice fields reached 3.16 million hectares has the potential to increase rice yields (BPS Sumut, 2013). Factors likely due to low production draenase bad influences, oil density so high that the rice plants receive less light, it is certainly a constraint in the cropping pattern of palm oil and rice. Some local superior varieties used by farmers such as KKB, Ramos, Sigodang have not shown satisfactory results.

Multiple studies (Gregoriou *et al.* 2007) have shown that the morphological changes resulting from shading included increases in leaf width, length, and area

index, and decreases in leaf thickness due to the reduction of palisade layer number, palisade cells, and spongy parenchyma length. On the rice plant, shade can reduce the number of tillers, dry weight of the canopy, leaf area index, grain yield and the efficiency of solar radiation use (Cruz, 1997). Local varieties have several advantages such as a more tolerant environment less suitable, easy maintenance, fluffier, more expensive than the others. Therefore, rice productivity test of Local Rice Varieties In The shade have the potential to reduce rice productivity more than other techniques that have been developed. The benefits of this research is to improve the welfare of farmers of the results of the unit area which is integrated cropping system so that the land becomes optimal productivity. Besides, this model system and can ensure food security at both national and farmers. The farmer can find a suitable rice varieties are planted with oil palm integration system in the rainfed areas. As for the national level of this system is a way to keep the existence of germplasm as local wisdom, maintaining national food security while local varieties still exist. Thus,This study aims to evaluate shade intensity respons on growth of local rice varieties.

Materials and Methods

In order to study productivity test of local rice varieties in the shade intensity an experiment was conducted in Balai Pengkajian Teknologi Pertanian, Pagar Merbau, Deli Serdang, North Sumatra. The experiment took place from November 2014 until March 2015. The experiment was a completely randomized design with two factors. The shade intensity (N) were 25%, 50% and no shade intensity as a control. Whereas Local Rice Varieties were (1) Sigodang, (2) Kukubalam and (3) Ramos. If the effect of different treatments on the real variance, then tested further by Duncan's multiple range test.

Land preparation. Tillage was done by using a tractor plow and harrow. Plowed soil until conditions crumb processed layer 15-25 cm deep.

Experimental Plots. Created with a length of 200 cm and width of 100 cm by the number of beds 45 plot. The number of replications were three replications, the distance between replications of 200 cm, 50 cm distance between plots.

Shade Manufactures. Shade was madeof bamboo poles and the roof put on parenet 25% and 50%. Appropriate treatment shade 10 meters long and 4.5 meters wide shade. Tall bamboo from the ground level was 2 meters.

Seed preparation. Seeds cleaned then soaked for 24 hours in saltwater. Washed with clean water and then drained and ripened for 24 hours.

Cultivation. Seedlings planted at 18 days after sowed. Row spacing 25 cm x 25 cm ,1 seed per hole.

Regulate Irrigation. Seeds are planted in water-saturated soil conditions and mapped fields in circulated again after 3-4 days. Water rotation must be checked every 3 days.

Fertilization. Fertilizer used was 14.49 kg urea fertilizer with 3 times applicationswhen the plant was 10 days, 30 days and 45 days, 9.66 TSP twice applications when the plant was 30 days and 45 days, and KCL 9.66 kg with once application at age of plant 30 days.

Pest and Disease Control. Pests controlled by kenfas 100 EC (Alfa sipermethria 100 g/l), walang sangit pest controlled by baycarb (BPMC (2-Ci-methyl propy) Phenyl Methyl carbamate), snails pest controlled mechanically (citations) and spraying molluscicides debestan (besnoid 400 gr), and stem rot disease was controlled byfungicides (Difenokonazol 250 g/l).

Harvest. Rice was harvested when 95% of panicles have yellowed.

Results and Discussion

In this reseach, local rice varieties showed significant effect on the growth and production variable such as penicle length where kuku balam variety was the highest among the varieties, followed by ramos then sigodang. Similarly 1000-grais weight and number of filled grains was fond on kuku balam as the highest. Local rice varieties showed significant effect on number of empty grains where sigodang variety was the highest, followed by kuku balam then ramos on local rice varieties and shade intensity. The shade intensity showed no significant effect on each observations (Table).

In this research, the shade intensity showed significant effect on penicle length where kuku balam variety (30.81) was the highest among the varieties, followed by ramos (30.66) then sigodang variety (30.12) (Table). The shade intensity showed significant effect on number of empty grains where sigodang variety (121.51) was the highest among the varieties, followed by kuku balam (50.70) then ramos variety (46.20) (Table). The shade intensity showed significant effect on number of filled grains where ramos variety (255.31) was the highest among the varieties, followed by kuku balam (249.58) then sigodang variety (68.02) (Table). The shade intensity showed significant effect on 1000-grain weight where kuku balam variety (33.18) was the highest among the varieties, followed by ramos (32.26) then sigodang variety (29.38) (Table).

Among the 3 varieties of local superior rice varieties used in this research, the varieties of kuku balam showed superior results on penicle length, 1000-grais weight and number of filled grains. The difference in results was also due to inter-parameters interact or interconnected so that the results obtained were consistent in the varieties of Ramos. It is supported by Kamandalu and Suastika (2007), the correlation analysis, found that there is a positive correlation between the number of grain of content per panicle with the yield rate of dried grain obtained. According to Arifin *et al*. (1999), the number of grains per panicle is positively correlated with the crop yield as well as the number of vacuum grains and the weight of grains of grain content is one of the determinants of the results.

The differences of crop characteristics effects caused in yields of rice varieties. As for the differentiation of the main traits, among others, the time appears panicle and the length of the stem to panicle. In addition, the differences in the apparent phenotypic character of each variety are due to the different genes that govern the character. Orphans' (1991) in Dahlan *et al* (2012), each gene has different activities to grow and regulate the various types of characters in the organism's, since each variety has a distinctive character.

Table. Average Penicle Length, Number of Empty Grains, Number of Filled Grains, 1000-Grais Weight on Local Rice Varieties and Shade Intensity

Treatment	Penicle Length (cm)	Number of Empty Grains	Number of Filled Grains	1000-Grain Weight
Local Rice Variety				
V_1	30.12 b	121.51 a	68.02 b	29.38 b
V_2	30.81 a	50.70 b	249.58 a	33.18 a
V_3	30.66 ab	46.20 b	255.31 a	32.26 a
Shade Intensity				
N_0	30.66	71.33	190.10	32.54
N_1	30.18	71.71	189.22	31.22
N_2	30.75	75.37	193.59	31.06
Local Rice Variety and Shade Intensity				
V_1N_0	30.19	117.37	65.40	30.90
V_1N_1	29.73	118.53	61.47	27.30
V_1N_2	30.44	128.63	77.20	29.93
V_2N_0	31.10	51.53	251.87	33.40
V_2N_1	30.23	51.10	248.33	34.70
V_2N_2	31.10	49.47	248.53	31.43
V_3N_0	30.70	45.10	253.03	33.32
V_3N_1	30.57	45.50	257.87	31.65
V_3N_2	30.70	48.00	255.03	31.81

Means followed by the same letters in the same columns and rows are not significantly different at 5% level of probability by DMRT

Qamara and Setiawan (1995), rice cultivars can be grouped on the basis of (1) photoperiodic sensitivity, (2) the type of water management, (3) plant type and (4) endosperm starch content, where different variations in properties will cause different levels adaptation to certain environmental conditions.

The differences in the ability of each variety in adapt are also factors causing different results obtained. The adaptability of the Ramos variety is higher so that it can produce superior production compared to the other two varieties. This is supported by Gosh and Kashyap, (2003) that the variability in growth and production variability is demonstrated by varieties, as each rice variety has its own adaptability to environmental biophysical conditions. The results of this study indicate that Ramos varieties have better adaptation power than sigodang and kukubalam varieties for environmental conditions at the study sites. Factors likely due to low production draenase bad influences, oil density so high that the rice plants receive less light, it is certainly a constraint in the cropping pattern of palm oil and rice. Some local superior varieties used by farmers such as KKB, Ramos, Sigodang have not shown satisfactory results. In this system yet many are trying to plant paddy rice under stands of palm oil, but for upland rice it has often done.Local rice germplasm, which is genetically diverse within as well as between varieties (Pintasen *et al*. 2007), continues to play a key role in rice farming in many parts of Asia.

The panicle length produced by rice plants is generally positively correlated with the number of grain per panicle, but on the other hand from the results obtained that the panicle length does not show any relation with the number of grain per panicle, but

relates to the weight of 1000 grains. Based on the results obtained, the length of panicles and the weight of 1000 grains of the best grains are found in Kukubalam varieties of 30.81 cm and 33.18 gram respectively. These results are also suspected to be influenced by the genetic variation of the varieties used. The results of Marzuki and Siregar (1997) showed that the environment, genetic varieties have significant effect on grain yield, 1000 grain weight.

Conclusions

Local rice varieties showed significant effect on the growth and production variable such as penicle length where kuku balam variety was the highest among the varieties, followed by ramos then sigodang. Similarly 1000-grais weight and number of filled grains was fond on kuku balam as the highest. Local rice varieties showed significant effect on number of empty grains where sigodang variety was the highest, followed by kuku balam then ramos on local rice varieties and shade intensity. The shade intensity showed no significant effect on each observations. Thus,kuku balam as local rice varieties under shade intensity become important solution to improve overall productivity.

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