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EFFECT OF NPK FERTILIZER DOSAGE AND NUMBER OF SEEDS ON THE GROWTH AND PRODUCTION OF TWO COB RICE (*Oryza Sativa* L.) VARIETY OF RAJASA 01

Zeni Abdi, Sudarma, Rolita
Universitas Gunung Leuser, Indonesia
Email: zeni.abdi@yahoo.co.id, sudarmaza@gmail.com, rolitaa40@gmail.com

Abstract

"Effect of NPK Fertilizer Dosage and Number of Seeds on Growth and Yield of Two Cob Rice (*Oryza sativa* L.) Rajasa 01 varieties". This study aimed to determine the effect of NPK fertilizer and the number of seeds on the growth and yield of two cob rice varieties, Rajasa 01. This research was carried out in Lubang Indah Village, Lawe Alas District, Southeast Aceh Regency, from January to April 2021. The materials used in this study were 5 kg Rajasa 01 rice seeds (cob rice), the essential fertilizer used in this research. Used solid compost and NPK fertilizer. The design used in this study was a Randomized Block Design (RAK) with two factorial studies. The first factor is the effect of the dose of NPK fertilizer (N), which consists of 3 levels, N1: 200 kg/ha, N2: 250 kg/ha, and N3: 300 kg/ha. The second factor is the number of seeds per planting hole (J), which consists of 3 levels, J1: 1 seed/planting hole, J2: 2 seeds/planting hole, and J3: 3 seeds/planting hole. There were nine treatment combinations and three replications, so there were 27 experimental plots. Observations of growth components were observed starting from the emergence of shoots to yield, namely plant height (cm), number of tillers of rice plants per Clump, number of grains per panicle, panicle length per Clump (cm), and weight per 1000 grains of grain. The results showed that the dose of NPK fertilizer significantly affected the variables of plant height at 60 DAP and 1000 grain weight. However, it had no significant effect on the variables of plant height at 30 and 45 DAP, number of tillers per Clump at 30, 45, and 60 DAP, number of panicles per Clump, panicle length per Clump, number of grain per panicle, plant height at 60 DAP and 1000 grain weight. The highest grain was found at 300 kg/ha (N3) dose of NPK fertilizer. The number of rice seeds significantly affects the weight of 1000 grains and the number of grains per panicle. However, it had no significant impact on the variables of plant height and several tillers per Clump at the age of 30, 45, and 60 DAP; the number of panicles per Clump, panicle length per Clump, and the highest plants were found in 2 seedlings/planting hole (J2). There was no significant interaction between the treatment dose of NPK fertilizer and the number of rice seedlings on all observed variables.

Keywords: NPK Fertilizer, Number of Seeds, Two Cob Rice

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Introduction

One of the government's efforts to increase rice productivity is developing green revolution technology. This technology was first discovered by the International Rice Research Institute (IRRI) in the mid-1980s. The essential characteristics of this technology are (1) short-lived high-yielding seeds to increase crop yields through increasing crop intensity, (2) responsiveness to chemical fertilizers, especially Urea, to increase crop intensity through the use of fertilizers (3) requiring a prime environment, especially managed irrigation. . The increase in productivity that the government wants to achieve and expect from rice plants cannot be separated from the use of superior seeds. The number of superior varieties issued by the government to increase rice production certainly impacts types in each region, which are not the same. According to Faisal (2014), about 80 high-yielding varieties developed in Indonesia. In line with developments in the agricultural sector, the newest variety was born, namely Varieties Rajasa 01 (Super Large panicles/1000 grains), which can be used in all weather conditions and areas with a description of the Rajasa variety. 01, large stem 115 DAS, Height: 120 cm, tiller: 20/28 grain, panicle: 800/900, resistant to fall, fluffier rice, potential 10/12 tons (https://www.tanimakmurnusantara.com/2020/ 05/ padi-1000-built-rajas-01.html).

In advanced agriculture, seeds are a carrier of technology contained in the genetic potential of varieties to farmers. Rice producers and consumers of rice will feel the benefits of the superiority of these varieties if quality seeds from these varieties are available and planted on a large scale. Roots that reach the hands of farmers must be of high quality with original and pure types. So this reflects the superior nature of the class, such as being clean from sources of weeds and disease spread and having high vigor so that it grows well when planted on land (Makarim, AK, and Suhartatik. 2009).

All plants for their growth require sufficient nutrients. Lack of nutrients causes plant growth to be hampered, and the grain produced is also low. The disadvantages of using compound fertilizers include adding a single fertilizer (especially Urea) to meet N's nutrient needs according to the plant growth phase. Compound fertilizers are more efficient in distribution compared to single fertilizers because they contain N, P, and K elements. The existing NPK compound fertilizers have N, P, and K levels that are not suitable, so it is difficult to determine the right NPK dose for soils with high P and K status (Santorini. 2010).

According to Atman & Yarda (2006), treating a small number of seedlings per Clump resulted in better tillering formation than treating a large number of seedlings per Clump so that in the end, the number of tillers formed was relatively the same. The results of Atman's research (2007) by planting one seed per planting hole gave the highest grain yield (5.45 tons/ha), whereby growing one source in a planting hole produced panicle length, number of grains per panicle, the weight of 1000 seeds and high grain yield. Higher than planting 3, 5, 7, and 9 per planting hole. Meanwhile, according to research by Wangiyana et al. (2009), planting three seeds per planting hole gives more productive results. Using three seeds per planting hole resulted in a higher

number of leaves, number of tillers, and dry weight of straw than planting the number of 1 and 2 seeds per planting hole, but all these studies were carried out on paddy fields.

Based on the description above, the authors are interested in researching the Effect of NPK Fertilizer Dosage and Number of Seeds on the Growth and Yield of Two Cob Rice (*Oryza sativa* L.) Varieties Rajasa 01.

The study aimed to determine the effect of NPK fertilizer and the number of seeds on the growth and yield of rice tongkol, two varieties of rajas 01.

Research Method

This research was conducted in Lubang Indah Village, Lawe Alas District, Southeast Aceh Regency. This research was carried out from January to April 2021.

The materials used in this study were as follows: The seeds used were Rajasa 01 variety (two cob rice) produced from Banda Aceh as much as 5 kg for 27 experimental plots. The inorganic fertilizer used in this research is NPK fertilizer. The essential fertilizer is solid compost, with a recommended dose of 2 tons/ha for one action. It takes 1 kg of compost, so 27 kg of compost is needed for 27 plots. The tools used in this research are tractor, hoe, rake, knife, sprayer, meter, scale, analytical and sitting, bucket, raffia rope, writing utensil, and nameplate.

The design used in this study was a Randomized Block Design (RAK) with two factorial studies. There were nine treatment combinations and three replications, so there were 27 experimental plots. The first factor is the effect of the dose of NPK fertilizer (N) which consists of 3 levels:

N1 = 200 kg/ha
N2 = 250 kg/ha
N3 = 300 kg/ha

The second factor is the number of seeds per planting hole (J) which consists of 3 levels:

J1 = 1 seed/planting hole
J2 = 2 seeds/planting hole
J3 = 3 seeds/planting hole

The implementation of the research begins with the preparation of planting media, which is carried out in the practice of the press by cultivating the soil or making beds measuring one × 1 m with a spacing of 20×20cm. Then do the basic fertilizer application, using compost fertilizer. Compost fertilizer is essential fertilizer given to the bed, left for one week before planting, and produced according to each treatment. TSP and KCl fertilizers were presented at the time of planting, while Urea fertilizer was given 3-4 weeks after planting, and the subsequent application was eight weeks after planting.

Before planting the seeds, the fit sources are sorted (wholly filled) by soaking them in salt water (concentration 200 g/l). The pithy seeds are immediately rinsed with water and soaked for 24 hours. They were planting rice according to the treatment given by growing using two times the rice seeds in each planting hole. Thinning is done after

two weeks after planting. Thinning is done by cutting the base of the plant stem using plant shears. Rice watering is done every day in the morning and evening. If it rains, no watering is done. Weeding can be done manually by pulling out the weeds directly or using other simple tools such as hoes, sickles, and machetes. Weeding is done around rice plants. The first weeding is done 10 or 12 days after transplantation, and the second after 30 days. Chemical pest control uses an insecticide with the active ingredient Deltamethrin 25 g/l. Chemical disease control uses a fungicide with active *copper oxy sulfate* 345 g/l. This fungicide also functions as a bactericide. Active ingredient copper *oxysulfate* is recommended to control leaf blight. Harvesting is done when the grain has turned yellow, but the panicles are still fresh. Rice can be harvested at 110-180 days, depending on the variety. Harvesting occurs when 90% of the rice has turned yellow or is physiologically ripe.

Observations of growth components were observed starting from the emergence of shoots to yield:

1. The height of the rice plant was measured from the base of the stem above the soil surface to the tip of the highest leaf by grasping the rice plant and slowly pulling it up. Measurements were made at 30, 45, and 60 DAP—the unit of measure in centimeters (cm).
2. Tillers were counted by counting the number of tillers of rice plants that grew from the main rice stalks. If there are 20 rice plants in each bed, then the number of tillers is 19 because the remaining stem is the mother rice plant.
3. The number of tillers of rice plants was estimated at the time of harvest.
4. The grain content in each panicle is the number of pointed grains in each panicle. They are observed in each panicle per plant sample at harvest. Calculation results are expressed in seeds.
5. Panicle length was observed at harvest on 5 sample plants per Clump. Sample plants were taken from the middle of the Clump, free from pests and diseases, and had good growth. The panicle length was measured from the base to the tip of the panicle
6. Weight per 1000 grains of grain per bed was obtained by weighing 1000 seeds of pithy grain taken randomly using an analytical weighing device. The results of the calculation of the weight of 1000 seeds are expressed in grams.

Results And Discussion

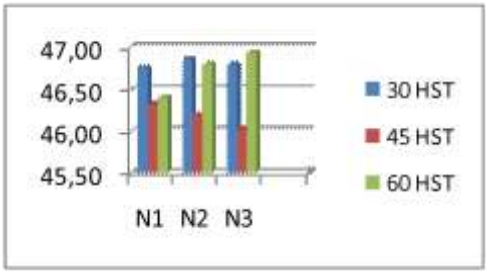
F test results on the analysis of variance showed that NPK fertilizer had a significant effect on plant height at 60 DAP. However, the dose of NPK fertilizer had no significant effect on plant height at 30 and 45 DAP. The average size of rice plants at 30, 45, and 60 DAP in the NPK fertilizer dose treatment after being tested by Duncan's multiple area tests can be seen in Table 1.

Table 1
The average plant height at 30, 45, and 60 DAP in the treatment dose of NPK fertilizer.

Dosage of NPK Fertilizer	Plant Height (cm)		
	30 DAP	45 DAP	60 DAP
N1 = 200 kg/ha	46.76	46.33	46.41
N2 = 250 kg/ha	46.86	46.20	46.80
N3 = 300 kg/ha	46.80	46.94	BNT
	46.03		
test	-	-	0.32

Table 1 shows that the highest plants were found at a dose of NPK fertilizer (300 kg/ha) N3 compared to plant height at other doses of NPK fertilizer. Plant height at a fertilizer dose of 300 kg/ha (N3) was significantly different from plant height at a fertilizer dose of 250 kg/ha (N2) but not very different at a fertilizer dose of 200 kg/ha (N1).

The average plant height at 30, 45, and 60 DAP due to the NPK fertilizer dose treatment can be seen in Figure 1.



Gambar 1
Plant Height (cm)

The results of the F test on the analysis of variance showed that the dose of NPK fertilizer significantly affected the number of tillers aged 30, 45, and 60 DAP. The average number of tillers of rice plants per Clump at the age of 30, 45, and 60 DAP in the NPK fertilizer dose treatment can be seen in Table 2.

Table 2
The average number of tillers per cluster at 30, 45, and 60 DAP at the dose treatment NPK fertilizer.

Dosage of NPK Fertilizer	Number of tillers per Clump (stem)		
	30 DAP	45 DAP	60 DAP

N1 = 200 kg/ha	19.76	19.33	19.41
N2 = 250 kg/ha	19.86	19.20	19.80
N3 = 300 kg /ha	19.80	19.03	19.94

Showed significant differences with other treatments. The highest number of tillers aged 30, 45, and 60 DAP tended to be shown at a dose of 300 kg/ha (N3) of NPK fertilizer compared to 250 kg/ha (N2) of NPK fertilizer and 200 kg/ha (N1) of NPK fertilizer. For more details, it can be seen in Figure 2.

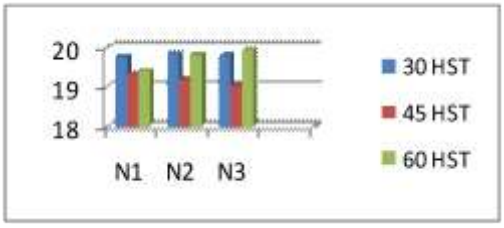


Figure 2
Number of Tillers (Stems)

The F test results in the variance analysis showed that the NPK fertilizer dose significantly affected the number of panicles per Clump. The average number of panicles per Clump in the NPK fertilizer dose treatment can be seen in Table 3.

Table 3
The average number of grains per panicle of rice plants in the NPK fertilizer dose treatment NPK fertilizer

dose	Amount of Grain per Panicle (Stem)
N1 = 200 kg/ ha	355.52
N2 = 250 kg/ha	355.82
N3 = 300 kg/ha	355.64

The amount of NPK fertilizer was 200 kg/ha (N1), although statistically, it did not significantly differ from other therapies. Several panicles per Clump tended to be shown at a dose of 300 kg/ha (N3) of NPK fertilizer compared to 250 kg/ha of NPK fertilizer treatment (N2). For more details, it can be seen in Figure 3.

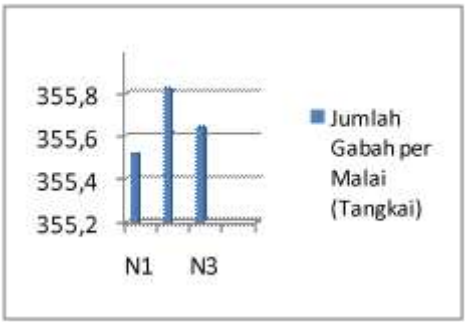


Figure 3
Number of Grains (Stems)

The F test results on the analysis of variance showed that the dose of NPK fertilizer had no significant effect on panicle length per Clump. The average panicle length per Clump in the treatment of NPK fertilizer doses can be seen in Table 4.

Table 4
Average panicle length per Clump in various treatments of NPK fertilizer doses NPK

Fertilizer Dose	Length per Clump (cm)
N1 = 200 kg/ha	58.50
N2 = 250 kg/ha	58.86
N3 = 300 kg/ha	58.77

The highest panicle length per Clump tends to be shown at a dose of 250 kg/ha (N2) of NPK fertilizer compared to treatment with an amount of 300 kg/ha of NPK fertilizer (N3) and NPK fertilizer dose of 200 kg/ha (N1). However, statistically, it did not significantly differ from other treatments. For more details, it can be seen in Figure 4.

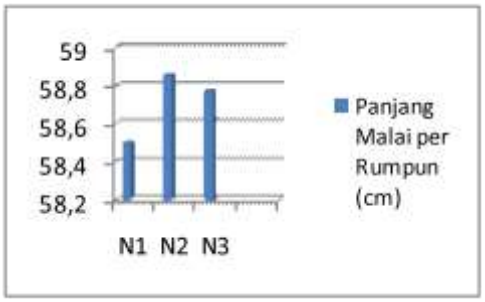


Figure 4
Panicle Length (cm).

The F test results in the analysis of variance showed that the dose of NPK fertilizer significantly affected the weight of 1000 grains of grain. The average weight of 1000 grains of NPK fertilizer after being tested with 0.5 BNT can be seen in Table 5.

Table 5
The average weight of 1000 grains of NPK fertilizer dose treatment Dose of NPK

Fertilizer	Weight 1000 Grains (g)
N1 = 200 kg/ha	22.16
N2 = 250 kg/ha	21.78
N3 = 300 kg/ha	21.87
BNT 0.2	0.27

Table 5 shows that the weight of the heaviest 1000 grains tends to be shown at a dose of 200 NPK fertilizer kg/ha (N1) compared to treatment with an amount of 300 kg/ha (N3) of NPK fertilizer and a dose of 250 kg/ha (N2) of NPK fertilizer. However, statistically, it did not significantly differ from other treatments. The average weight of 1000 grains of grain due to therapy with doses of NPK fertilizer can be seen in Figure 5.

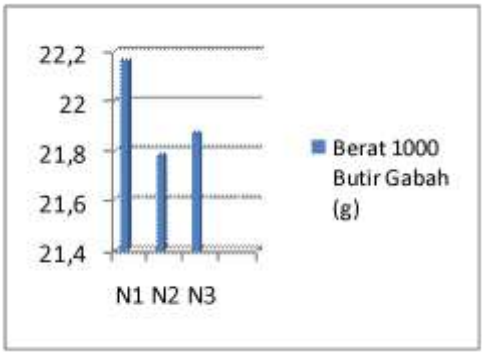


Figure 5
Weight of 1000 Grains (g)

The results of the F test on the analysis of variance showed that the number of rice seeds had a significant effect on plant height at the age of 30, 45, and 60 DAP. The average plant height at 30, 45, and 60 DAP in various treatments of the number of rice seedlings can be seen in Table 6.

Table 6
The average plant height at 30, 45, and 60 DAP in treating the number of rice seeds.

Number of Seedlings	Plant Height (cm)		
	30 DAP	45 DAP	60 DAP
J1 (1 seedling/planting hole)	48.80	48.69	48.75
J2 (2 seedlings/planting hole)	48.87	48.78	49.13
J3 (3 seeds/planting hole)	48.77	48.69	49.18

Table 6 shows that the highest plant was found in the treatment with the number of rice seeds, three seeds/planting hole (J3), compared to the plant height in the treatment with the number of seeds/planting hole one seed/planting hole. (J1), and two seedlings/planting hole (J2) at all ages of observation, although statistically, it did not show a significant difference with other treatments. The relationship between rice plant height on the number of rice seedlings aged 30, 45, and 60 DAP can be seen in Figure 6.

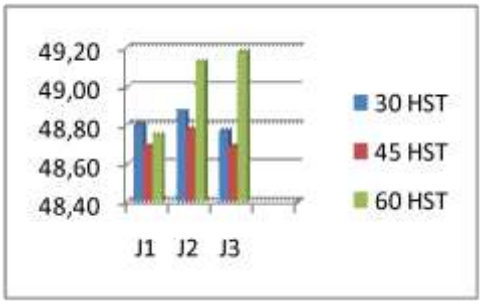


Figure 6
Plant Height (cm)

The results of the F test on the analysis of variance showed that the treatment of the number of rice seedlings had no significant effect on the number of tillers per Clump at ages 30, 45, and 60 HST. The average number of tillers per Clump at the age of 30, 45, and 60 DAP in the treatment of the number of rice seedlings can be seen in Table 7.

Table 7
The average number of tillers per cluster at the age of 30, 45, and 60 DAP in the treatment of the number of rice seedlings

Total Seedlings	Number of tillers per Clump (stem) (bmang) 60 DAP		
	30 DAP	45 DAP	60 DAP
J1 (1 seedling/planting hole)	119.13	119.02	119.08
J2 (2 seedlings/planting hole)	119.20	119.11	119.46
J3 (3 seeds/planting hole)	119.10	110.36	108.85

Table 7 shows that the highest number of tillers per Clump tended to be indicated by the number of rice seedlings of 2 seeds/planting hole (J2) compared to the number of tillers per Clump in The number of rice seedlings treatment was one seed/planting hole (J1) and three seeds/planting hole (J3), although statistically, it did not show a significant difference with other treatments. The relationship between the number of tillers per Clump on the number of rice seedlings aged 30, 45, and 60 DAP can be seen in Figure 7.

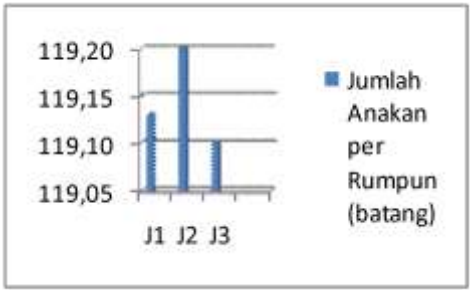


Figure 7
Number of Tillers (Stems)

The results of the F test on the analysis of variance showed that the number of rice seedlings had a significant effect on panicle length per Clump. The average panicle length per Clump in the treatment of the number of rice seedlings can be seen in Table 8.

Table 8
The average panicle length per Clump in treating the number of rice seeds.

Number of Seedlings	Panicle Length per Clump (cm)
J1 (1 seed/planting hole)	66.23
J2 (2 seedlings/planting hole)	66.77
J3 (3 seedlings/planting hole)	66.64

Table 8 shows the panicle length per Clump. The highest number of rice seedlings tended to be shown in the number of rice seedlings of 2 seeds/planting hole (J2) compared to the treatment of 3 sources/planting hole (J3) and one seedling/planting hole (J1). However, statistically, it did not significantly differ from other treatments. For more details, it can be seen in Figure 8.

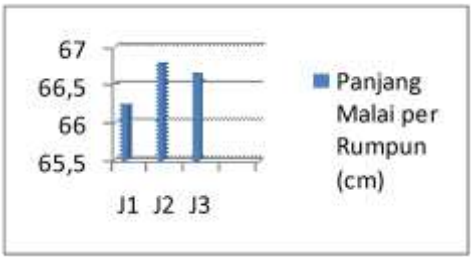


Figure 8
Panicle Length (cm)

The results of the F test on the analysis of variance showed that the treatment of the number of rice seeds had a significant effect on the number of grains per panicle. The average number of grains per panicle in various therapies and the number of rice seedlings after being tested with BNT 0.1 can be seen in Table 9.

Table 9
The average number of grains per panicle in treating the number of rice seeds.

Number of Seeds	Number of Grains per Panicle (grain)
J1 (1 seed/planting hole)	40.23
J2 (2 seeds/planting hole)	40.79
J3 (3 seeds/planting hole)	40.65

Table 9 shows the number of grains per panicle. The highest number was demonstrated in the treatment of the number of rice seedlings of 2 seeds/planting hole (J2) compared to the amount of grain in the treatment of the number of rice seeds of 3 seeds/planting hole (J3) and one seedling/planting hole (J1). The average number of grains per plant panicle due to the treatment of the number of rice seeds can be seen in Figure 9.

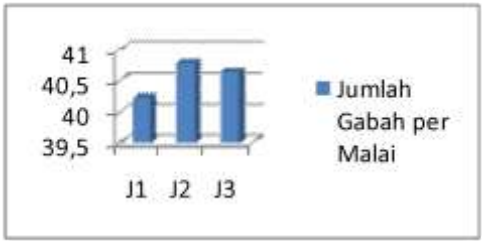


Figure 9
Number of Grains per panicle (Grain)

The results of the F test on the analysis of variance showed that the treatment of the number of rice seeds had a significant effect on the weight of 1000 grains of grain. The average weight of 1000 grains of rice in various treatments of the number of rice seeds after being tested with BNT 0.05 can be seen in Table 10.

Table 10
The average weight of 1000 grains of rice in the treatment of the number of rice seeds

Number of Seeds	Weight of 1000 Grains (g))
J1 (1 seed/planting hole)	48.46
J2 (2 seeds/planting hole)	48.78
J3 (3 seeds/planting hole)	48.92

Table 10 shows that the heaviest weight of 1000 grains was found in the treatment of the number of rice seeds 3 Seedlings/planting hole (J3) was compared with the weight of 1000 grains of grain in the treatment of the number of paddy seeds of 2 seeds/planting hole (J2) and one seedling/planting hole (J1).

The average weight of 1000 grains of rice due to the treatment of the number of rice seeds can be seen in Figure 10.

Figure 10
Weight of 1000 Grains (gr)

The F test results in the variance analysis showed a significant interaction between the dose of NPK fertilizer and the number of rice seeds on all growth variables and observed rice yields. This means that the growth and creation of rice plants due to NPK fertilizer dose treatment do not depend on the number of rice seeds and vice versa.

Discussion

The results showed that the highest plant was found at a dose of 300 kg/ha (N3) of NPK fertilizer compared to plant height at an amount of 250 kg/ha (N2) of NPK fertilizer and 200 kg/ha (N1) of NPK fertilizer. Plant height at a dose of NPK fertilizer of 300 kg/ha (N3) was significantly different from plant height at a dose of NPK fertilizer of 250 kg/ha (N2) but not very different from an amount of NPK fertilizer of 200 kg/ha (N1). The highest number of tillers aged 30, 45, and 60 DAP tended to be shown at a dose of 300 kg/ha (N3) of NPK fertilizer compared to 250 kg/ha (N2) of NPK fertilizer and 200 kg/ha (N1) of NPK fertilizer. Showed significant differences with other treatments. The highest number of grains per panicle tends to be shown at a dose of 300 kg/ha (N3) of NPK fertilizer compared to 250 kg/ha (N2) of NPK fertilizer and 200 kg/ha (N1) of NPK fertilizer. However, statistically, there is no significant difference with other treatments. The highest panicle length per Clump tended to be shown at a dose of 250 kg/ha (N2) of NPK fertilizer compared to treatment with an amount of 300 kg/ha (N3) of NPK fertilizer and a dose of 200 kg/ha (N1) of NPK fertilizer. However, statistically, there was no significant difference with other treatments. The highest weight of 1000 grains tends to be shown at a dose of 200 kg/ha (N1) of NPK fertilizer, compared to the importance of 1000 grains of rice at an amount of 300 kg/ha (N3) of NPK fertilizer and 250 kg/ha (N2) of NPK fertilizer. Statistics did not show a significant difference with other treatments.

The results showed that the highest plant was found in the treatment with the number of rice seedlings of 3 seeds/planting hole (J3) compared to the plant height in the treatment of the number of rice seeds of 2 seeds/planting hole (J2), and one seedling/planting hole (J1) at all ages. Although statistically, observations did not show a significant difference with other treatments. The highest number of tillers per Clump tended to be shown in the number of rice seedlings of 2 seeds/planting hole (J2) compared to the number of tillers per Clump in the treatment of the number of rice seedlings of 1 seed/planting hole (J1) and three seeds/planting hole (J3). However, statistics did not show a significant difference with other treatments. The highest panicle

length per Clump tends to be shown in the number of rice seedlings of 2 seeds/planting hole (J2) compared to the treatment of 1 seed/planting hole (J1) and three seeds/planting hole (J3), although statistically, it did not show a significant difference with other treatments. . The highest number of grain per panicle was demonstrated in the treatment of the number of rice seeds of 2 seeds/planting hole (J2) compared to the amount of grain in the treatment of the number of rice seeds of 1 seed/planting hole (J1) and three seeds/planting hole (J3). The heaviest weight of 1000 grains of grain was found in the treatment of the number of rice seeds of 3 seeds/planting hole (J3) compared to the importance of 1000 grains of rice in the treatment of the number of rice seeds of 2 seeds/planting hole (J2) and one seed/planting hole (J1).

The F test results in the variance analysis showed a little interaction between the dose of NPK fertilizer and the number of rice seedlings on all rice plants' observed growth and yield variables. This means that the growth and yield of rice plants due to NPK fertilizer dose treatment do not depend on the number of rice seeds and vice versa.

Conclusion

1. The NPK fertilizer dose significantly affected the variables of plant height at 60 DAP and 1000 grain weight. However, it had no significant effect on the variables of plant height at 30 and 45 DAP, number of tillers per Clump at 30, 45, and 60 DAP, number of panicles per Clump, panicle length per Clump, number of grain per panicle, plant height at 60 DAP and 1000 grain weight. The highest grain was found at 300 kg/ha (N3) dose of NPK fertilizer.
2. The number of rice seeds significantly affected the weight of 1000 grains and the number of grains per panicle. However, it had no significant effect on the variables of plant height and several tillers per Clump at the age of 30, 45, and 60 DAP; several panicles per Clump, panicle length per Clump, and the highest plants were found in 2 seedlings/planting hole (J2).
3. There was no significant interaction between the treatment dose of NPK fertilizer and the number of rice seeds on all observed variables.

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