Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

THE EFFECT OF DOSAGE AND TIME OF NPK FERTILIZER APPLICATION ON THE GROWTH AND YIELD OF RICE (*Oryza sativa* L.) VARIETY IR-64

PENGARUH DOSIS DAN WAKTU PEMBERIAN PUPUK NPK TERHADAP PERTUMBUHAN DAN HASIL PADI (*Oryza sativa* L.) VARIETAS IR-64

Afdhalul Hilza[1*], Tasliati Djafar[1]

[1]Agrotechnology Study Program, Faculty of Agriculture, Universitas Iskandar Muda, Banda Aceh, Indonesia

*Corresponding Email: Hilzaafdhalul835@gmail.com

Abstract

This study aims to determine the most effective dose and timing of NPK fertilizer application and to examine their interaction on the growth and yield of rice plants. The study was conducted in Gampong Lampreh, Ingin Jaya District, Aceh Besar Regency, using the IR-64 rice seed variety obtained from the Samahani Main Seed Center (BBI). The study was arranged using a 3 × 3 factorial Randomized Block Design (RBD) with three replications, yielding 27 experimental units. The first factor was the NPK fertilizer dose, while the second was the timing of fertilizer application: 0 and 10 days, 10 and 20 days, and 15 and 30 days after planting. The parameters observed included plant height, number of tillers, and dry grain weight per hectare. The results showed that NPK fertilizer application significantly affected plant height at 35 and 75 days after planting (DAP), and had a very significant effect at 55 DAP. The number of tillers was significantly affected at 35 days after planting, very significantly at 55 days after planting, but not significantly different at 75 days after planting. NPK fertilizer treatment did not significantly affect dry grain weight per hectare. The best dose was obtained at 50 g NPK per plot. There was a significant interaction between the dose and timing of fertilizer application on plant height at 75 days after planting and on the number of tillers at 55 days after planting. In contrast, other parameters did not show significant interactions.

Keywords: *Rice (Oryza sativa* L.*); NPK fertilizer; time of fertilizer application.*

Abstrak

Penelitian ini bertujuan untuk menentukan dosis dan waktu pemberian pupuk NPK yang paling efektif serta mengkaji interaksi keduanya terhadap pertumbuhan dan hasil tanaman padi. Penelitian dilaksanakan di Gampong Lampreh, Kecamatan Ingin Jaya, Kabupaten Aceh Besar menggunakan benih padi varietas IR-64 yang diperoleh dari Balai Benih Induk (BBI) Samahani. Penelitian disusun menggunakan Rancangan Acak Kelompok (RAK) faktorial 3 × 3 dengan tiga ulangan sehingga diperoleh 27 satuan percobaan. Faktor pertama adalah dosis pupuk NPK, sedangkan faktor kedua adalah waktu pemberian pupuk, yaitu 0 dan 10 hari, 10 dan 20 hari, serta 15 dan 30 hari setelah tanam. Parameter yang diamati meliputi tinggi tanaman, jumlah anakan, dan bobot gabah kering per hektar. Hasil penelitian menunjukkan bahwa pemberian pupuk NPK berpengaruh nyata terhadap tinggi tanaman pada umur 35 dan 75 hari setelah tanam (HST), serta berpengaruh sangat nyata pada umur 55 HST. Jumlah anakan dipengaruhi nyata pada umur 35 HST, sangat nyata pada umur 55 HST, namun tidak berbeda nyata pada umur 75 HST. Perlakuan pupuk NPK tidak memberikan pengaruh nyata terhadap bobot gabah kering per hektar. Dosis terbaik diperoleh pada pemberian 50 g NPK per plot. Terdapat interaksi nyata antara dosis dan waktu pemberian pupuk terhadap tinggi tanaman pada umur 75 HST serta jumlah anakan pada umur 55 HST, sedangkan parameter lainnya tidak menunjukkan interaksi yang nyata.

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

Kata kunci: Padi (*Oryza sativa* L.); pupuk NPK; waktu pemberian pupuk.

INTRODUCTION

Rice (*Oryza sativa* L.) is an ancient agricultural plant originating from two continents, Asia and West Africa, which have tropical and subtropical climates (Pratama, 2020). Besides being a staple food, rice provides several nutrients that support the human body, as it contains substances that are easily converted into energy. Rice has become an integral part of Indonesian life; it is undeniable that this raw material has an impact on the political order and national stability. Rice is the staple food for more than 95% of the population and a livelihood for some rural farmers (Pratama, 2020). The demand for rice is increasing every year along with population growth. According to the 2020 population census, Indonesia's population is 237.63 million, an increase of 23.57 million from 2010's 207.2 million. This means that Indonesia's average annual population growth is 1.25%. (BPS, 2021). This issue remains a concern for all countries whose staple food relies on rice. This automatically positions rice as a primary commodity that deserves continued development. Providing rice for the public remains a challenge due to the continued increase in rice consumption. Although national rice production in 2023 reached its highest level, reaching 53.98 million tons of dry milled grain, from a harvested area of 10.21 million hectares, efforts to maintain rice self-sufficiency are still needed through increasing and expanding rice crop intensification in both paddy fields, drylands, and rainfed areas (BPS, 2024). To achieve production targets, fertilizer use is crucial in rice cultivation. However, its use must comply with recommended fertilizer dosages based on soil analysis.

Increasing rice production must be done to meet the consumption needs of the Indonesian people. Fertilization is crucial in rice cultivation. Balanced fertilization determines rice production and productivity. Balanced fertilization in the field must adhere to the six principles of "right timing": appropriate quantity, type, price, quality, and use (Kurniawan, 2017).

The timing of fertilizer application significantly affects rice plant growth and yield, as plants respond differently to fertilizer during the vegetative growth phase. The appropriate timing of fertilization depends on the plant's needs and response, the solubility and type of fertilizer, and climatic conditions. Rice plants are typically fertilized before and after planting, during the vegetative and generative growth phases.

Rice can be fertilized with organic or inorganic fertilizers. Inorganic fertilizers, whether high- or low-nitrogen, are essential for rice growth and yield. Inorganic fertilizers are typically applied in the form of compound fertilizers, such as NPK PHONSKA 15:15:15. The basic composition of Phonska fertilizer includes 15% N, 15% P_2O_5, 15% K_2O, 10% S, and a maximum water content of 2% (Tobing *et al.*, 2020).

The research questions were: whether NPK fertilizer dosage affects the growth and yield of IR-64 rice plants; the timing of NPK fertilizer application; and the interaction between NPK fertilizer dosage and timing on the growth and yield of IR-64 rice plants. The objectives of this study were to determine the appropriate dosage and timing of NPK fertilizer application to achieve good growth and yield in IR-64 rice plants, and to assess the interaction between these factors.

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

RESEARCH METHODS

This research was conducted in rice fields in Gampong Lampreh, Ingin Jaya District, Aceh Besar Regency, from March 12, 2024, to June 20, 2024. The research site is located at an elevation of 3 meters above sea level. The materials used in this study were: IR 64 rice variety seeds obtained from BBU Samahani, 360 grams of CBH 65 organic compound fertilizer with an NPK formula of 15:15:5, and 50 cc of Indofuran pesticide. The tools used in this study included a hoe, plow, harrow, sickle, scales, measuring tape, hand sprayer, stationery, and other materials.

The study used a 3x3 factorial design with three replications. Two factors were studied: the dose and timing of NPK application, each consisting of three treatment levels:

a. NPK Fertilizer Dosage Factor (D)

D_1 = 30 grams NPK/plot (300 kg NPK/Ha)
D_2 = 40 grams NPK/plot (400 kg NPK/Ha)
D_3 = 50 grams NPK/plot (500 kg NPK/Ha)

b. NPK Fertilizer Application Time Factor (W)

W_1 = 0 days and 10 days
W_2 = 10 days and 20 days
W_3 = 15 days and 30 days

Thus, there are 9 treatment combinations and 27 experimental units.

The mathematical model used in this study (Montgomery, 2019) is:

$$Yijk = \mu + \beta i + Dj + Wk + (DW)jk + €ijk$$

Observation data were analyzed using analysis of variance. Results of the analysis of variance that had a very significant or significant effect on the observed parameters were followed by an honest significant difference (HSD) test at a 5% level.

Research Implementation

1. Soil Preparation

The land for planting and seeding was plowed and hoed three times, then harrowed once, cultivating the soil to a depth of 25-30 cm. After the first plowing, the soil was immediately flooded to accelerate the decomposition of plant debris and soften it. This flooding lasted for 4-5 days. During the second plowing, a nursery plot was also created in one of the planting areas. The soil was smoothed until it was well-muddy, then divided into plots measuring 1 m long, 1 m wide, and 20 cm high.

The final plowing and harrowing were carried out five days before planting. The soil was plowed until it was muddy, and then 27 experimental plots measuring 1 m x 1 m were created. Each plot within a block is demarcated by a 20 cm-wide and 15 cm-high

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

embankment, with a 50 cm distance between blocks, which also serves as drainage and a control path.

2. Seed Sowing

Before sowing, the seedbed is fertilized with 5 grams of NPK fertilizer as a base fertilizer. The seeds are then soaked in water for 24 hours to allow the grain to germinate. Once 90% of the grain has germinated, the seeds are ready to be distributed evenly throughout the nursery. Seeding is carried out carefully to ensure the seeds are not submerged.

To prevent pest attacks, 10 days after sowing, the nursery is sprayed with Indofuran insecticide at a concentration of 2 cc per liter of water.

3. Planting

Planting is carried out when the seedlings are 25 days old or have 5-6 leaves. Healthy, uniformly growing seedlings were selected. They were planted using a spacing of 25 cm x 25 cm. Only the seedling stem was planted in each planting hole, carefully buried to a depth of 3 cm.

4. Maintenance

Maintenance included fertilization, replanting, watering, weeding, and pest control.

a. Fertilization was carried out twice, each time using half the dose of the fertilizer treatment being tested. The first fertilizer application was carried out at planting, 10 days after planting (DAP), and 15 DAP, depending on the experimental plot, by spreading it evenly over the plot surface. The second fertilizer application, at half the dose, was applied at 10, 20, and 30 DAP, while subsequent fertilization applications were applied according to the experimental application schedule.
b. Replanting of dead seedlings was only carried out until the seedlings were 7 days old or before the first fertilizer application.
c. Water management: After planting the rice seedlings, the plot is irrigated gradually according to the plant's growth rate, until the water level reaches 7-10 cm from the soil surface.
d. Weeding: Weeds that grow in the plot are removed regularly, carefully removing them to avoid damaging the plant roots.
e. Pest control: To control potential pest attacks, use the insecticide indofuran at a concentration of 2 cc per liter of water. Applications are made every 20 days.

Observed Parameters

1. Plant Height
   Plant height was observed at 35, 55, and 75 DAP, measuring from the soil surface to the tip of the tallest leaf, on net plot plants.
2. Number of tillers per hill
   The number of tillers was observed at 35, 55, and 75 DAP by counting fully developed tillers per hill on plants in the net plot.
3. Dry Grain Weight per Hectare

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

4. Dry grain weight was observed after harvest by weighing all the grain in the net plot, after threshing and drying for 3 days. The results were then converted to dry grain weight per hectare.

RESULTS AND DISCUSSION

Effect of NPK Fertilizer Dosage on the Growth and Yield of IR-64 Rice Plants

1. Plant Height

Observation data showed average plant height at 35, 55, and 75 DAP. The F-test results in the analysis of variance showed that NPK fertilizer significantly affected plant height at 35 and 75 DAP, with the effect most pronounced at 55 DAP. The average net plant height of IR-64 rice per plot at 35, 55, and 75 days after the BNJ test is shown in Table 1.

Table 1. Average Height of IR 64 Rice Plants at 35, 55, and 75 days DAP, Due to NPK Fertilizer Dose Treatment.

Treatment	Plant Height (cm)		
	35 DAP	55 DAP	75 DAP
D_1	53.80^{ab}	77.26^{a}	87.21^{a}
D_2	52.72^{a}	76.06^{a}	88,21 ^{ab}
D_3	57.53^{b}	81.78^{b}	91.93 ^{b}
BNJ $_{0.05}$	4.32	3.61	3.90

Description: Numbers followed by the same letter are not significantly different at the 5% BNJ level.

The results of the BNJ test (Table 1) indicate that rice plant height at 35 DAP did not differ significantly between D_3 and D_2. At 55 DAP, D_3 was not significantly different from D_2 but was significantly different from D_1. The increased growth rate of rice plants at a dose of 50 grams/plot (D_3) suggests that at this dose, the rice plants received sufficient nutrients to support plant growth. According to Husin *et al*. (2019), plants will thrive if all required elements are available in sufficient quantities and are readily absorbed. NPK fertilizer is a complete compound fertilizer containing the N, P, and K required by plants, one of which is nitrogen (N), which supports rice growth.

The nutrient N in plants plays a role in protein and chlorophyll formation. N functions to make plant parts greener, containing many green granules (in the process of photosynthesis). Furthermore, nitrogen can accelerate plant growth and yield, specifically plant height, tiller number, and grain size. It also improves plant and grain quality, increases rice protein content, and increases grain yield (Mawardiana *et al*., 2013).

2. Number of Tillers per Hill

Observation data on the average number of rice tillers at 35, 55, and 75 DAP were collected to assess the effect of NPK fertilizer dosage. The F-test results from the analysis of variance showed that NPK fertilization significantly affected the number of rice tillers at 35 and 55 DAP. However, they had no significant effect on the net number of rice tillers per pot after 75 days of planting. The average number of rice tillers per plot after the BNJ test at 35 and 55 DAP is shown in Table 2.

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

Table 2. Average Number of Tillers of IR-64 Rice Plants at 35 and 55 DAP Due to NPK Fertilizer Dose Treatment.

Treatment	Plant Height (cm)	
	35 DAP	**55 DAP**
D_1	16.89[a]	17.02[a]
D_2	15.75[a]	16.83[a]
D_3	21.83[b]	21.78[b]

Table 2 shows that the number of tillers in rice plants at 35 and 55 DAP differed significantly between D_3 and D_1 and D_2. The highest number of tillers at 35 and 55 DAP was observed in treatment D3, and the lowest in D_2. The higher the dose of NPK fertilizer applied to the soil, the more nutrients are available to and absorbed by plants, thereby stimulating tiller growth. According to Kurniadi (2002), tiller number is strongly influenced by the availability of nitrogen and phosphorus in the soil. If nitrogen is sufficient in the soil, plants will produce many tillers.

Muyani (2010) argues that the nitrogen in this compound fertilizer is a nutrient that can stimulate vegetative growth in plants when available in sufficient, balanced quantities for tiller formation. This aligns with the opinion of Sri Setyadi Harjadi (1984), who stated that plants will grow well when the required growth factors are available and balanced. Furthermore, Sarief (1986) added that the availability of nutrients that plants can absorb is one factor that can influence growth and increase yield. The low number of rice tillers at a dose of 40 grams of NPK/plot (D_2) is due to rice plants being unable to utilize nutrients, which can impair optimal tiller formation.

3. Dry Grain Weight per hectare (kg)

Observation data on the average dry grain weight of rice per hectare due to the effect of NPK fertilizer doses are presented in Appendix Table 3. The F-test results in the analysis of variance indicate that the NPK fertilizer dose had no significant effect on the dry grain weight of rice per hectare. This is due to the availability of NPK nutrients in the soil being sufficient and balanced. The average dry grain weight of IR-64 rice per hectare due to the NPK fertilizer dose is presented in Table 3.

Table 3. Average Dry Grain Weight of IR-64 Rice Due to NPK Fertilizer Dose Treatment.

Number	Treatment	Dry Grain Weight per Hectare (kg)
1	D_1	2,777.78
2	D_2	2,844.44
3	D_3	3,822.22

Table 3 shows that the highest average dry grain weight of IR-64 rice was found in the D_3 treatment, at 3,822.22 kg, followed by the D_2 treatment at 2,844.44 kg, and the lowest was found in the D_1 treatment at 2,777.78 kg. Based on the results obtained, the NPK fertilizer dosage did not significantly affect dry grain weight per hectare. This is because the availability of NPK nutrients in the soil is sufficient and balanced. According to Rosmakam & Yuwono (2011), the availability of nutrients that plants can absorb is one factor that can influence growth and increase yield. Furthermore, the type and dosage of fertilizer used are influenced by the soil fertility conditions at the planting location.

Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

Effect of NPK Fertilizer Application Timing on the Growth and Yield of IR 64-Rice Plants

1. Plant Height

Observations of the average rice plant height at 35, 55, and 75 DAP, as a result of the timing of NPK fertilizer application, are presented in Table 4.

The results of the F-test in the analysis of variance showed that the timing of NPK fertilizer application had a very significant effect on rice plant height at 35 days after planting and a significant effect at 55 days after planting. However, rice plant height at 75 days after planting had no significant effect.

Table 4. Average net plant height of IR-64 Rice at 35 and 55 DAP.

Number	**Treatment**	**35 DAP**	**55 DAP**
1	W_1	58,45 b	80,86 b
2	W_2	51,94 a	76,57 a
3	W_3	53,63 b	77,67 ab

Table 4 shows that rice plant height at 35 and 55 DAP in treatment W1 was significantly different from that in treatments W_2 and W_3. The tallest rice plants were found in treatment W1, while the smallest were found in treatment W_2. The increased growth rate of rice plants at the 0-day and 10-day (W_1) application times is suspected to be due to optimal, balanced utilization and absorption of NPK fertilizer, which significantly impacts their growth. Sutejo (2010) stated that fertilization should not be applied at random. Consideration must be given to the required timing and the availability of nutrients. If NPK fertilizer is applied at 10 days and 20 days (W_2), plant growth will decrease. This is because the application times are not efficient at absorbing and utilizing nutrients. Husin *et al*. (2019) argue that nutrient deficiencies in plants cause abnormal growth. Plants with less fertile growth will require faster and more frequent fertilization.

2. Number of Tillers per Clump

Observation data on the average number of rice tillers at 35, 55, and 75 DAP as a result of the timing of NPK fertilizer application are presented in Table 5. The F-test results in the analysis of variance indicate that the timing of NPK fertilizer application significantly affected the number of tillers at 55 DAP. However, it did not significantly affect the number of tillers at 35 and 75 DAP. The average number of tillers in rice plants after the BNJ test at 55 days after planting is shown in Table 5.

Table 5. Average Number of Tillers in IR 64 Rice Plants at 55 Days After Planting Due to NPK Fertilizer Application Timing.

Number	**Treatment**	**Number of Tillers 55 DAP**
1	W1	19,64 b
2	W2	16,33 a
3	W3	19,47 ab

Table 5 shows that the number of tillers in rice plants at 55 days after planting was not significantly different between W1 and W_3 but was significantly different from W_2. The highest number of tillers was observed in treatment W1, while the lowest was observed in

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

treatment W_2. The increase in the number of tillers in rice plants at the 0-day and 10-day (W1) application times is thought to be due to the plants receiving the nutrients they need, thus supporting growth and tiller formation. This is in line with the opinion of Husein N et al. (2019), who explained that the application time according to plant needs significantly influences the number of tillers.

The decrease in the number of tillers in rice plants at the 10- and 20-day (W2) application times indicates that the plants are not receiving sufficient nutrients because nutrients are less available when they are needed. Abdulrachman et al. (2009) stated that nutrient uptake during the growth period varies depending on the plant's growth stage. Mulyani (2010) stated that achieving a significant effect requires more than just applying the correct amount of fertilizer at different times within the plant. Furthermore, Sutejo (2010) stated that the availability of nutrients for plants depends, among other things, on the time interval. An appropriate time interval will provide sufficient nutrients for the plant.

Interaction Effect

The results of the analysis of variance test showed a significant interaction between NPK fertilizer dosage and application time on rice plant height at 75 DAP and the number of tillers at 55 DAP. However, there was no significant interaction for the other observed variables. The average rice plant height at 75 days after planting, as affected by NPK fertilizer dosage and application time, is presented in Table 6.

Table 6. Average Rice Plant Height at 75 DAP Due to NPK Fertilizer Dose and Application Time.

Number	Dose	Fertilizer Application Time		
		W_1	W_2	W_3
1	D_1	89,45 ab	87,77 ab	84,42 a
2	D_2	89,71 ab	91,17 ab	83,75 a
3	D_3	91,71 ab	89,07 ab	95,00 b

Table 6 shows that the tallest rice plants were observed in the D3 W3 treatment (NPK dose of 50 g/plot, applied at 15 and 30 days). Meanwhile, the lowest rice plant height was observed in the D2 W3 treatment (NPK dose of 40 g/plot, applied at 15 and 30 days).

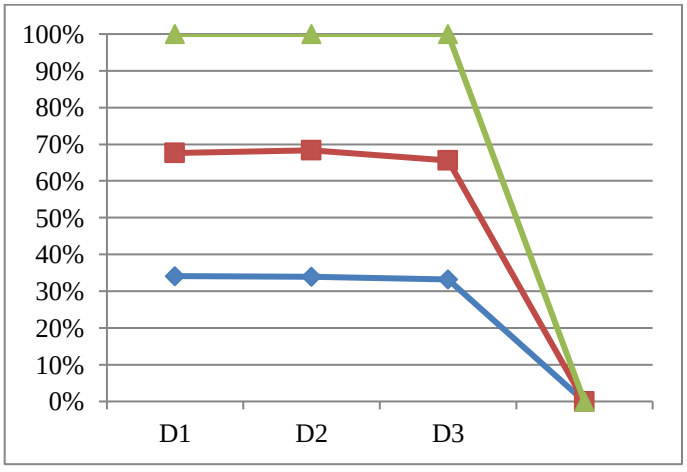

Figure 1. Relationship between Rice Plant Height at 75 DAP at Each Level of NPK Fertilizer Dose and the Time of Application.

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

Figure 1 shows that the highest rice yields were achieved with an NPK fertilizer dose of 50 kg/plot combined with application times of 15 and 30 days. The graph shows that the NPK fertilizer dosage levels are misaligned, indicating a significant interaction between NPK fertilizer dosage and application time in influencing rice yields. The average number of rice tillers at 55 DAP, as affected by NPK fertilizer dosage and application time, is presented in Table 7.

Table 7. Average Number of Rice Plants at 55 Days After Planting Due to Various NPK Fertilizer Dose Treatments and Application Times.

Number	Dose	Fertilizer Application Time		
		W_1	W_2	W_3
1	D_1	18,33 ab	14,58 a	17,58 ab
2	D_2	16,00 a	17,50 ab	17,00 ab
3	D_3	24,58 a	15,96 ab	23,83 bc

Table 7 shows that the highest number of tillers was found in the D_3 W_1 treatment (NPK dose of 50 g/plot with an application period of 0 to 10 days). Meanwhile, the lowest number of tillers was found in the D_1 W_2 treatment (NPK dose of 30 g/plot with application periods of 10 and 20 days). The relationship between the number of tillers in rice plants at 55 DAP and the NPK fertilizer dose level and application period is shown in Figure 2.

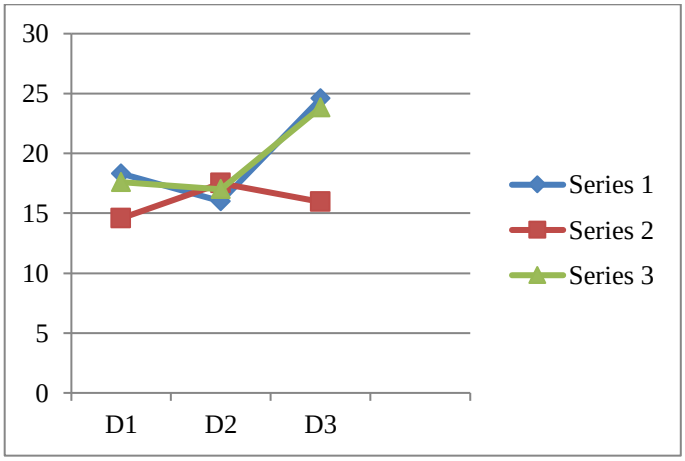

Figure 2. Relationship between the Number of Rice Plant Tillers at 55 DAP at Each Level of NPK Fertilizer Dose and the Time of Application.

Figure 2 shows that the highest number of rice tillers was observed at a NPK fertilizer dose of 50 kg/plot, with application times of 0 and 10 days. The graph shows that the NPK fertilizer dosage levels are not parallel, indicating a significant interaction between the NPK fertilizer dosage and application time in influencing the number of tillers. This indicates that the NPK fertilizer dosage and application time can increase vegetative growth of rice plants, namely, plant height and the number of tillers. Husin *et al*. (2019) stated that if the plant's growth period is sufficient and balanced with nutrients, cell division will occur rapidly, thereby improving overall plant growth and production (Mutakin, 2020; Syahputra & Marpaung, 2021).

CONCLUSION

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 2, Thn. 2026
https://doi.org/10.71275/roce.v3i2.231

The NPK fertilizer dose had a very significant effect on the height and number of IR 64 rice plants at 55 DAP, and a significant effect on the height of IR 64 rice plants at 35 DAP and the number of tillers at 35 DAP. However, the effects on the number of tillers at 75 DAP and on dry grain weight were not significant. The timing of NPK fertilizer application had a very significant effect on the height of IR-64 rice plants at 35 DAP, and a significant effect on the height and number of tillers at 55 DAP. However, the effect was not significant on the height of IR-64 rice plants at 75 DAP, the number of tillers at 75 DAP, or the dry grain weight. There was a significant interaction between the NPK fertilizer dose and the time of application on IR-64 rice plant height at 75 DAP and the number of tillers at 55 days after planting. However, there was no significant interaction for the other observed variables.

REFERENCES

Buckman, H.O. dan N.C. Brady. (1982). *Ilmu Tanah* (Terjemahan Soegiman). PT Gramedia, Jakarta. 232 hlm.

Dwidjo Seputro, D. (2012). *Pengantar Fisiologi Tumbuhan*. PT Gramedia, Jakarta. 232 hlm.

Fiyanti Osman. (1996). *Memupuk Padi dan Palawija*. Penebar Swadaya, Jakarta. 87 hlm.

Husin, N., Muliati, M., & Zakaria, F. (2019). Waktu aplikasi NPK Phonska dan variasi jumlah benih per lubang tanam terhadap pertumbuhan dan hasil jagung manis (*Zea mays* saccharata Sturt.). *JATT (Jurnal Agrotek Tropika Tropis)*, 8(1), 51–57.

Hakim, N.; M. Yusuf; A.M. Lubis; Sutopo Ghani Nugroho; Rusli Saul; Ami Diha; Go Bang Hong dan H. Bailey (1986). *Dasar Ilmu Tanah*. Universitas Lampung, Bandar Lampung. 488 hlm.

Mutakin, J. (2020). Keragaman Gulma, Pertumbuhan dan Hasil Padi Sawah pada Sistem Tanam dan Penyiangan yang Berbeda. *Jagros: Jurnal Agroteknologi Dan Sains (Journal of Agrotechnology Science)*, 4(2), 259-273.

Lingga, P. (1994). *Petunjuk Penggunaan Pupuk*. Penebar Swadaya, Jakarta. 163 hlm.

Montgomery, D. C. (2019). *Design and Analysis of Experiments* (10th ed.). John Wiley & Sons.

Rasyidin, (1983). *Bercocok Tanam Tanaman Karet (Hevea brasiliensis)*. Diklat Fakultas Pertanian Universitas Sumatera Utara, Medan. 180 hlm.

Sarief, E.S., (1986). *Pupuk dan Cara Pemupukan Tanaman Pertanian*. Pustaka Buana, Bandung. 182 hlm.

Setyamidjaja, D., (1986). *Pupuk dan Pemupukan*. CV Simplek, Jakarta. 90 hlm.

Syahputra, M., & Marpaung, P. (2021). The Mapping of Irrigated Paddy Fields which were Polluted by Detergent Waste in Kolam Village, Percut Sei Tuan Sub-district, Deli Serdang District. *Jurnal Online Pertanian Tropik*, 8(2), 144-149.

Ade A, R Hayati dan E Hayati. (2015). Pengaruh Pemupukan Terhadap Pertumbuhan Beberapa Varietas Padi Gogo (*Oryza sativa* L.). *Jurnal Floratek*. 10: 61 – 68

Kasno, A., and Rostamam, Tia (2013). Serapan *Hara dan Peningkatan Produktivitas Jagung dengan Aplikasi Pupuk NPK Majemuk. Bogor* : Balai Penelitian Tanah

Mul Mulyani, S. (2010). *Pupuk dan cara Pemupukan*. PT Rihel Cipta. Jakarta.

Rosmakam, A. dan Yuwono, N.W. (2011). *Ilmu Kesuburan Tanah*. Kanisius.