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Impact of Mycorrhiza Application and Variety on the Growth and Productivity of Chili Pepper (*Capsicum frutescens* L.)

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ABSTRACT

This study aimed to assess the influence of mycorrhiza and variety on the growth and yield of chili pepper plants, along with the interaction between these two factors. The research employed a 3 × 4 Factorial Randomized Block Design (RAK), leading to 12 treatment combinations. Each combination was conducted three times, resulting in a total of 36 experimental units. The initial factor was the mycorrhiza amount, which included control, 10, 20, and 30 g for each plant. The second factor was chili variety, which included Panca, Rajo, and Ramos. The monitored parameters included increases in *plant height*, stem diameter, leaf count, flower count, fruit count per plant, fruit weight per plant, fresh stem weight, fresh root weight, root length, and percentage of roots infected with mycorrhiza. Inoculation with mycorrhiza significantly influenced plant height at 45 days after transplanting (DAT), but did not have a meaningful effect on plant height at 15 and 30 DAT, stem diameter at 15 and 30 DAT, number of leaves, number of flowers, number of fruits per plant, fresh stem weight, fresh root weight, and root length. The effect of varieties on the parameters observed showed no significant effect on *plant height*, stem diameter, number of leaves, number of flowers, number of fruits per plant, fresh weight of the stem, fresh weight of the roots, and root length.

Keywords: mycorrhiza, root length, varieties

INTRODUCTION

The demand for bird's eye chili increases annually alongside population growth and the development of industries that depend on chili as a raw material. This has established chili as a vegetable commodity of national importance (Yuniati *et al.* 2019). Bird's eye chili is widely cultivated by Indonesian farmers because red chili commands a relatively high selling price, and the demand for red chili tends to rise annually (Swastika *et al.* 2022). This steadily increasing demand for chili over time has established it as a reliable non-oil and gas export commodity in Indonesia. This is evidenced by the fact that chili peppers are among the top six fresh vegetable commodities exported (along with shallots, tomatoes, potatoes, cabbage, and carrots) (Candrianto *et al.* 2021). According to the Central Statistics Agency, chili pepper production in Indonesia reached 1, 506, 441 tons in 2023. This data represents a decrease from the previous year's production of 1,544,441 tons.

Red chili cultivation faces various challenges, including technical issues, soil nutrient availability, and pest and disease infestation. Therefore, support from intensive cultivation technologies is essential, whether related to fertilization, land preparation, maintenance, or the application of appropriate technologies throughout the cultivation process (Rijal *et al.* 2020). The appropriate use of nutrients in the correct quantities, based on plant requirements, timing of planting, and positioning of nutrients in the root zone, also enhances the effectiveness of chili farming. One way to increase chili production while meeting high public demand is through fertilizer management, which is part of agricultural intensification (Saputra 2020).

Mycorrhizae are a type of fungal symbiosis, and their presence in the soil is highly beneficial. This is because mycorrhizae contribute to better soil quality by enhancing soil aggregates and colloids, assisting plants in boosting their absorption of N, P, K, Ca, and other micronutrients (Adetya *et al.* 2019). Mycorrhizal fungi form an association between fungi and plant roots. This association is widespread, and nearly all plants can form a symbiotic relationship with mycorrhizal fungi. In addition to these benefits, mycorrhizal fungi can collaborate with other soil microorganisms, such as rhizobia (Susanti & Kalsum 2020). In general, both possess the same ability to aid and enhance the growth of plants. This capability can be utilized in agriculture to improve the growth and crop yields (Hermawan *et al.* 2023).

One of the main factors contributing to low chili pepper productivity is the use of unsuitable varieties and the application of fertilizers at doses that do not meet the plants' requirements. Varieties comprise several distinct genotypes, each capable of adjusting to the environment (Azwir *et al.* 2020). Every variety has genetic variations that can affect growth, yield, and

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adaptability, which differ among varieties. High-yielding varieties possess superior traits compared with local varieties. These advantages are evident in characteristics such as higher fruit yield, better response to fertilization, and resistance to pests and diseases (Putra *et al.* 2021). High-yielding varieties will not show their advantages without being accompanied by ideal cultivation practices. Fertilization is one such process. The correct application of fertilizers can promote plant development and aid in preserving the ecological balance (Pradipta *et al.* 2017).

METHODS

Time and Location of the Study

This study will be conducted at the Kopbun Suka Tani Sejahtera Research and Business Center in the Kota Juang Subdistrict of the Bireuen Regency.

Materials and Equipment

The mycorrhiza obtained from the Soil Biology Laboratory at Syiah Kuala University, and the chili varieties Panca, RAJO, and RAMOS.

Experimental Design

This study utilized a 3 × 4 factorial randomized block design (RBD), yielding 12 treatment combinations. Each treatment combination was repeated three times, resulting in 36 treatment units. The first factor was mycorrhizal dose (V), consisting of four levels: D0 = control, D1 = 10 g/plant, D2 = 20 g/plant, and D3 = 30 g/plant. The second factor was chili variety, consisting of three levels: V1 = Panca, V2 = Rajo, and V3 = Ramos.

Observation Variables

- **Height of plant(cm)**

Plant height measurements were taken when the plants were 15, 30, and 45 days after planting (DAP). Plant height was measured from the marked base of the stem to the tip of the tallest leaf. Observations were made on the sample plants in each polybag. The height of the plants was recorded using a tape measure, and the results for the sample plants were averaged in the observation table.

- **Stem diameter (cm)**

Stem diameter was measured at 15, 30, and 45 DAP using a caliper. This was done by placing the caliper at the bottom of the stem, which had been marked to measure the stem base diameter.

- **Number of Leaves per Plant (leaves)**

The number of leaves was counted when the plants were 15, 30, and 45 days after sowing (DAP) by counting the number of leaves on each chili plant stem.

- **Number of Flowers**

The number of flowers was counted when the plants were 45 days after sowing (DAP) by counting the number of flowers on each chili plant stem.

- **Number of Fruits per Plant (fruits)**

Observations were conducted at 90, 100, and 110 DAP by counting the total number of chili peppers that had turned red.

- **Fruit Weight per Plant (g)**

Observations were made at harvest at 90, 100, and 110 days after sowing by weighing the fruit yields of the chili plants.

- **Fresh Weight of Plant Stems (g)**

The fresh weights of the plant stems were measured when the plants were 110 days old. The plants were uprooted and then cleaned with water

- **Fresh Weight of Plant Roots (g)**

The fresh weight of plant roots was measured when the plants were 110 days after sowing (DAP). The plants were uprooted, the roots were rinsed with water, allowed to air-dry briefly, and then weighed using an analytical balance.

- **Plant Root Length (cm)**

Measurements of plant root length were taken when the plants were 110 days after sowing (DAP). The plants were uprooted, and the roots were cleaned with water. The longest root was measured using a ruler from the base to the tip.

RESULTS AND DISCUSSION

RESULTS

The Application of Mycorrhizae on the Growth and Yield of Chili Peppers

The findings of this study regarding the use of mycorrhizae in enhancing the growth and yield of chili plants indicated a highly significant impact on the percentage of roots infected with mycorrhizae and a significant influence on plant height at 45 days after planting (DAP). However, there was no notable impact on plant height at 15 and 30 DAP, stem diameter at 15 and 30 DAP, leaf count at 15, 30, and 45 DAP, flower count at 45 DAP, fruit count at 90 and 110 DAP per plant, fresh weight of the plant at 110 DAP per plant, fresh weight of the roots at 110 DAP per plant, and root length at 110 DAP in chili plants, as detailed below.

Height of plant

The F-test results from the analysis of variance showed that the use of mycorrhizae significantly impacted plant height at 45 days after planting (DAP), but no notable impact on plant height at 15 and 30 DAP.

Table 1. Average height of chili pepper (Capsicum frutescens L.) plants at 15, 30, and 45 days after planting (DAP) under mycorrhizae treatment. Table 1 indicates that the mean height of chili plants at 15, 30, and 45 days post-sowing tended to be higher at the 10-gram mycorrhiza dose, although the difference was not statistically significant compared to the other treatments.

Stem Diameter

The F-test results of the variance analysis showed that the use of mycorrhizae did not significantly influence stem diameter at 15, 30, and 45 days postsowing. The average stem diameters of chili plants at 15, 30, and 45 days after sowing under mycorrhizal treatments are shown in Table 2. Table 2 indicates that the mean stem diameter of chili plants at 15 and 30 days post-sowing appeared greater in the control treatment, while at 45 days after sowing, the stem diameter was larger in the 30-gram mycorrhiza treatment; however, this discrepancy was not statistically significant when compared to the other treatments.

Number of Leaves

The results of the F-test in the analysis of variance indicated that the application of mycorrhizae had no significant effect on the number of leaves at 15, 30, and 45 days after sowing (DAP). The average number of chili leaves at 15, 30, and 45 DAP under the mycorrhizal treatment is shown in Table 3. Table 3 indicates that the mean number of leaves on chili plants at 15, 30, and 45 days post-sowing tended to be higher at the 10-gram mycorrhiza dose, although the difference was not statistically significant compared to the other treatments.

Number of Flowers

The F-test results of the variance analysis showed that the use of mycorrhizae did not significantly influence the number of flowers at 45 DAP. Table 4 displays the average number of chili flowers at 45 DAP for the mycorrhizal treatment. Table 4 indicates that the average leaf count at 45 days post-sowing was generally greater in the 30-gram mycorrhiza treatment, even though the difference was not statistically significant when compared to the other treatments.

Table 1 Average plant height at 15, 30, and 45 days after sowing under mycorrhiza treatments of chili plants

Mycorrhiza Dosage	Plant Height		
	15 DAP	30 DAP	45 DAP
Control	5,67 cm	17,44 cm	29,44 cm
10 gr	6,72 cm	20,06 cm	32,11 cm
20 gr	4,94 cm	15,56 cm	29,78 cm
30 gr	5,28 cm	16,06 cm	30,78 cm
HSD 0,05	-	-	2,37

Table 2 Average stem diameter of chili plants at 15, 30, and 45 days after sowing (DAP) under the mycorrhiza treatment

Mycorrhiza Dosage	Stem Diameter		
	15 DAP	30 DAP	45 DAP
Control	0,16 cm	0,29 cm	0,46 cm
10 g	0,12 cm	0,28 cm	0,47 cm
20 g	0,13 cm	0,26 cm	0,47 cm
30 g	0,12 cm	0,27 cm	0,49 cm

Table 3 Average number of leaves of chili plants at 15, 30, and 45 days after sowing (DAP) under mycorrhiza treatments for chili peppers

Mycorrhiza Dosage	Number of Leaves		
	15 DAP	30 DAP	45 DAP
Control	9,78	27,89	132,11
10 g	10,11	32,33	172,67
20 g	9,11	28,56	128,56
30 g	9,67	31,67	141,67

Table 4 Average number of flowers of chili plants at 45 DAP under the mycorrhizae treatment

Mycorrhiza Dosage	Number of Flowers
	45 DAP
Control	3,89
10 g	5,22
20 g	5,22
30 g	5,44

Number of Fruits

The F-test results of the variance analysis showed that the application of mycorrhizae did not significantly influence the number of fruits at 90 and 110 days post-sowing. The typical quantity of chili fruits at 90 and 110 days after sowing (DAP) under the mycorrhizal treatment is shown in Table 5. Table 5 indicates that the greatest average quantity of chili peppers at 90 days post-sowing was recorded with a mycorrhiza application of 20 g/plant. At 110 days post-sowing, the number of chili pepper fruits tended to be higher at a mycorrhiza dose of 30 g/plant, although this was not statistically significant different from the other doses.

Fruit Weight

The F-test results from the analysis of variance showed that mycorrhizal application did not significantly influence fruit weight at 90 and 110 DAP. The average chili fruit weights at 90 and 110 DAP under the mycorrhizal treatments are shown in Table 6. Table 6 shows that the highest average chili fruit weight at 90 days after sowing was observed at a mycorrhizal dose of 20 g/plant. At 110 days after sowing, the number of chili fruits tended to be higher at mycorrhizal amendment of 10 and 30 g/plant, although this was not significantly different from the other treatments.

Fresh Bunch Weight

The F-test results from the analysis of variance showed that the application of mycorrhizae did not significantly affect the fresh bunch weight at 110 DAP. The average fresh bunch weights at 110 DAP for the mycorrhizal treatments are shown in Table 7. Table 7 shows that the highest average fresh weight of chili fruit at 110 days after sowing was observed at the 30 g/plant mycorrhiza dose, although this was not statistically significant different from the other doses.

Fresh Root Weight

The F-test results from the analysis of variance showed that the application of mycorrhizae did not significantly impact fresh root weight at 110 days post-sowing. Table 8 displays the average fresh root weight at 110 DAP for the mycorrhizal treatments. Table 8 shows that the highest average fresh root weight of chili peppers at 110 days after sowing was observed at the

Table 4 Average number of flowers at 45 days after planting under the mycorrhizae treatment

Mycorrhiza dosage	Number of Flowers
	45 DAP
Control	3.89
10 g	5.22
20 g	5.22
30 g	5.44

Note: DAP = Days after planting.

Table 5 Average number of fruits at 90 and 110 days after planting under the mycorrhiza treatment

Mycorrhiza dosage	Number of Fruits	
	90 DAP	110 DAP
Control	25.00	31.10
10 g	31.00	32.00
20 g	46.67	28.80
30 g	24.33	41.00

Note: DAP = Days after planting.

Table 6 Average fruit weight at 90 and 110 days after planting under mycorrhiza treatments

Mycorrhiza dosage	DAP	
	90 HST	110 HST
Control	23.33	21.11
10 g	23.33	26.67
20 g	51.56	20.00
30 g	36.67	26.67

Note: DAP = Days after planting.

Table 7 Average fresh shoot weight at 110 days after planting mycorrhiza treatments

Mycorrhiza dosage	Fresh Bunch Weight
	110 DAP
Control	83.89
10 g	93.89
20 g	117.22
30 g	117.78

Note: DAP = Days after planting.

20 g/plant mycorrhiza dose, although this was not statistically significant different from the other doses.

Root Length

The F-test results of the variance analysis showed that mycorrhizal application did not significantly influence fresh root weight at 110 DAP. Table 9 displays the average fresh root weight at 110 DAP for the mycorrhizal treatments. Table 9 shows that the longest mean root length of chili plants at 110 days after sowing was observed at the 30 g/plant mycorrhiza dose, although this was not statistically significant different from the other doses.

Root Infection

The F-test results of the variance analysis showed that mycorrhizal application significantly affected root infection at 45 DAP. The average root infection scores at 45 DAP for the mycorrhizal treatments are shown in Table 10. Table 10 shows that the heaviest average root infection weight in chili plants at 45 days after sowing was observed at the 30 g/plant mycorrhiza dose, although this was not statistically significant different from the other doses.

Effect of variety on chili plant growth and yield

The findings of the research concerning the influence of diversity on chili plant growth and yield indicate that there was no significant effect when observing several parameters, namely, height of plant at 15, 30, and 45 DAP; stem diameter at 15, 30, and 45 DAP; number of leaves at 15, 30, and 45 DAP; number of flowers at 45 DAP; number of fruits at 90 and 110 DAP per plant; fresh weight of aboveground biomass at 110 DAP per plant; fresh weight of roots at 110 DAP per plant; root length at 110 DAP; and the percentage of roots infected with mycorrhizae in chili plants, as follows:

Height of plant

The F-test results of the analysis of variance showed that the variety did not significantly affect plant height at 15, 30, and 45 DAP. Table 11 displays the average heights of chili pepper plants at 15, 30, and 45 DAP for the different variety treatments. Table 11

Table 8 Average fresh root weight at 110 days after planting for the mycorrhiza treatments

Mycorrhiza dosage	Fresh Root Weight
	110 DAP
Control	18.33
10 g	19.44
20 g	21.11
30 g	20.00

Note: DAP = Days after planting.

Table 9 Average root length at 110 days after planting for the mycorrhiza treatments

Mycorrhiza dosage	Root Length
	110 DAP
Control	16.44
10 g	18.00
20 g	17.56
30 g	17.89

Note: DAP = Days after planting.

Table 10 Average root infection scores at 110 days after planting for the mycorrhiza treatments

Mycorrhiza dosage	Root Infection
	45 DAP
Control	17.78
10 g	55.56
20 g	69.44
30 g	73.33
HSD 0,05	3.79

Note: DAP = Days after planting.

Table 11 Average plant height at 15, 30, and 45 days after planting under various variety treatments

Variety	Plant Height		
	15 DAP	30 DAP	45 DAP
Panca	6.46	18.54	33.08
Rajo	5.25	16.71	30.25
Ramos	5.25	16.58	28.25

Note: DAP = Days after planting.

indicates that the average height of chili plants at 15, 30, and 45 days after sowing was generally greater in the Panca variety, but the difference was not statistically significant when compared to the other varieties.

Stem Diameter

The F-test results from the analysis of variance showed that variety did not significantly impact the stem diameter of plants at 15, 30, and 45 days post-sowing. Table 12 shows the average stem diameters of chili plants at 15, 30, and 45 days after sowing for the different variety treatments. Table 12 indicates that the mean stem diameter of chili peppers at 15 DAP was generally greater in the Ramos variety, while the stem diameters at 30 DAP and 45 DAP in the Rajo variety, despite being statistically different, did not show significant differences from the other varieties

Number of Leaves

The F-test results from the analysis of variance showed that variety did not significantly affect the number of leaves at 15, 30, and 45 DAP. Table 13 displays the average quantity of chili leaves at 15, 30, and 45 DAP for the different variety treatments. Table 13 indicates that the average count of chili leaves at 15 DAP was usually greater in the Panca variety, whereas the leaf count at 30 DAP and 45 DAP in the Rajo variety, although statistically different, was not significantly distinct from the other varieties

Number of Flowers

The F-test findings of the variance analysis showed that variety did not significantly influence the number of flowers at 45 DAP. Table 14 displays the average number of chili flowers at 45 DAP among the different variety treatments. Table 14 indicates that the average flower count on chili plants at 45 days post-sowing was generally greater in the Panca variety, even though the difference lacked statistical significance when compared to other varieties

Number of Fruits

The F-test results of the variance analysis showed that the variety did not significantly influence the number of fruits at 90 and 110 days post-sowing. Table 15 displays the average count of chili fruits at 90 and 110 days post-sowing across the different variety treatments Table 15 indicates that the Panca variety generally had a greater average count of chili peppers per plant at 90 and 110 days after sowing, although statistically, the average number of chili peppers per plant at 90 days did not differ significantly from that of the other varieties.

Table 12 Average stem diameter at 15, 30, and 45 days after planting under various variety treatments

Variety	Stem Diameter		
	15 DAP	30 DAP	45 DAP
Panca	0.13	0.27	0.47
Rajo	0.13	0.29	0.48
Ramos	0.14	0.26	0.46

Note: DAP = Days after planting.

Table 13 Average number of leaves at 15, 30, and 45 days after planting under various variety treatments

Variety	Number of Leaves		
	15 DAP	30 DAP	45 DAP
Panca	10.33	30.08	144.00
Rajo	9.75	31.92	148.50
Ramos	8.92	28.33	138.75

Note: DAP = Days after planting.

Table 14 Average number of flowers at 45 days after planting across various variety treatments

Variety	Number of Flowers
	45 HST
Panca	41.83
Rajo	22.17
Ramos	31.25

Note: DAP = Days after planting.

Table 15 Average number of fruits at 90 and 110 days after planting under various variety treatments

Variety	Number of Fruits	
	90 DAP	110 DAP
Panca	41.83	39.58
Rajo	22.17	27.83
Ramos	31.25	32.25

Note: DAP = Days after planting.

Fruit Weight

Table 16 indicates that the average count of chili peppers per plant at 90 and 110 days post-sowing was generally greater in the Panca variety. The F-test results of the variance analysis suggested that variety did not have a significant impact on fruit weight at 90 and 110 days after sowing. Table 16 indicates that the average weight of chili fruits at 90 days post-sowing was generally greater in the Rajo variety, whereas at 110 days after sowing, the Panca variety showed a higher fruit weight, although statistically, the average fruit weight of the chili plants did not significantly differ from other varieties

Fresh Weigh of Fruit Clusters

The outcomes of the F-test in the variance analysis showed that variety did not significantly influence the fresh weight of fruit clusters at 110 DAP. The average fresh weight of chili fruit clusters at 110 DAP across various varieties is presented in Table 17. Table 17 indicates that the average fresh weight of chili plant clusters at 110 days post-sowing was generally greater in the Rajo variety, though this difference lacked statistical significance when compared to the other varieties

Fresh Root Weight

The outcomes of the F-test in the variance analysis showed that variety did not significantly influence the fresh root weight of plants at 110 DAP. Table 18 displays the average fresh root weight of chili plants at 110 DAP for the different variety treatments. Table 18 indicates that the mean weight of fresh roots for chili plants at 110 days post-sowing was generally greater in the Rajo variety, but this difference was not statistically significant compared to the other varieties.

Root Length

The F-test results of the variance analysis showed that variety had no significant impact on root length at 110 days post-sowing. The average chili root length at 110 DAP for the various treatments is shown in Table 19. Table 19 indicates that the average root length of chili plants at 110 days post-sowing was generally greater in the Rajo variety, although this difference was not statistically significant relative to the other varieties.

Root Infection

The F-test results of the variance analysis showed that variety did not significantly influence root infection in plants at 110 days post-sowing. The average chili root length at 110 DAP for various treatments is shown

Table 16 Average fruit weight at 90 and 110 days after planting under various variety treatments

Variety	Fruit Weight	
	90 DAP	110 DAP
Panca	34.17	29.17
Rajo	35.33	19.58
Ramos	31.67	22.08

Note: DAP = Days after planting.

Table 17 Average wet cluster weight at 110 days after planting under various variety treatments

Variety	Fresh Weigh of Fruit Clusters
	110 DAP
Panca	72.50
Rajo	121.25
Ramos	115.83

Note: DAP = Days after planting.

Table 18 Average fresh root weight at 110 days after planting across different variety treatments

Variety	Fresh Root Weight
	110 DAP
Panca	16.67
Rajo	23.33
Ramos	19.17

Note: DAP = Days after planting.

Table 19 Average root length at 110 days after planting for the various variety treatments

Variety	Root Length
	110 DAP
Panca	15.50
Rajo	18.58
Ramos	18.33

Note: DAP = Days after planting.

Table 20 Average root infection at 110 days after planting for various variety treatments

Variety	Root Infection
	110 DAP
Panca	72.50
Rajo	121.25
Ramos	115.83

Note: DAP = Days after planting.

in Table 20. Table 20 shows that the average root infection rate in chili plants at 110 days after sowing tended to be higher in the Rajo variety, although this difference was not statistically significant compared to other varieties.

DISCUSSION

The findings from the research regarding the use of mycorrhizae on chili plants' growth and yield demonstrate a highly significant impact on the percentage of roots infected with mycorrhizae, a significant effect on plant height at 45 DAP, yet no significant effect on plant height at 15 and 30 DAP, stem diameter at 15 and 30 DAP, or the number of leaves at 15, 30, and 45 days after sowing (DAP), the number of flowers at 45 DAP, the count of flowers at 45 DAP, the count of fruits at 90 and 110 DAP for each plant, the fresh weight of aboveground biomass at 110 DAP for each plant, the fresh weight of roots at 110 DAP for each plant, the fresh weight of the roots at 110 DAP per plant, and root length at 110 DAP. Mycorrhizae help plant roots absorb nutrients, particularly phosphorus, more efficiently than without mycorrhizae. Phosphorus is essential for photosynthesis, energy production, and cell growth, which support overall plant growth, including *plant height*. This is consistent with the findings of Madusari *et al.* (2018), who found that the application of mycorrhizae improved plant height more effectively than in chili plants without mycorrhizal application.

In this study, the mycorrhizal dose had no notable impact on leaf count at 15, 30, and 45 DAP, nor on stem thickness at 15, 30, and 45 DAP. This is attributed to several factors, such as suboptimal dosage, environmental conditions, variety genetics, application timing, and nutrient competition. This aligns with the study by Maulana *et al.* (2020), who indicated that the dosage of mycorrhizae did not significantly impact stem diameter at 15, 30, and 45 DAP, nor the leaf count on chili pepper plants at 15, 30, and 45 DAP.

Each plant species responds differently to the application of FMA. Environmental factors, such as weather, humidity, and light intensity, significantly influence plant responses to FMA application. If environmental conditions are not optimal, FMA application may not have a noticeable effect on fruit numbers and weights. According to a study by Mawardiana *et al.* (2024), mycorrhizae had no effect on fruit yield and fruit weight in horticultural crops; this is likely because the mycorrhizae had not yet established an association with the soil type at the study site, and the presence of other unobserved antagonistic microorganisms is suspected. If the use of mycorrhizae does not considerably influence fresh root weight, it is because the effects of mycorrhizae on roots typically take time to become apparent. If observations are conducted over a short period, the effect on fresh root weight may not be apparent. This aligns with the study by Harahap (2023), who indicated that the use of mycorrhizal biofertilizer did not significantly impact the fresh root weight of horticultural plants. This study suggests that the use of mycorrhizae has not yet affected fresh root weight. The application of mycorrhizae in this study may not have influenced fresh root weight.

Plant roots do not have sufficient space to form an extensive root system. Consequently, the ability of the roots to absorb nutrients and water from the FMA is restricted, which may reduce the effectiveness of FMA application on root growth parameters. According to Sugiarti & Taryana (2018), the application of mycorrhizae did not significantly affect root length. This is likely due to the growing medium being too small and the limited space, which affects root development rate. According to Herlina *et al.* (2018), mycorrhizae did not have a meaningful impact on the fresh weight of plants. This is probably due to the fact that the implementation of mycorrhizae on the plants has not yet been effectively optimized.

The findings of the research regarding the impact of variety on the growth and yield of chili plants show that there was no significant influence observed when assessing various parameters, including plant height at 15 DAP, 30 DAP, and 45 DAP; stem diameter at 15 DAP, 30 DAP, and 45 DAP; leaf count at 15 DAP, 30 DAP, and 45 DAP; flower quantity at 45 DAP; and fruit number at 90 and 110 DAP per plant, fresh weight of the shoot at 110 DAP per plant, fresh weight of the roots at 110 DAP per plant, root length at 110 DAP, and the percentage of roots infected with mycorrhizae in chili peppers

The analysis of variance results showed that different chili pepper varieties did not significantly affect the stem diameter of the chili pepper plants. This is due to the availability of nutrients in relatively small and unbalanced quantities, resulting in inefficient plant growth. This is consistent with the findings of Firdaus & Juanda (2022), who showed that chili pepper variety had no significant effect on the stem diameter of chili pepper plants (Maulana *et al.* 2025). This is probably attributed to the comparatively low nutrient levels in the soil, which did not have a notable impact on the stem diameter of the chili plants.

Differences in genetic responses to environmental conditions can result in similar yields for different varieties. Other factors, such as temperature, humidity, and soil quality, can influence overall plant growth. This finding is consistent with that of Pratama *et al.* (2018), who reported that variety did not significantly affect plant height. This aligns with the research conducted by Prakoso *et al.* (2018), which indicated that variety did not significantly influence the quantity of both flowers and fruits

The findings of this study revealed no notable differences between the varieties regarding the fresh weight of the plant and the length of the roots. This is consistent with Simatupang's findings in the study by Setiayani *et al.* (2023), which state that differences in growth and yield among varieties are influenced by a variety's ability to adapt to its growing environment (Maulana *et al.* 2025). Although there are genetically modified varieties with better production potential, unfavorable environmental conditions can reduce crop yield.

The findings of this study suggest that there are no notable differences among the varieties in terms of fruit weight. Environmental factors such as soil, climate, and weather often have a more dominant influence on growth. This aligns with the research by Naibaho *et al.* (2021), who showed that certain factors, such as inefficient soil conditions, can lead to less productive soil and result in soil becoming infertile.

Although different chili pepper types possess unique genetic traits, environmental conditions significantly influence their growth. Factors such as water supply, soil nutrients, and light exposure can affect the ultimate fresh weight yield. When these environmental factors are more dominant, the differences resulting from genetic variations may become less significant.

The results of this study indicate that variety had no significant effect on root infection parameters. This suggests that variations among varieties do not significantly affect these parameters. This may indicate that other factors, such as environmental conditions or general root characteristics common to all chili pepper varieties, play a greater role in influencing the level of mycorrhizal infection in the roots.

CONCLUSION

The use of mycorrhizae on the development and output of chili plants demonstrated a notable impact on the percentage of roots infected by mycorrhizae in chili plants, a significant influence on plant height at 45 days post-sowing, but no meaningful effect on other factors. The different types of chili plants did not have a significant impact on any of the studied parameters. There was a highly significant interaction between mycorrhiza and variety on root infection 45 days after sowing.

REFERENCES

Adetya V, Nurhatika S, Muhibuddin A.2019. Pengaruh Pupuk Mikoriza Terhadap Pertumbuhan Cabai Rawit (*Capsicum Frutescens*) Di Tanah Pasir. *Jurnal Sains dan Seni ITS*. 7(2): 75–79. https://doi.org/10.12962/j23373520.v7i2.37251

Ambar Susanti MP,Umi Kalsum MP.2020. Peranan Mikoriza Untuk Pengendalian Penyakit Karat Daun. LPPM Universitas KH. A. Wahab Hasbullah.

Azwir M, Ulim MA,Syamsuddin S. 2020. Pengaruh Varietas Dan Dosis Pemupukan NPK Mutiaraterhadap Pertumbuhan Dan Produksi Tanaman Cabai Merah (*Capsicum Annuum* L.). *Jurnal Ilmiah Mahasiswa Pertanian*. 3(4): 75–84. https://doi.org/10.17969/jimfp.v3i4.9518

Badan Pusat Statistik Dan Direktorat Jendaral Hortikultura. 2022. Luas Panen, Produksi Dan Produktivitas Sayuran di Indonesia 2018–2012. Jakarta

Candrianto C, Viarani SO, Luthvina R,Meilizar M, Oktavia N, Amalia W. 2021. Pengolahan Cabai Merah (*Capsicum Annum* L.) Menjadi Sari Cabai Original Untuk Menciptakan Peluang Usaha Bagi Masyarakat. *JURNAL PRODIKMAS Hasil Pengabdian Kepada Masyarakat*. 6(1): 13–21.

Firdaus R, Juanda BR. 2022.Janua. Pengaruh Varietas Dan Dosis Pupuk NPK Mutiara Terhadap Pertumbuhan Dan Hasil Cabai Merah Hibrida. In *Prosiding Seminar Nasional Pertanian.* 4(1): 111–124.

Harahap PS. 2023. Pengaruh Pemberian Pupuk Hayati Mikoriza Dan Pupuk NPK Terhadap Pertumbuhan Dan Produksi Kacang Panjang (*Vigna Sinensis* L.). *Biofarm: Jurnal Ilmiah Pertanian*.19(2): 227–232. https://doi.org/10.31941/biofarm.v19i2.3324

Herlina B,Sutejo S,Laksono J. 2017. Peranan Inokulasi Fungi Mikoriza Arbuskular (FMA) Dan Pupuk Fosfat Terhadap Produktivitas Dan Kandungan Nutrisi Indigofera Zollingeriana. *Jurnal Sain Peternakan Indonesia*. 12(2): 184–190. https://doi.org/10.31186/jspi.id.12.2.184-190

Hermawan A, Jumini, Syafruddin. 2023. Interaksi Jenis Mikoriza Dan Beberapa Varietas Cabai (*Capsicum Annuum* L.) Terhadap Pertumbuhan Dan Hasil Pada Tanah Ultisol Aceh Besar. *Jurnal Ilmiah*

Mahasiswa Pertanian. 8(1): 17–42. https://doi.org/10.17969/jimfp.v8i1.23447

Lele O K. 2023. Peran Endomikoriza Dan Tingkat Ketersediaan Air Pada Tanah Vertisol Terhadap Peningkatan Serapan Fosfor Dan Hasil Paprika. *Savana Cendana*. 8(01): 1–5. https://doi.org/10.32938/sc.v8i01.1935

Madusari S, Yama DI, Jumardin J, Liadi BT, Baedowi RA. 2018. Pengaruh Inokulasi Jamur Mikoriza Arbuskular Terhadap Pertumbuhan Dan Produksi Tanaman Cabai (*Capsicum Annum* L.). Prosiding Semnastek.

Maulana M. 2020. Pertumbuhan Beberapa Varietas Cabai (*Capsicum Annum* L.) Akibat Applikasi Mikoriza Pada Tanah Salin. *Fanik: Jurnal Faperta Uniki*. 1(1): 9–16. https://doi.org/10.35457/viabel.v16i1.1725

Maulana M, Harta RY,Harahap DE. 2023. Penerapan Mikoriza Pada Tanah Limbah Pengeboran Minyak Terhadap Beberapa Varietas Cabai. *Jurnal Agrotech Berkelanjutan*. 9(1): 45–56. https://doi.org/10.35308/jal.v9i1.5946

Maulana M, Yunanda N, Harta RY, Untari Y, Maulia E. 2025. Applying Mycorrhiza and Trichoderma harzianum to Increase Chilli Plant Production (Capsicum annum L). *Jurnal Agronomi Tanaman Tropika*. 7(2): 449–453. https://doi.org/10.36378/juatika.v7i2.4280

Maulana M, Noer Z. 2025. Mycorrhizal Application and Dosage Material Organic Towards Increasing Chili Pepper Production (Capsicum frutescens) on Goal Plant Cocoa. *Jurnal Agronomi Tanaman Tropika.* 7(3): 967–972. https://doi.org/10.36378/juatika.v7i3.4967

Mawardiana M, Karnilawati K, Al Hadi B, Isnawati I. 2024. Aplikasi Mikoriza Dan Pupuk Kandang Untuk Meningkatkan Produksi Tomat. *Jurnal Agroristek*. *7*(2): 63–70.

Naibaho A, Heviyanti M, Murdhiani M, Manarany R. 2021. Uji Adaptasi Lima Varietas Unggul Cabai Merah Keriting Di Lahan Kering Dengan Teknologi Proliga. *Jurnal Agroqua: Media Informasi Agronomi Dan Budidaya Perairan*. 19(1):159–167. https://doi.org/10.32663/ja.v19i1.1850

Pradipta AP, Yunus A, Samanhudi S. 2017. Hasil Padi Hibrida Genotipe T1683 Pada Berbagai Dosis Pupuk NPK. *Agrotechnology Research Journal*. *1*(2): 24–28. https://doi.org/10.20961/agrotechresj.v1i2.18884

Prakoso SD, Parwati WDU, Setyorini T. 2018. Pengaruh Jenis Pupuk Organik Pada Pertumbuhan Dan Hasil Dua Varietas Cabai Rawit. *Jurnal Agromast*. 3(1).

Pratama TY, Nurmayulis N, Rohmawati I. 2018. Utanggap Beberapa Dosis Pupuk Organik Kascing Terhadap Pertumbuhan Dan Hasil Tanaman Sawi (*Brassica Juncea* L.) Yang Berbeda Varietas. *Agrologia*. 7(2): 288754. https://doi.org/10.30598/a.v7i2.765

Putra I, Yusrizal, Septiandar, Hadianto W, Ariska N, Resdiar A. 2021. Respon Pemberian Pupuk Organik Cair (POC) Bongol Pisang Terhadap Pertumbuhan Dan Produksi Beberapa Varietas Cabai Rawit (*Capsicum Frutencens* L Var. Cengek). *Agrista*. 25(1): 40.

Rijal M, Syarif A. Pary C, Rosmawati R, Imkari S,Mutmainnah H. 2020. Aplikasi Pupuk Organik Pupuk Cair Dari Libah Tahu Berbantu Em-4 Terhadap Pertumbuhan Cabai Merah. *Biosel: Biology Science And Education*. 9(2): 191. https://doi.org/10.33477/bs.v9i2.1635

Saputra DD. 2020. Uji Konsentrasi Pupuk Organik Cair Azolla Dan Dosis Pupuk Kompos Jerami Padi Pada Pertumbuhan Tanaman Cabai Merah Keriting (*Capsicum Annum* L.). *Fakultas Pertanian, Universitas Muhammadiyah Jember*. *43* (Jember): 1–9.

Setiyani E, Handriatni A, Jazilah S. 2023. Pengaruh Dosis Pupuk Kandang Dan Macam Varietas Terhadap Pertumbuhan Dan Produksi Cabai Merah (*Capsicum Annum* L). *Biofarm: Jurnal Ilmiah Pertanian*. 19(1): 192–199. https://doi.org/10.31941/biofarm.v19i1.3254

Sugiarti L, Taryana Y. 2018. Pengaruh Pemberian Takaran Fungi Mikoriza Arbuskular (FMA) Terhadap Pertumbuhan Bibit Kopi Arabika (Coffea Arabica L.). *Jurnal Agro*. 5(1): 61–65. https://doi.org/10.15575/1813

Swastika Y, Syamsinar, Mega DAU. 2022. Analisis Faktor-Faktor Yang Mempengaruhi Fluktuasi Harga (Studi Kasus Di Pasar Niaga Daya). *ASE Journal.* 12–20. https://doi.org/10.59638/asejournal.v1i01.18

Yuniati S, Studi A, Juni D. 2019. Pengaruh Intensitas Penyiraman Terhadap Pertumbuhan Dan Produksi Tanaman Cabai Rawit (Capsicunfrutescens L.) Influence The Intensity Of Watering Towards Growth And The Production Of Pepper Plants (*Capsicun Frutescens* L.). *Jurnal Agriyan*. 5(2):45–52. https://doi.org/10.55182/jnp.v2i1.91