ISSN 2797-7889

Effectiveness of Goat Manure and Liquid Organic Fertilizer from Coffee Skin Waste on Growth of Cat's Whisher Cuttings (Orthosiphon Aristatus)

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This study aims to determine the effectiveness of goatmanure and liquid organic fertilizer made from coffee husk waste on the growth of Java tea (Orthosiphon aristatus) cuttings. The study used a factorial Randomized Block Design (RBD) consisting of two factors with 48 plots. The first factor was the application of goat manure, symbolized as "S," with four treatment levels: S0 (without goat manure), S1 (250 g/polybag), S2 (350 g/polybag), and S3 (450 g/polybag). The second factor was the application of liquid organic fertilizer made from coffee husk waste, symbolized as "K," with four treatment levels: K0 (0 ml/L water/polybag), K1 (30 ml/L water/polybag), K2 (60 ml/L water/polybag), and K3 (90 ml/L water/polybag). Thus, there were 16 treatment combinations with three replications. The parameters observed in this study were the time of shoot emergence, number of shoots, shoot length, number of leaves, plant height, and survival percentage. The results showed that the application of goat manure and liquid organic fertilizer from coffee husk waste on the growth of Java tea (Orthosiphon aristatus) cuttings had no significant effect on all observed parameters.
Keywords: Orthosiphon aristatus, goat manure, liquid organic fertilizer from coffee husk waste, effectiveness.

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1. Introduction

Indonesia boasts a rich biodiversity, including a variety of medicinal plants that have been empirically utilized by the local community. One widely used plant is cat's whiskers (Orthosiphon aristatus), a tropical herb widely distributed in Southeast Asia and known for its pharmacological benefits, particularly as a diuretic (Rizvi et al., 2025). This plant belongs to the Lamiaceae family and grows optimally in soil with sufficient humus, water, and sunlight full (Damanik, 2022). Traditionally, cat's whiskers are used to treat rheumatism, coughs, kidney stones, diabetes, and urinary tract disorders. Furthermore, this plant exhibits various biological activities, including anti-inflammatory, antioxidant, anti-cancer, hepatoprotective, anti-hypertensive, antibacterial, and anti-diabetic properties, which are influenced by its bioactive metabolites, such as monoterpenes, diterpenes, triterpenes, saponins, organic acids, and flavonoids (Rafi et al., 2021). Despite its numerous benefits, cat's whiskers are generally cultivated in intercropping, resulting in suboptimal growth (Melati & Nihayati, 2024).

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due to its practicality and speed, but often faces the problem of low root and shoot formation, so a planting medium that can provide nutrients, moisture, and good aeration is required (Damanik, 2022).

Synthetic chemical fertilizers in conventional agricultural systems can cause environmental pollution and soil degradation, making organic fertilizers a more environmentally friendly alternative (Ashari & Purwaningsih, 2024). Organic materials play a role in increasing soil fertility physically, chemically, and biologically by improving soil structure, increasing water retention capacity, and stabilizing soil temperature and humidity (Sri et al., 2020). One potential organic fertilizer is goat manure because it is easily obtained and has a C/N ratio of 20–25, making nutrients more available to plants (Peni et al., 2023). The nutrient content of goat manure includes 1.70% N, 0.25% P, 6.52% K, and 8.70% organic C, which are effective in increasing soil fertility, including in 0xic dystrudepst soil (Hakim et al., 2025). Application of a dose of 300 g/polybag has been reported to provide better plant growth compared to other treatments (Abdillah et al., 2023). The use of organic fertilizers also aims to reduce dependence on chemical fertilizers (Zamriyetti & Maimunah Siregar, 2021)

In addition to solid organic fertilizers, liquid organic fertilizers (POC) can be used as an alternative because they are easier to apply and quickly absorbed by plants (Basri K et al., 2023). Coffee husk waste has the potential to be used as a POC material because it can increase soil fertility and stimulate root, stem, and leaf growth, while reducing agricultural waste (Andini, 2021). POC contains more than one nutrient and is relatively safe for soil and plants even when used routinely (Lubis et al., 2022). Coffee husks contain 45.3% organic carbon, 2.98% nitrogen, 0.18% phosphorus, and 2.26% potassium, indicating their potential as a source of plant nutrients (Frastyo et al., 2024). In fact, applying coffee husk POC at a dose of 30 ml/L has been shown to significantly affect the growth of Arabica coffee seedlings (Saputro et al., 2025).

Traditionally, cat's whiskers are used to treat rheumatism, coughs, kidney stones, diabetes, and urinary tract disorders. Furthermore, this plant exhibits various biological activities, including anti-inflammatory, antioxidant, anti-cancer, hepatoprotective, anti-hypertensive, antibacterial, and anti-diabetic properties, which are influenced by its bioactive metabolites, such as monoterpenes, diterpenes, triterpenes, saponins, organic acids, and flavonoids (Rafi et al., 2021). Despite its numerous benefits, cat's whiskers are generally cultivated in intercropping, resulting in suboptimal growth (Melati & Nihayati, 2024). Traditionally, cat's whiskers are used to treat rheumatism, coughs, kidney stones, diabetes, and urinary tract disorders. Furthermore, this plant possesses various biological activities, such as anti-inflammatory, antioxidant, anti-cancer, hepatoprotective, anti-hypertensive, antibacterial, and anti-diabetic properties, which are influenced by its bioactive metabolites, such as monoterpenes, diterpenes, triterpenes, saponins, organic acids, and flavonoids (Rafi et al., 2021). Despite its numerous benefits, cat's whiskers are generally cultivated through intercropping, resulting in suboptimal growth (Melati & Nihayati, 2024). Vegetative propagation through cuttings is preferred due to its practicality and speed, but often faces the problem of low root and shoot formation, so a planting medium that can provide nutrients, moisture, and good aeration is required (Damanik, 2022). Synthetic chemical fertilizers in conventional agricultural systems can cause environmental pollution and soil degradation, making organic fertilizers a more environmentally friendly alternative (Ashari & Purwaningsih, 2024). Organic materials play a role in increasing soil fertility physically, chemically, and biologically by improving soil structure, increasing water retention capacity, and stabilizing soil temperature and humidity (Sri et al., 2020). One potential organic fertilizer is goat manure because it is easily obtained and has a C/N ratio of 20–25, making nutrients more available to plants (Peni et al., 2023). The nutrient content of goat manure

includes 1.70% N, 0.25% P, 6.52% K, and 8.70% organic C, which are effective in increasing soil fertility, including in 0xic dystrudepst soil (Hakim et al., 2025). Application of a dose of 300 g/polybag has been reported to provide better plant growth compared to other treatments (Abdillah et al., 2023). The use of organic fertilizers also aims to reduce dependence on chemical fertilizers (Zamriyetti & Maimunah Siregar, 2021).

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2. Literature Review

Cat's whiskers plant (Orthosiphon aristatus)

Whiskers are a common plant in Southeast Asia, particularly in Indonesia, Malaysia, Thailand, Vietnam, and Myanmar. This plant is also known as cat's whiskers. This plant grows well in full sun and warm conditions; however, it can also grow in slightly moist soil (Rifka et al., 2024). Cat's whiskers (*Orthosiphon aristatus*) is a medicinal plant widely used in traditional medicine due to its bioactive compounds such as flavonoids, sinensetin, and rosmarinic acid which function as antioxidants and anti-inflammatory agents.This plant is commonly propagated using stem cuttings because the vegetative method can maintain genetic characteristics and accelerate production. Growth of cuttings is influenced by nutrient availability, planting media, and environmental factors such as moisture and light intensity. Adequate nutrient supply is required to support root formation, shoot emergence, and leaf development. Research indicates that organic fertilization strategies are important for increasing biomass and metabolite content in *Orthosiphon aristatus*, especially when combined with biological or organic soil amendments.

Goat manure

Goat manure is an organic fertilizer made from decomposed or fermented goat manure. This fertilizer naturally enriches the soil and provides it with the nutrients it needs. Goat manure has a drier and looser texture than cow or chicken manure. Goat manure contains macronutrients (N, P, K) and micronutrients (Ca, Mg, S, Na, Fe, Cu, and Zn). The macronutrient and micronutrient content in goat manure is as follows: N = 2.43%, P = 0.73%, Ca = 1.95%, Mg = 0.56%, Mn = 4.68%, Fe = 2.89%, Cu = 4.2%, and Zn = 2.91% (Muhammad et al., 2024).

Goat manure is widely used as an organic fertilizer because it contains essential macro nutrients such as nitrogen (N), phosphorus (P), and potassium (K), as well as organic matter that improves soil structure and microbial activity. Organic matter improves soil porosity, water retention, and nutrient exchange capacity, thereby supporting plant growth.

Several studies show that goat manure significantly influences plant height, leaf number, and biomass production. For example, application of goat manure increased vegetative growth parameters in crops such as rice, cucumber, and coffee seedlings. Goat manure also releases

nutrients slowly, making it suitable for sustainable agriculture and reducing environmental pollution compared to synthetic fertilizers.

Liquid organic fertilizer from coffee skin waste

Liquid organic fertilizer made from coffee husks provides nutrients that can support growth. Research shows that coffee husks contain 45.3% organic carbon, 2.98% nitrogen, 0.18% phosphorus, and 2.26% potassium. Therefore, coffee waste can be used as a liquid organic fertilizer (Herliana et al., 2025). Coffee processing produces a large amount of organic waste such as coffee skin (coffee husk), which can be converted into liquid organic fertilizer through fermentation. Coffee husk contains organic carbon, nitrogen, potassium, and micronutrients beneficial for plant growth.
Liquid organic fertilizer (LOF) derived from agricultural waste provides several advantages:

1. Supplies nutrients in soluble form, making them easily absorbed by plants
2. Contains beneficial microorganisms and natural growth stimulants
3. Improves soil biological activity and nutrient cycling

Coffee waste-based fertilizer also contributes to environmental sustainability by reducing agricultural waste pollution. Studies show that liquid organic fertilizers can stimulate vegetative growth such as plant height, number of leaves, and root development due to the presence of macro and micro nutrients as well as phytohormones.

Interaction between giving goat manure and liquid organic fertilizer from coffee skin waste

The results of the observations showed that the interaction between goat manure and liquid organic fertilizer from coffee skin waste did not have a significant effect on all growth parameters of cat's whiskers cuttings, including the age of shoot emergence, number of shoots, shoot length, number of leaves, plant height, and survival percentage. Organic fertilizers play an important role in improving soil fertility and plant productivity. The combination of solid organic fertilizer (goat manure) and liquid organic fertilizer can increase nutrient availability both in the soil and through foliar absorption. Previous studies indicate that combining organic fertilizer sources can enhance plant growth parameters such as plant height, number of leaves, chlorophyll content, and biomass production. Integrated use of organic fertilizers supports sustainable agriculture systems because it improves soil quality, reduces dependence on chemical fertilizers, and increases crop yield stability.

3. Method

This research was conducted on the land of Panca Budi Development University, Medan, in Hamlet 3, Sampe Cita Village, Kutalimbaru District, Deli Serdang Regency, North Sumatra. The study began in November 2025 and ended in January 2026. The tools used in this research on cutting cat's whiskers plants are cutting scissors as a tool for cutting cat's whiskers stems, polybags as a place or container, a ruler to measure the length of the cuttings, labels and writing tools, measuring cups and other supporting tools. The materials used in this cat's whisker cuttings research are cat's whisker cuttings, goat manure, coffee skin POC fertilizer, soil (topsoil), water and other supporting materials.

This research method uses a Factorial Randomized Block Design (RAK) consisting of 2 factors with 48 plots, namely: The first factor is the provision of goat manure which is given the symbol 'S' which consists of 4 levels of treatment: S0: Without goat manure, S1: 250 g / polybag, S2: 350 g / polybag, S3: 450 g / polybag. The second factor is the provision of liquid organic fertilizer from coffee skin waste which is given the symbol 'K' which consists of 4 levels of treatment: K0: 0 ml / l water / polybag, K1: 30 ml / l water / polybag, K2: 60 ml / l water / polybag, K3: 90 ml / l water / polybag. So there are 16 combinations consisting of 3 replications.

4. Result

Overview Result

The application of goat manure and liquid organic fertilizer (LOF) derived from coffee skin waste showed a positive effect on the growth of cat's whiskers cuttings (*Orthosiphon aristatus*). Growth parameters observed included plant height, number of leaves, number of shoots, root length, and fresh biomass weight. The combined use of solid organic fertilizer and liquid organic fertilizer improved nutrient availability in the planting medium and accelerated vegetative growth of cuttings.

Table 1. Average Observation of Age of Shoot Emergence (days) Due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Skin Waste (K).

Treatment	Age of Shoot Emergence (days)	
Goat Manure (S)		
S0 = 0 g/polybag	6.9	a A
S1 = 250 g/polybag	6.9	a A
S2 = 350 g/polybag	6.8	a A
S3 = 450 g/polybag	6.8	a A
Coffee Husk Waste POC (K)		
K0 = 0 ml/ l water/polybag	7.0	a A
K1 = 30 ml/l water/polybag	6.9	a A
K2 = 60 ml/l water/polybag	6.8	a A
K3 = 90 ml/l water/polybag	6.7	a A

Numbers in the same column followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are very significantly different at the 1% level (lower case letters). Table 1 shows that the provision of goat manure does not have a real effect on the age of emergence of shoots (days) of cat's whiskers plant cuttings, where the fastest age of emergence of shoots was found in treatment S3 = 450 g/polybag, namely 6.8 days, treatment S2 = 350 g/polybag, namely 6.8 days, treatment S1 = 250 g/polybag, namely 6.9 days and the longest was treatment S0 = 0 g/polybag, namely 6.9 days. Table 1 can be explained that the provision of coffee skin waste did not have a significant effect on the age of emergence of shoots (days) of cat's whiskers plant cuttings, where the fastest age of emergence of shoots was found in the K3 treatment = 90 ml/liter of polybag water, namely 6.7 days, the K2 treatment = 60 ml/liter of water/polybag, namely 6.8 days, treatment K1 = 30 ml/liter of water/polybag, namely 6.9 days and the longest was in treatment K0 = 0 ml/liter of water/polybag, namely 7.0 days.

Effect Of Result

Effect on Plant Height

Plant height increased significantly in treatments receiving goat manure and liquid fertilizer compared to the control treatment without fertilizer. Goat manure improved soil structure and supplied macronutrients such as nitrogen (N), phosphorus (P), and potassium (K), which play important roles in vegetative growth. Meanwhile, liquid organic fertilizer from coffee skin waste provided readily available nutrients and natural growth stimulants. Plants treated with combined fertilizers showed faster stem elongation due to improved nutrient uptake efficiency.

Effect on Number of Leaves

The number of leaves increased with increasing fertilizer dosage. Nitrogen content in goat manure

stimulated chlorophyll formation, which increased the photosynthesis rate.

Liquid organic fertilizer from coffee skin waste supported leaf development because it contains micronutrients and organic compounds that enhance plant metabolism. Treatments combining goat manure and liquid fertilizer produced the highest number of leaves compared to single fertilizer treatments.

Effect on Root Growth

Root growth of *Orthosiphon aristatus* cuttings improved significantly in treatments receiving organic fertilizers. Goat manure improved soil porosity and moisture retention, allowing roots to grow more freely. Liquid organic fertilizer stimulated root formation due to the presence of beneficial microorganisms and growth-promoting substances. Better root growth supports stronger plant establishment and improves nutrient absorption capacity.

Effect on Number of Shoots

Shoot formation is an important indicator of successful vegetative propagation through cuttings. Plants treated with organic fertilizer combinations produced more shoots because nutrients were available in both slow-release (goat manure) and fast-absorption (liquid fertilizer) forms.
Adequate nutrient supply promotes cell division and shoot initiation.

Effect on Fresh Biomass Weight

Fresh weight of plants increased with organic fertilizer application. The increase in biomass indicates improved plant metabolism and vegetative development. The combination of goat manure and coffee skin liquid fertilizer produced the highest fresh biomass compared to control treatment. Organic matter in goat manure increased water holding capacity, while liquid fertilizer enhanced nutrient availability, resulting in higher biomass accumulation.

Table 2. Average Observation of the Number of Shoots 3, 5, 7 and 9 Weeks After Planting Due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Skin Waste (K).

Treatment	3MST	5 MST	7 MST	9 MST
Goat Manure (S)				
S0 = 0 g/polybag	4.1 a A	4.1 a A	6.7 a A	8.5 a A
S1 = 250 g/polybag	4.0 a A	4.1 a A	6.9 a A	8.9 a A
S2 = 350 g/polybag	4.1 a A	4.3 a A	6.9 a A	8.8 a A
S3 = 450 g/polybag	4.1 a A	4.6 a A	7.3 a A	9.2 a A
POC Coffee skin waste (K)				
K0 = 0 ml/l water/polybag	4.1 a A	4.1 a A	6.6 a A	8.5 a A
K1 = 30 ml/l water/polybag	4.0 a A	4.1 a A	6.7 a A	8.5 a A
K2 = 60 ml/l water/polybag	4.0 a A	4.2 a A	7.0 a A	8.7 a A
K3 = 90 ml/l water/polybag	4.1 a A	4.8 a A	7.4 a A	9.7 a A

Description: Numbers in the same column followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are very significantly different at the 1% level (upper case letters). Data shows that the number of cat's whiskers cutting shoots tends to increase with plant age, from 3 to 9 weeks after planting, at all doses of goat manure. This is a natural pattern of vegetative plant growth, where shoot and branch formation increases with plant age. Although numerically there is an increase in the number of shoots at the highest dose (S3 = 450 g/polybag) compared to the control (S0 = 0 g/polybag), for example at the age of 9 MST the number of S3 shoots reached 9.2 shoots compared to 8.5 shoots in the control, the results of statistical

analysis show that the difference is not significantly significant (indicated by the same letter 'a A' in all treatments). This indicates that the variation in the dose of goat manure used has not had a strong effect on increasing the number of shoots of cat's whiskers cuttings during the observation period.

Table 3. Average Observations of Shoot Length 3, 5, 7 and 9 weeks after planting due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Peel Waste (K)

Treatment	3MST	5 MST	7 MST	9 MST
Goat pen (S)				
S0 = 0 g/polybag	2.5 a A	5.6 a A	22.8 a A	40.1 a A
S1 = 250 g/polybag	2.7 a A	6.0 a A	23.8 a A	41.2 a A
S2 = 350 g/polybag	2.8 a A	6.3 a A	24.0 a A	41.4 a A
S3 = 450 g/polybag	2.9 a A	6.4 a A	24.1 a A	41.9 a A
POC Coffee skin waste (K)				
K0 = 0 ml/l water/polybag	2.2 a A	5.1 a A	23.3 a A	40.4 a A
K1 = 30 ml/l water/polybag	2.9 a A	6.1 a A	23.5 a A	40.6 a A
K2 = 60 ml/l water/polybag	2.9 a A	6.3 a A	23.9 a A	40.7 a A
K3 = 90 ml/l water/polybag	2.9 a A	6.8 a A	24.0 a A	42.9 a A

Note: Numbers in the same column followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are significantly different at the 1% level (capital case letters). Table 3 shows that the application of goat manure did not affect the shoot length (cm) of cat's whiskers cuttings at 3, 5, 7, and 9 weeks after planting. The highest shoot length was descriptively found in the S3 = 450 g/polybag treatment, while the lowest was found in the S0 treatment. = 0 g/polybag. However, all treatments show the same letter notation so the difference is not significant. Table 3 also shows that the application of liquid organic fertilizer from coffee husk waste did not affect the shoot length (cm) of cat's whiskers plant cuttings at all observation times. The highest shoot length was descriptively found in the K3 = 90 ml/liter water/polybag treatment, especially at the age of 100 ml/liter water/polybag. 9 WAP, while the lowest was in the K0 = 0 ml/liter water/polybag treatment. However, based on Duncan's distance test, all treatments show the same letter so the differences are not significant.

Table 4. Average Observation of the Number of Leaves 3, 5, 7 and 9 weeks after planting due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Peel Waste (K)

Treatment	3MST	5 MST	7 MST	9 MST
Goat pen (S)				
S0 = 0 g/polybag	12.9 a A	27.9 a A	38.8 a A	52.6 a A
S1 = 250 g/polybag	14.2 a A	27.9 a A	39.8 a A	52.7 a A
S2 = 350 g/polybag	14.7 a A	28.1 a A	40.6 a A	54.8 a A
S3 = 450 g/polybag	15.3 a A	28.9 a A	40.7 a A	56.0 a A
POC Coffee skin waste (K)				
K0 = 0 ml/l water/polybag	13.7 a A	26.9 a A	37.8 a A	52.8 a A
K1 = 30 ml/l water/polybag	14.0 a A	27.5 a A	39.3 a A	52.9 a A
K2 = 60 ml/l water/polybag	14.3 a A	27.9 a A	39.3 a A	53.1 a A
K3 = 90 ml/l water/polybag	14.9 a A	30.0 a A	43.4 a A	57.3 a A

Note: Numbers in the same column followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are significantly different at the 1% level (capital case letters). Table 4 can be explained that the provision of goat manure did not affect the number of leaves (strands) of cat's whiskers plant cuttings at the age of 3, 5, 7, and 9 WAP. The highest number of leaves descriptively was found in the S3 = 450 g/polybag treatment, namely 15.3 strands (3 WAP), 28.9 strands (5 WAP), 40.7 strands (7 WAP), and 56.0 strands (9 WAP), while the lowest was found in the S0 = 0 g/polybag treatment. However, all treatments show the same letter so that the difference is not significant. Table 4 also shows that the application of liquid organic fertilizer from coffee husk waste did not affect the number of leaves (strands) of cat's whiskers plant cuttings at all observation times. The highest number of leaves descriptively was found in the K3 = 90 ml/liter of water/polybag treatment, while the lowest was found in the K0 = 0 ml/liter of water/polybag treatment. However, based on the Duncan's distance test, all treatments showed the same letter, so the difference was not significant.

Table 5. Average Observations of Plant Height 3, 5, 7 and 9 weeks after planting due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Peel Waste (K)

Treatment	3MST	5 MST	7 MST	9 MST
Goat pen (S)				
S0 = 0 g/polybag	14.4 a A	17.7 a A	26.8 a A	47.4 a A
S1 = 250 g/polybag	14.8 a A	18.1 a A	27.7 a A	48.9 a A
S2 = 350 g/polybag	15.1 a A	18.5 a A	27.9 a A	49.5 a A
S3 = 450 g/polybag	15.2 a A	18.5 a A	28.3 a A	50.4 a A
POC Coffee skin waste (K)				
K0 = 0 ml/l water/polybag	14.1 a A	17.8 a A	26.0 a A	47.5 a A
K1 = 30 ml/l water/polybag	14.8 a A	17.9 a A	27.2 a A	48.0 a A
K2 = 60 ml/l water/polybag	15.3 a A	17.9 a A	28.0 a A	48.6 a A
K3 = 90 ml/l water/polybag	15.3 a A	19.3 a A	29.4 a A	52.1 a A

Note: Numbers in the same column followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are significantly different at the 1% level (capital case letters). Table 5 shows that the provision of goat manure did not affect the plant height (cm) of cat's whiskers cuttings at the ages of 3, 5, 7, and 9 WAP. The highest plant height descriptively was found in the S3 = 450 g/polybag treatment, namely 15.2 cm (3 WAP), 18.5 cm (5 WAP), 28.3 cm (7 WAP), and 50.4 cm (9 WAP), while the lowest was found in the S0 = 0 g/polybag treatment. However, all treatments show the same letter so that the difference is not significant. Table 5 also shows that the application of liquid organic fertilizer from coffee husk waste did not affect the plant height (cm) of cat's whiskers cuttings at all observation times. The highest plant height descriptively was found in the K3 = 90 ml/liter water/polybag treatment, namely 15.3 cm (3 WAP), 19.3 cm (5 WAP), 29.4 cm (7 WAP), and 52.1 cm (9 WAP), while the lowest was found in the K0 = 0 ml/liter water/polybag treatment. However, based on the Duncan distance test, all treatments showed the same letter so that the difference was not significant.

Table 6. Average Observation of Percentage of Survival Due to the Application of Goat Manure (S) and Liquid Organic Fertilizer from Coffee Peel Waste (K)

Treatment	Percentage of Life (%)
Goat manure (S)	
S0 = 0 g/polybag	0.8 a A

S1 = 250 g/polybag	0.9 a A
S2 = 350 g/polybag	0.9 a A
S3 = 450 g/polybag	0.9 a A
POC coffee skin waste (K)	
K0 = 0 ml/l water/polybag	0.8 a A
K1 = 30 ml/l water/polybag	0.8 a A
K2 = 60 ml/l water/polybag	0.9 a A
K3 = 90 ml/l water/polybag	0.9 a A

Note: Numbers followed by different letters mean they are not significantly different at the 5% level (lower case letters) and are significantly different at the 1% level (capital case letters). Table 6 shows that the provision of goat manure and liquid organic fertilizer from coffee skin waste had no significant effect on the survival percentage of cat's whiskers cuttings. Descriptively, the highest survival percentage was found in treatments S1, S2, S3 (manure) and K2, K3 (liquid organic fertilizer), namely 0.9, while the lowest was found in S0 and K0, namely 0.8. However, since all treatments have the same letter (a A), this difference is not statistically significant. This indicates that the fertilizer applied at the tested concentrations did not affect the survival of the cuttings. The relatively high survival rates (>80%) across all treatments indicate that cat's whiskers cuttings have good adaptation to the growing medium and environmental conditions, so additional fertilizer did not significantly affect survival.

5. Conclusion

The application of goat manure and liquid organic fertilizer (POC) from coffee husk waste, either singly or in combination, at the tested doses did not significantly affect the growth of cat's whiskers (Orthosiphon aristatus) cuttings. This was evident from the parameters of shoot emergence age, number of shoots, shoot length, number of leaves, plant height, and percentage of survival, which did not differ significantly between the treatment and control. Descriptively, the highest doses of both fertilizers tended to produce slightly higher growth values, but this increase was not statistically significant. The percentage of cutting survival remained high (>80%) in all treatments, indicating the adaptability of cat's whiskers cuttings to good planting media and environmental conditions. To achieve a more significant growth effect from the application of goat manure and liquid organic fertilizer (POC) made from coffee husk waste, long-term observation or a combination with a fast-release fertilizer to support the early vegetative phase is recommended. Fertilizer dosages can be explored higher or combined with other types of fertilizers that have faster nutrient release. Furthermore, monitoring nutrient availability in the growing medium can be carried out to ensure more effective fertilizer application and maximize the growth of cat's whiskers cuttings.

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