Bioedunis Journal
ps://jurnal.uinsyahada.ac.id/index.php/Bioedunisi
Vol. 04 No. 01 Juni 2025

E-ISSN : 2829-7601

The Effect of Jakaba on the Growth and Pest Resistance of Borokoli (Brassica oleracea L)

Rafeah Husni
[1] Biology Education Study Program, Faculty of Tarbiyah and Teacher Training, STAIN Mandailing Natal, Indonesia

-rafeahlubis112@gmail.com

Abstract

This study aims to see the effect of Jakaba liquid organic fertilizer in increasing the growth and resistance of broccoli plants (*Brassica oleracea L.*) to leaf pest attacks. The study used an experimental design with three treatment groups, namely the group given Jakaba fertilizer, the group given NPK fertilizer, and the control group (without fertilizer). The study was conducted in Hutarimbaru Village from March to May 2025. The parameters observed included plant height, number of leaves, flower formation, and intensity of leaf pest attacks. The data obtained were analyzed using descriptive statistical analysis and ANOVA to determine significant differences between treatments. The results showed that Jakaba fertilizer increased the growth of broccoli plants and improved resistance to leaf pest attacks better than the control. NPK fertilizer also showed a significant increase in growth, but was not better in terms of pest resistance compared to Jakaba. This study concludes that Jakaba fertilizer can be an alternative environmentally friendly fertilizer in sustainable broccoli cultivation. .

Keywords: Jakaba, broccoli, NPK, organic fertilizer, pests .

INTRODUCTION

Fertile agricultural land is the main foundation in ensuring crop productivity and food security. However, currently many agricultural lands in Indonesia are experiencing a decline in quality due to the continuous and unbalanced use of chemical fertilizers. The impacts of this practice include a decrease in the organic matter content of the soil, reduced soil microbial activity, and hardening and degradation of the soil structure. As a result, agricultural productivity has decreased from year to year, and farmers' dependence on external inputs has increased. According to Sugiono & Sugiarto (2021), the decline in soil quality affects plant growth and productivity. The use of inorganic fertilizers has disadvantages, including that if

used in excessive doses continuously for a long time, it will cause a decrease in land productivity.

Broccoli (*Brassica oleracea* L.) is a highly nutritious vegetable that is widely favored by the public because of its vitamin, mineral, and antioxidant content that is beneficial for health. In addition to its high economic value, broccoli is also one of the superior horticultural commodities that has the potential to be developed in a sustainable agricultural system. However, in its cultivation practices, broccoli plants are very susceptible to pest attacks, especially leaf pests such as armyworms (*Spodoptera litura*) and aphids (*Aphididae*), which can significantly reduce the quality of the harvest.

To overcome pest problems, farmers generally rely on the use of chemical pesticides. Although effective in the short term, continuous use of pesticides can cause pest resistance, environmental pollution, decreased soil health, and leave harmful residues on the harvest. On the other hand, unbalanced fertilization, especially the dominance of chemical fertilizers, also weakens the natural resistance of plants to attacks by pests. Therefore, a more holistic and environmentally friendly approach is needed in broccoli cultivation, one of which is through the use of organic fertilizers that can strengthen plant resistance naturally.

The use of organic fertilizers is an alternative that is widely studied to reduce the negative impacts of chemical fertilizers. One of the organic fertilizers that is starting to be widely used among farmers is Jakaba (*Eternal Lucky Mushroom*), which is a liquid organic fertilizer resulting from fermentation of natural ingredients such as bamboo roots, bran, bean sprouts, and leri water. Jakaba is reported to contain beneficial microorganisms such as *Pseudomonas fluorescens* and *Xanthomonas maitophilia* as well as macro and micro nutrients that can help increase plant growth and can activate secondary plant metabolite compounds that play a role in defense against pests. Jakaba is one of the POCs that has benefits in increasing land productivity and soil fertility. Jakaba is brown in color and shaped like coral with a crunchy texture that breaks easily (Fatmawati, 2022). Jakaba helps agricultural plants by providing nutrients, plant growth regulators (ZPT), and preventing fusarium attacks (Ibnusina, 2024). Jakaba is made from various organic materials (Yusminan et al., 2022).

Based on the background that has been described, several problems arise that need to be studied further. The main problem is whether the use of Jakaba organic fertilizer can improve the growth and quality of broccoli plants as a whole. In addition, it is necessary to know the extent to which Jakaba fertilizer is effective in strengthening the natural defense system of broccoli plants against pests such as caterpillars and aphids, which have been the main obstacles in their cultivation. This study also aims to compare the growth and resistance

of broccoli plants treated with Jakaba fertilizer with NPK, as well as control plants that were not treated, so that significant differences that may arise can be identified.

The use of Jakaba fertilizer in broccoli cultivation is expected to improve the overall quality of the plant, both in terms of morphology (plant height, number of leaves and flower shape/size), as well as resistance to leaf pest attacks. However, scientific information on the effect of Jakaba in this context is still limited, so research is needed to examine the true potential of this fertilizer.

This research is important to support a healthy, environmentally friendly and sustainable agricultural system, while also providing alternative practical solutions for farmers in managing pests without relying entirely on chemical pesticides.

RESEARCH METHODS

This study used an experimental design with a comparative study approach to test the effectiveness of Jakaba liquid organic fertilizer on the growth and resistance of broccoli plants to leaf pest attacks. The samples used were broccoli plants (*Brassica oleracea L.*) aged 5 weeks after sowing. The study used an experimental method by observing the type of fertilization treatment. The two treatments tested were **P1** : Jakaba; **P2** : inorganic fertilizer (NPK); **P3** : Control (without fertilizer). Each treatment was repeated five times, so there were a total of 15 experimental units.

This research was conducted in Hutarimbaru village, Panyabungan Selatan District, Mandailing Natal Regency from March to May 2025. Data collection was carried out by measuring plant height, number of leaves, and observing the intensity of leaf pest attacks with visual assessment. The collected data were analyzed using descriptive statistical analysis and Anova to test differences in growth and resistance between the three treatment groups.

RESULTS AND DISCUSSION

Plant Height

Observations showed that Jakaba and NPK fertilizers had a more significant effect on increasing plant height compared to the control. In the 12th week, the average plant height for Jakaba was 49.8 cm, NPK 56.2 cm, and control 35.0 cm (Table 1).

Table 1. Results of Plant Height Observations

Week To	Jakaba (cm)	NPK (cm)	Control (cm)
7	28.7	32.5	24.1
9	37.8	44.6	28.6

10	43.1	50.4	31.3
11	47.0	54.3	33.5
12	49.8	56.2	35.0

From week 7 to 12, all treatments showed an increase in plant height, but the growth rate differed between treatments. Broccoli plants given **NPK fertilizer** showed the highest growth consistently, followed by the **Jakaba treatment** , and the lowest was **the control** . Plant height growth in week 7 did not show extreme differences, but from **week 9 onwards** , there was a clear divergence between treatments.

NPK fertilizer showed the most significant increase in plant height. From 32.5 cm in the 7th week to 56.2 cm in the 12th week. This is because NPK contains macronutrients (N, P, K) in a form that is directly available and easily absorbed by plant roots. Nitrogen (N) encourages stem elongation and leaf growth, Phosphorus (P) supports root development and energy metabolism, Potassium (K) helps nutrient transport and strengthen plant tissues. NPK application provides a fast and real effect, especially on vegetable plants that are classified as fast-growing and heavy feeders such as broccoli.

Plants given **Jakaba fertilizer also** showed quite good growth. From 28.7 cm (7th week) to 49.8 cm (12th week), or almost the same as NPK at the end of the observation. Jakaba POC contains around 0.40% Nitrogen, 0.10% Phosphorus and 0.06% Potassium (Apriyanto, 2023). Plant growth tends to be more **stable and natural** , although the effect is not as fast as chemical fertilizers. According to Mutalib et al. (2021) the content of jakaba is vitamins, carbohydrates in the form of starch, and minerals as well as various proteins that support the process of forming growth hormones in the form of auxin, alanine and gibberellin which can encourage shoot growth, bring food to the most important places in the stem and leaves.

To get maximum results, Jakaba fertilizer should be combined with NPK fertilizer. This is in line with the research of Farhanah (2024), stating that the combination (Jakaba 50 ml/l water + NPK 1 gr/plant) can increase the height of lettuce plants. In addition, the interaction of Jakaba and NPK fertilizers has a significant effect on plant height parameters (Sari, 2025). The increase in the height of peanut plants that occurs is thought to be due to the N content in Jakaba POC and NPK which can improve soil structure which causes plant roots to easily penetrate the soil and provide a wider exploration space, which causes an increase in the absorption area to obtain more nutrients, resulting in an increase in the height of peanut plants.

Plant height is also influenced by the metabolic process in the plant's body itself, in carrying out these metabolic activities plants need nutrients obtained from fertilization either

through the planting medium or through the leaves. The increase in plant height is an indicator of normal plant growth where growth and increase in plant height are closely related to the process of photosynthesis, which will produce photosynthate used by plants for their growth process (Marliah, et al 2012).

Plants without fertilizer (control) also experienced growth, but the lowest and slowed down significantly. From 24.1 cm to 35.0 cm in five weeks. This shows that the soil naturally has limited nutrient reserves. Without external additions, plants find it difficult to achieve optimal growth, especially for plants with high nutrient requirements such as broccoli. Comparison between treatments shows that **NPK** is superior in increasing growth quickly and to maximum height in the short term. **Jakaba** showed good performance that was close to NPK, and brought additional benefits to soil structure and health **.** According to Risman (2022) Jakaba also contains microorganisms needed by plants such as Pseudomonas fluorescens, Pectolytic pectin, and Xanthomonas maitophilia. These microorganisms help the absorption of nutrients for plants. The role of jakaba here, in addition to providing microorganisms, is to release N and P nutrients bound to the soil. **The control** showed a slowdown in growth, emphasizing the importance of fertilization in broccoli cultivation. For a sustainable agricultural system, the use of biofertilizers such as Jakaba can be an alternative or complement to chemical fertilizers to keep production high without damaging soil fertility in the long term.

Number of Leaves

The results showed that the number of broccoli leaves increased over time in all treatments. However, the growth rate of the number of leaves differed between the NPK, Jakaba, and control fertilizer treatments. Broccoli plants given **NPK fertilizer** had the highest number of leaves in each week of observation. However, the difference **was not too far from Jakaba fertilizer** , especially from week 10 to week 12. Plants in the **control treatment** showed significantly fewer leaves than the other two treatments.

Table 2. Observation of the Number of Leaves

Week To	Jakaba (cm)	NPK (cm)	Control (cm)
7	6.2	6.6	5.4
9	9.0	9.6	6.6
10	10.2	10.6	7.4
11	11.0	11.4	8.0
12	11.8	12.0	8.4

The significant increase in the number of leaves in the **NPK fertilizer treatment** was due to the availability of macronutrients, especially nitrogen (N), which plays a major role in the formation of leaves and vegetative plant tissues. Phosphorus and potassium also support cell division and nutrient transport in plant tissues. NPK has a rapid effect because nutrients are directly available in the form of ions. The average increase in the number of leaves from the 7th to the 12th week was 5.4 strands in the NPK treatment. Although the effect is not as fast as NPK, Jakaba fertilizer can also increase the number of leaves significantly. According to research conducted by Ibnusina et al. (2024), the provision of jakaba has a significant effect on the research variable of the number of lettuce leaves. Jakaba can increase plant growth with better height, strong stems, dense green leaves and protect plants from fusarium attacks (Puspitasari, 2022).

The increase in the number of leaves in mustard greens is due to the nitrogen content in Jakaba POC. Nitrogen plays a role in the formation of chlorophyll in leaves, protein, and fat and in accelerating the vegetative growth of plants (Sari, 2025). The number of leaves in plants with Jakaba fertilizer continues to increase approaching the NPK treatment. The difference between Jakaba and NPK in the 12th week was only 0.2 leaves. Statistically not significantly different , but significantly different from the control . Jakaba not only plays a role in providing nutrients that are beneficial to plants, but also improves land quality. The use of organic fertilizers can improve the vegetative growth of lettuce plants, especially the number of leaves (Ibnusina, 2024).

Plants that were not given fertilizer (control) experienced a slower increase in the number of leaves. From 5.4 leaves (week 7) to 8.4 leaves (week 12), the increase was only 3 leaves over five weeks. The limited availability of nitrogen and phosphorus in the soil causes obstacles in leaf formation and plant growth in general. This emphasizes the importance of the role of fertilizer in supporting the vegetative development of broccoli. Giving the Eternal Lucky Mushroom (Jakaba) with the right dose can accelerate plant growth, especially the vegetative phase of the plant (Ramadita, 2024).

Pest Resistance

Observations were made on the intensity of pest attacks that commonly attack the leaves and growing points of broccoli plants. Assessments were made based on the percentage of leaves showing symptoms of damage. compared to the total leaves in five plant samples for each treatment, using an intensity scale (%).

The results showed that broccoli plants given Jakaba biofertilizer were significantly more resistant to pest attacks than those given NPK fertilizer. The average intensity of pest attacks on Jakaba treatment plants (9.6%) was significantly lower than NPK (14.9%). This difference reflects the different biological mechanisms between the two types of fertilizers. Jakaba contains secondary metabolites consisting of alkaloids, polyphenols, tannins, and saponins. Jakaba soaking water has an active insecticidal effect by acting as a respiratory poison (Ani, 2023). Jakaba's ability as a natural insecticide can be seen in the image below.

Table 3. Average Intensity of Pest Attacks (%) on Broccoli Plants

Week To	Jakaba (%)	NPK (%)	Control (%)
7	7.5	12.0	26.4
9	9.2	14.1	30.1
10	10.0	15.6	33.9
11	10.4	16.2	36.1
12	10.9	16.7	38.5
Average	**9.6**	**14.9**	**33.0**

Based on the image above, jakaba fertilizer can suppress pest attacks as evidenced by the absence of damaged leaves, while leaf damage is clearly visible in the NPK and control treatments. The mechanism of alkaloid compounds as nerve poisons that can inhibit the activity or work of the acetylcholinesterase enzyme. This enzyme functions to break down acetylcholine into choline. Acetylcholine works in the transmission of stimuli, if the work of the acetylcholinesterase enzyme is disrupted, it can cause accumulation of acetylcholine and damage to the nervous system, resulting in the death of larvae (Ani, 2023).

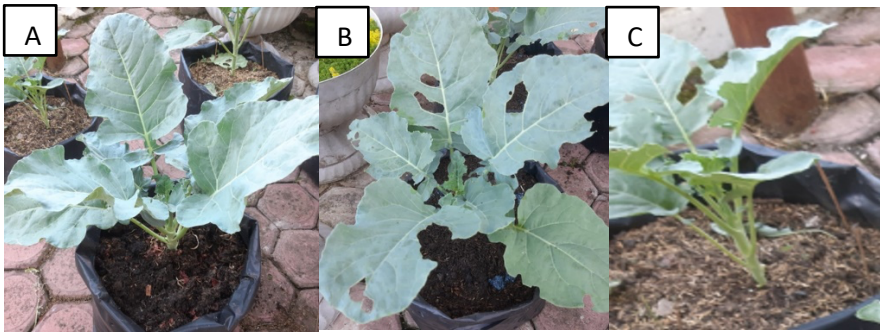

Figure 1. Comparison of Broccoli Resistance to Pests with Jakaba Fertilizer Treatment (A), NPK (B), and Control (C).

Based on the image above, jakaba fertilizer can suppress pest attacks as evidenced by the absence of damaged leaves, while leaf damage is clearly visible in the NPK and control treatments. The mechanism of alkaloid compounds as nerve poisons that can inhibit the activity

or work of the acetylcholinesterase enzyme. This enzyme functions to break down acetylcholine into choline. Acetylcholine works in the transmission of stimuli, if the work of the acetylcholinesterase enzyme is disrupted, it can cause accumulation of acetylcholine and damage to the nervous system, resulting in the death of larvae (Ani, 2023).

Tannin compounds work by inhibiting energy production. Tannins can bind to lipids and proteins and are able to bind protease enzymes, where these enzymes play a role in catalyzing proteins into amino acids needed for larval growth, tannins reduce the work of digestive enzymes including protease and amylase so that intestinal protein activity is also inhibited, which results in nutritional disorders and inhibited cell metabolism (Aseptianova, 2017).

Saponins work by reducing the tension on the surface of the mucous membrane of the larvae's digestive tract, causing corrosion to the membrane and resulting in damage that begins with swelling of the midgut, which causes the acellular peritrophic membrane to detach from the intestinal cells, causing the cells to separate and cause death in the larvae (Yenie et al., 2013).

Flower Formation

The generative phase in broccoli is characterized by the formation of dense and compact flowers or plants. Flower quality is influenced by the adequacy of nutrients, especially nitrogen (N), phosphorus (P), and potassium (K), as well as soil microorganisms that play a role in plant hormone metabolism. This study evaluated the effect of Jakaba biofertilizer, NPK chemical fertilizer, and control treatment on the speed of flower emergence, flower size, flower weight, and flower color as indicators.

Table 4. Effect of Fertilizer on Broccoli Flower Formation and Quality

Week To	Jakaba (%)	NPK (%)	Control (%)
Flowering Age (DAP)	± 50.2	± 52.4	± 56.2
Flower Diameter (cm)	14.8	15.2	11.4
Fresh Flower Weight (gr)	268.4	295.4	192
Flower Color	Green	Deep green and fresh	Pale green, partly yellow and brown
Texture	Less dense	Solid and Compact	Not dense

Broccoli plants given Jakaba biofertilizer formed flowers the fastest (50.2 HST), compared to NPK (52.4 HST) and control (56.2 HST). This reflects **the effect of rhizosphere microbes in Jakaba fertilizer** which produce phytohormones such as auxin and gibberellin

which accelerate the transition from the vegetative to the generative phase. This effect is very important in short rotation-based agricultural systems or on narrow land, because it allows earlier harvesting without decreasing yields.

Plants given NPK fertilizer produced flowers with slightly larger diameters than Jakaba, but the difference was not statistically significant ($p>0.05$). This is because the high nitrogen content in NPK fertilizer increases the division and enlargement of flower cells, potassium strengthens the tissue structure and enlarges the flower size. However, Jakaba almost matches the performance of NPK , thanks to the ability of phosphate-solubilizing and nitrogen-fixing microbes that increase the efficiency of nutrient uptake by plants. The highest flower weight was produced by the NPK treatment (295.4 gr), followed by Jakaba (268.4 gr), and the lowest in the control (192 gr). The difference in the weight of jakaba and NPK is due to the texture of the flowers using jakaba not being as dense as the flowers with the addition of NPK. The Potassium (K) content in Jakaba is relatively low so that it is not optimal for fertilization or the generative phase (Norliyani, 2023).

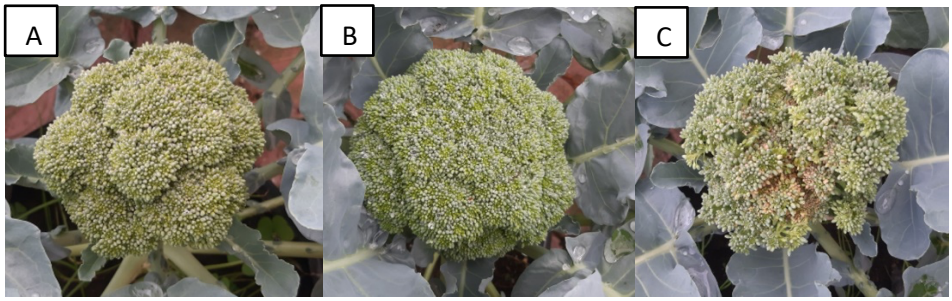

Figure 2. Effect of Fertilizer on Broccoli Flower Formation and Quality with Jakaba Fertilizer Treatment (A), NPK (B), and Control (c).

Broccoli flower color is an important visual indicator in assessing yield quality and market preference. This study found that flowers in NPK plants were dark green , indicating high chlorophyll levels due to optimal nitrogen and magnesium availability, which supports the synthesis of leaf and flower pigments. Jakaba produced green flowers **,** indicating that the plants still had high photosynthetic activity and healthy tissue, although not as high as NPK. The control showed a pale green color , indicating chlorophyll deficiency, weak tissue, and low physiological health of the flowers. Flower color also reflects the potential for post-harvest shelf life. Dark green flowers tend to be more resistant to wilting and oxidation than pale flowers.

CONCLUSION

Based on the results of the experiments that have been conducted, it is concluded that Jakaba fertilizer has a good effect on the growth and pest resistance of broccoli. Jakaba showed the best results (compared to NPK and control) for pest resistance. This is due to the presence of secondary metabolites consisting of alkaloids, polyphenols, tannins, and saponins. Secondary metabolites can interfere with respiration, digestion, and inhibit insect energy production. In the leaf number indicator, Jakaba has almost the same ability as NPK and is very different from the control. NPK fertilizer showed the best results in the plant height and flower formation indicators (due to sufficient P elements), while the P elements contained in Jakaba are still relatively low. However, Jakaba has a better effect than the control. Based on this description, it is concluded that Jakaba is good for use as an organic fertilizer during the vegetative period and can be used as a natural insecticide (bioinsecticide) for sustainable agriculture.

REFERENCES

Ani, K., Ernawati., Suryani., Adonis, E., Manao, A., Ariyana, R. (2023). Budidaya Jakaba dan Aplikasi sebagai Insektisida terhadap Larva *Ostrinia fulnacaris guenee*. *Bioeksperimen, 9*(1), 42-49. https://doi.org/10.23917/bioeksperimen.v9i1.19826

Apriyanto, A., Ibnusina, F., Afrizal, R. (2023). Pemberian Dosis POC Jakaba Terhadap Pertumbuhan dan Produksi Tanaman Pakcoy (Brassica rapa L.). *Perbal: Jurnal Pertanian Berkelanjutan*, *11*(3), 343–351. https://doi.org/10.30605/perbal.v11i3.2950

Aseptianova, Tuti. K. F. W., Nita, N. (2017). Efektifitas Pemanfaatan Tanaman Sebagai Insektisida Elektrik Untuk Menegendalikan Nyamuk Penular Penyakit DBD. *Jurnal Bioeksperimen, 3*(2), 10-19. https://doi.org/10.23917/bioeksperimen.v3i2.5178

Farhanah, A., Hamzah, F., Kaharuddin., Atika., Pari, R. F. (2024). Tanaman Selada Merah Secara Vertikultur dengan Pemberian POC Jakaba. *Jurnal Agrisistem, 20*(1), 1-8. https://doi.org/10.52625/j-agr.v20i1.309

Fatmawati, D. F. (2022). Jakaba as an Organic Fertilizer Solution for Millennial Farmers in Pattallassang Village, Gowa Regency, South Sulawesi. Prosiding Webinar Abdimas, 589-596.

Ibnusina, F., Nofriani., Arnayulis., Sari, F. A. (2024). Penggunaan Jakaba Untuk Meningkatkan Efisiensi Pemupukan pada Tanaman Selada (*Lactuva sativa*) di Lahan Organosol. *Jurnal Pertanian Terpadu 12*(2): 199-206. https://doi.org/10.36084/jpt..v8i2.245

Ibnusina, F. (2024). Efek Pemberian Jakaba terhadap Pertumbuhan dan Produksi Tanaman Sawi Hijau (Brassica juncea L .) pada Tanah Organosol. 35(2), 250-258.

Marliah. A, Nurhayati., Tarmizi. (2012). Pengaruh Jenis Mulsa dan Konsentrasi Pupuk Organik Cair Super Bionik Terhadap Pertumbuhan dan Hasil Bawang Merah (Allium ascanicum L). Prodi Agroteknologi, Fakultas Pertanian, Universitas Syah Kualu Darusalam Banda Aceh. Jurnal Floratek F.

Mutalib, A, M Yusuf, Mu'minah, A Junaed, dan A Nurfadliah. 2021. Pertumbuhan tiga varietas kopi pada lahan bukaan baru pasca pemberian pupuk organik cair jakaba. Seminar Nasional Politeknik Pertanian Negeri Pangkajane Kepulauan. 337–343.

Norliyani, A., Santi, M., Huda, J., Mahdiannoor. (2023). Budidaya Cabai Merah Menggunakan Jakaba di Lahan Podsolik. *Jurnal Daun, 10*(1), 125-142. https://doi.org/10.33084/daun.v10i1.4395

Puspitasari, YD, TW Cahyanti, dan PA Nugroho. 2022. Revitalisasi produksi dan peningkatan pengetahuan petani berbasis komunitas dalam pemuliaan tanaman menggunakan jamur keberuntungan abadi (Jakaba) untuk meningkat kesejahteraan keluarga. Prosiding Seminar Nasional UNIMUS. 5: 1994–2004.

Ramadita., Ibnusina, F., Nofrianil. (2024). Efek Pemberian Jakaba terhadap Pertumbuhan dan Produksi Tanaman Sawi Hijau (Brassica juncea L.) pada Tanah Organosol. *Jurnal Agrikultura, 35*(2): 250 - 258

Risman, A. (2022). Pertumbuhan dan Produksi Tanaman Cabai Katokkon (*Capsicum chinense Jacq*) pada Berbagai Konsentrasi Pupuk Jakaba. Universitas Bosowa

Sari, D., Rizal, M., Endriani. (2025). Interaksi Pemberian Pupuk Organik Cair Jakaba dan NPK Terhadap Pertumbuhan dan Produksi Tanaman Kacang Tanah (Arachis Hypogea L.). *Jurnal Agrotela, 6*(1), 13-20.

Sari, F. A., Ibnusina, F. (2025). Penerapan Frekuensi Pemberian POC Jakaba Terhadap Pertumbuhan dan Produksi Tanaman Sawi Hijau (*Brassica Juncea* L.) pada Tanah Organosol. *Jurnal AGRI PEAT, 26*(1), 13-19. https://10.36873/agp.v26i01.19600

Sugiono, D, dan Sugiarto. 2021. Pengaruh pupuk NPK majemuk dan pupuk hayati (Biofertilizer) terhadap pertumbuhan dan hasil tanaman jagung manis varietas

sweetboy. Seminar Nasional dalam Rangka Dies Natalis Ke-45 UNS Tahun 2021. 5(1): 65–73.

Yenie, E. S., Kalvin, A., Irfhan, M. (2013). Pembuatan Pestisida Organik Menggunakan Metode Ekstraksi dari Sampah Daun Pepaya dan Umbi Bawang Putih. *Teknik Lingkungan, 10*(1), 46-59. https://doi.org/10.25077/dampak.10.1.46-59.2013

Yusminan, Y., Walida, H., Syawal Harahap, F., & Elizabeth Mustamu, N. (2022). Comparison Of Jakaba Growth With The Addition Of Organic Matter In Rice Washing Water. International Journal of Science and Environment (IJSE), 2(2), 74-78. https://doi.org/10.51601/ijse.v2i2.16