Journal of Research in Social Science And Humanities (2024); 4(2):
DOI: http://dx.doi.org/10.47679/jrssh.v4i1.172
ISSN 2809-3356 (print), ISSN 2807-3916 (online)

RESEARCH ARTICLE

Impact Of Planting Media And Red Corner Extract On Growth On Lada (Piper Nigrum L.) Stumps Of One Ruas

Sulaminingsih [1], Charlie Novianry Panjaitan [2], Diki Fajaranto [3]

Abstract

Pepper (Piper nigrum L.) is a valuable spice that is highly profitable, but often difficult to cultivate in the early phase of cuttings growth. This study investigated how different types of growing media and concentrations of extracts from shallots impacted the growth of these single internode pepper cuttings. The study was conducted using a Factorial Randomised Group Design repeated five times. One internode of pepper cuttings was planted on three types of media: soil, soil + compost, soil + burnt husk, and soil + sand. In addition, they were treated with onion extract at concentrations of 200 millilitres of onion extract per litre of water, 250 millilitres of onion extract per litre of water, and 300 millilitres of onion extract per litre of water. Observations included root length, number of leaves, and shoot height. Results showed that the growing medium and concentration of shallot extract greatly affected the growth of pepper cuttings. The mixed media of soil + compost with 300 ml shallot extract/L water produced the best growth for shoot height and number of leaves observed. This proves that soil + compost mixed media with 300 ml/L shallot extract may be a good option for pepper cuttings. This study provides a scientific basis for a more productive and efficient method of pepper cultivation.

Keyword: Pepper, Growing Medium, Onion Extract, Cuttings Growth, Plant Growth, Plant Propagation.

Introduction

Pepper (Piper nigrum L.) plays an important role in international trade. Indonesia has great potential to increase pepper production and quality as one of the largest pepper producers in the world (Yuzairi U.S et al., 2022). However, the low growth rate and survival of pepper cuttings, especially in the early growth stages, often hamper pepper cultivation (Amelia et al., 2020; Aminuddin et al., 2022; Listiana et al., 2022). Vegetative propagation of pepper plants through cuttings often experiences obstacles, such as insufficient planting media and ineffective growth regulators (Evizal et al., 2022; Inderiati et al., 2020).

In pepper propagation through cuttings, the main problem is the low success rate of cuttings growth in the early phase (Herry, 2022; Netty Stam, Hidrawati, 2022). Inappropriate planting media can inhibit the absorption of water and nutrients, while the lack of natural hormone activity does not stimulate root formation and plant growth (Masangge et al., 2023). Inappropriate planting media can also inhibit growth and root formation.

The success rate of pepper cuttings propagation is very important because it has a direct impact on the quality and productivity of pepper plants (Ardi et al., 2023; Indarsih et al., 2023; Sumawijaya & Ismail Saleh, 2023). When cuttings grow poorly, the number of plants that can be cultivated is reduced, which has an impact on yields and farmers' income. In addition, the cost and time spent during the nursery process is affected by the use of growing media and growth regulators that have not produced the expected results.

STIPER (Sekolah Tinggi Ilmu Pertanian) Berau

*) corresponding author

Sulaminingsih

Email: sulaminingsih89@gmail.com

The aim of the study was to overcome the low success rate of vegetative growth of pepper cuttings. This study is to see how different types of planting media and the treatment of shallot extract impact on the growth of one internode pepper cuttings. It is expected that by finding the most effective combination of planting media and shallot extract treatment, the success rate of cuttings growth can be substantially improved.

As pepper plays an important role in Indonesia's agricultural economy, it is important to address this topic. Improving the productivity and yield of pepper plants will increase the production and quality of pepper. This will increase farmers' income and strengthen Indonesia's position as the world's largest pepper producer. The use of good growing media and natural growth regulators can also help produce a more sustainable and environmentally friendly agriculture.

To solve this problem, this study will look at different types of growing media that can help pepper cuttings grow well and test how effective shallot extract is as a natural growth regulator. This study aims to address the need for more efficient pepper propagation techniques. By studying how growing media, extracts from shallots affect the shoot growth of single internode pepper cuttings, it is hoped that practical solutions can be found that can be used by pepper farmers to increase the success rate of their plant propagation.

This research will increase knowledge on the ideal combination of growing media and natural growth regulators for the growth of pepper cuttings. Many studies have been conducted regarding the use of synthetic hormones and growing media, but there are still few studies that combine growing media with extracts from shallots. Agricultural researchers and practitioners are expected to benefit from the findings of this research.

Currently, quite a lot of research has been conducted on the use of synthetic hormones and growing media to propagate plants. However, studies that specifically combine growing media with natural growth regulators such as shallot extract are still rare. By investigating the potential of shallot extract as an environmentally friendly natural alternative, this research will make a significant contribution to the field of agrotechnology.

The use of shallot extract as a natural tool to control the growth of pepper cuttings is the main innovation in this study. Natural hormones such as auxin, which can stimulate root formation and plant growth, are found in shallot extract. It is expected that better pepper propagation methods will be found by combining shallot extract with the right growing medium.

Methods

This study uses quantitative research methods using primary In this study, an experimental design using a Factorial Randomised Group Design was used to test different types of planting media and concentration levels of shallot extract on the growth of one internode pepper (Piper nigrum L.) cuttings. The types of planting media tested were soil, soil + compost, soil + burnt husk, soil + sand, and soil + soil. To ensure the reliability and validity of the results, each treatment combination was repeated five times. Every week for eight weeks, the height, number of leaves, and root length of the plants will be examined. The effect of treatments on the growth of pepper cuttings will be determined by analysing the data obtained using analysis of variance (ANOVA).

Result and Discussions

This study looked at how different types of growing media used and concentration levels of shallot extract impacted the growth of one internode of pepper (Piper nigrum L.) cuttings. For eight weeks after transplanting, data was collected on plant height, number of leaves, and root length. The results are presented in the following tables and graphs.

Table 1. Effect Of Planting Medium And Concentration Of Shallot Extract On Pepper Cuttings (Piper Nigrum L.)

Media Garden	Extract Concentration Red Onion	Bud Height (cm)	Number of Leaves (strands)	Root Length (cm)
Soil	200 ml/L air	10.36	1.60	8.30
Soil	250 ml/L air	5.14	2.00	11.26
Soil	300 ml/L air	7.10	2.20	8.32
Soil + Compost	200 ml/L air	7.00	2.60	10.46
Soil + Compost	250 ml/L air	5.90	2.00	8.58
Soil + Compost	300 ml/L air	21.00	4.60	12.02
Soil + Burnt Husk	200 ml/L air	9.90	3.00	6.14
Soil + Burnt Husk	250 ml/L air	8.20	1.60	11.80
Soil + Burnt Husk	300 ml/L air	7.28	2.00	10.04
Soil + Sand	200 ml/L air	5.22	2.20	9.28
Soil + Sand	250 ml/L air	8.18	1.80	17.20
Soil + Sand	300 ml/L air	5.64	2.00	6.00

The results of this study showed that the combination of planting media and shallot extract concentration greatly influenced the growth of pepper cuttings, especially shoot height and number of leaves. The soil + compost mixture with a shallot extract concentration of 300 milliliters per liter of water was the most effective for the growth parameters of shoot height and number of leaves.

The relationship between planting media and shallot extract concentration on shoot height is shown in Figure 1

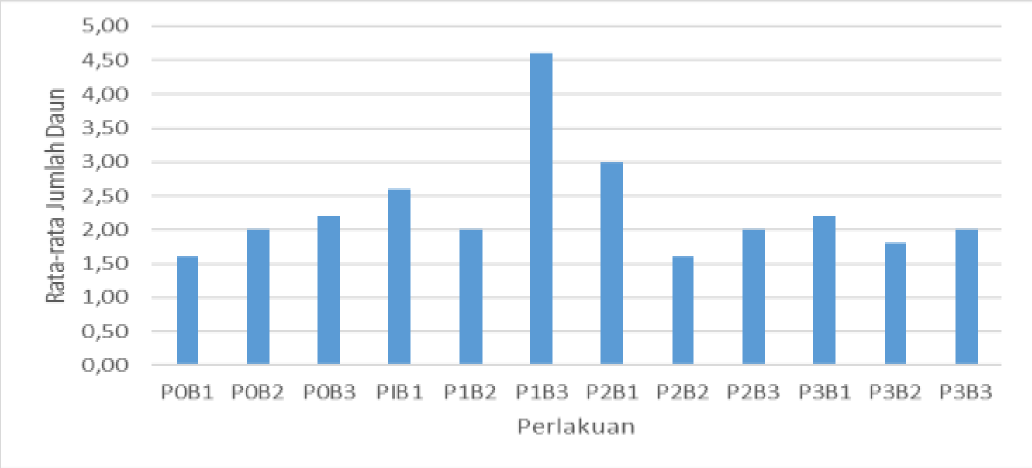
Figure 1 Planting Medium And Shallot Extract Concentration Impact On Shoot Height

The shoot height of pepper cuttings is influenced by the planting media factor and the shallot extract concentration factor. The interaction of the two factors also had a significant effect on shoot height.

The structure and texture of the soil as a planting medium affect the ability of water retention and aeration. Good soil can balance the water and air needed for root and shoot growth. Adding compost increases the organic matter content in the soil, which can improve soil fertility (Armanda & Hermawati, 2021; Azis H et al., 2023; Syahdan & Karim, 2022). Compost contains various nutrients that are released slowly, ensuring that plants get nutrients consistently (Aminuddin et al., 2022; Hariyadi et al., 2021; Nuraida & Arnis En Yulia, 2022).

A good soil medium with the right level of auxin improves the ability of roots to absorb nutrients, supporting higher shoot growth (Weihan et al., 2023). The combination of compost that increases organic matter and beneficial microbes with shallot extract can create a highly favorable environment for shoot growth with a continuous supply of nutrients and protection from pathogens (Abuk, 2021; Ismawanti et al., 2022; Lingkungan et al., 2022). The effect of growing media and shallot extract concentration on the number of leaves is presented in Figure 2.

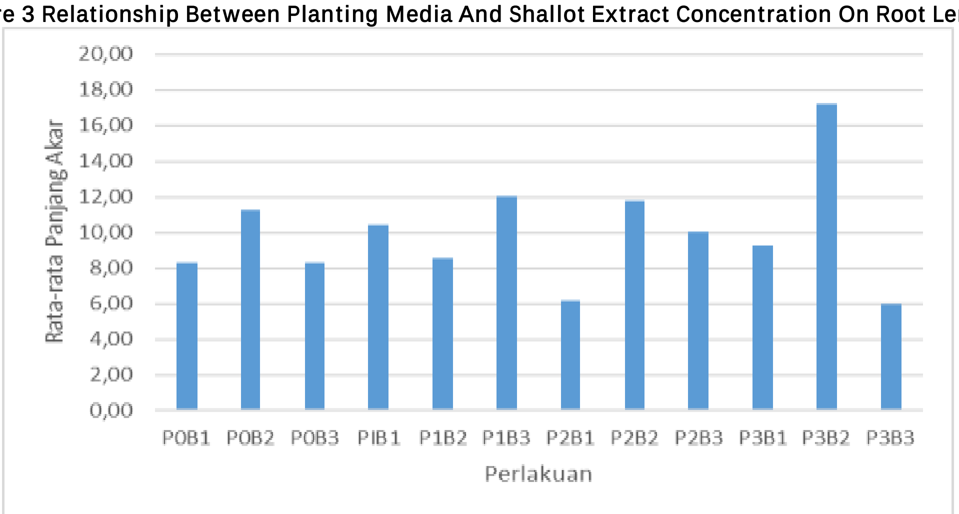
Figure 2 Planting Media And Shallot Extract Concentration Affect The Number Of Leaves



Planting media has a significant effect on the number of leaves. The application of shallot extract also had a significant effect. The interaction of these two factors was also significantly different.

Many important factors for plant growth are influenced by the growing medium. These include nutrient availability, water retention, aeration, and activity (Anita et al., 2022; Lingkungan et al., 2022). The addition of compost improves soil structure, increases water retention and aeration, and increases organic matter content in the soil (Ardi et al., 2023; Nuke et al., 2021; Pradiksa et al., 2022). An additional source of gradually released nutrients is also provided by organic matter. Compost aids the decomposition of organic matter and the release of essential nutrients to plants by increasing the activity of beneficial microbes, such as bacteria and fungi. Compost provides more complete and continuous macro and micro nutrients than soil alone, so plants have better access to nutrients necessary for leaf growth. These microbes can also improve root health, which indirectly improves leaf growth because shallot extract contains bioactive compounds that are very important for plant growth, especially growth hormones such as auxins, flavonoids, and allicin, the concentration of shallot extract in different amounts of water greatly affects the number of leaves of pepper cuttings (Devianti et al., 2021; Handayani et al., 2021; Hastuti et al., 2021). The effect of planting media and shallot extract on root length is shown in Figure 3.

Figure 3 Relationship Between Planting Media And Shallot Extract Concentration On Root Length



Planting media, shallot extract and their interaction were not significantly different. There are many factors that affect the length of plant roots, such as soil nutrients, moisture, aeration, and the presence of biostimulants or hormones from shallot extract. If the growing media used (soil, soil + compost, soil + burnt husk, or soil + sand) provide comparable nutrients for root growth, there will be no significant difference in root length between treatments (Pembangunan et al., 2023). If the soil has a balanced content of nutrients, such as potassium, phosphorus, and nitrogen, pepper plants may already have enough nutrients for root growth.

The amount of shallot extract used may not be enough to significantly increase root growth (Agrium et al., 2022; Ilham et al., 2024; Sudartini et al., 2021) One of the hormones in shallot extract, auxin, usually requires higher concentrations to stimulate significant root growth. Although flavonoids and allicin in shallot extract help protect plants from stress, their effects on root length may not be significant.

These findings suggest that the growth of pepper cuttings can be significantly enhanced by the use of an appropriate growing medium combined with natural growth regulators such as shallot extract. Pepper growers will find this important as they can increase the propagation success of their plants, which in turn can improve the quality and productivity of pepper plants. Onion extract is also a more organic and environmentally friendly alternative

The soil + compost treatment combined with the application of 300 ml/L water of shallot extract improves the physical and chemical conditions for pepper cuttings growth, providing good aeration, sufficient water retention, and adequate nutrients. The extracted shallots contain the natural growth hormone auxin, which stimulates root formation and increases nutrient uptake by the plant, thereby accelerating growth

Conclusion

Growing media that combines a mixture of soil and compost provides the best growth results for pepper cuttings.

By using onion extract in a concentration of 300 ml/L water as a natural growth regulator, the growth of pepper cuttings can be significantly improved.

The combination of soil with compost and the use of shallot extract in a concentration of 300 ml/L water, can increase the shoot height and number of leaves of pepper cuttings.

References

Abuk, V. (2021). Pengaruh Kompos dan Takaran Teh Kompos Terhadap Pertumbuhan dan Hasil Tanaman Sawi (Brassica juncea L .) di Lahan Kering. 6(2477), 49–53.

Agrium, J., Pertanian, F., Kuala, U. S., Blangjerango, K., Lues, K. G., Agroteknologi, D. J., Pertanian, F., & Kuala, U. S. (2022). Pengaruh Konsentrasi Ekstrak Bawang Merah dan Lama Perendaman Terhadap Pertumbuhan Setek Tanaman Nilam (Pogostemon cablin Benth) T. 19, 283–294.

Amelia, R., Meilawati, N. L. W., & Nurhidayah, S. (2020). Respons Pertumbuhan Aksesi Lada (Piper nigrum L.) Hasil Iradiasi Sinar Gamma terhadap Zat Pengatur Tumbuh Rootone F dan Air Kelapa. AGROSCRIPT Journal of Applied Agricultural Sciences, 2(2), 105–113. https://doi.org/10.36423/agroscript.v2i2.562

Aminuddin, M., Saputra, R. A., & Sofyan, A. (2022). Adaptasi Setek Batang Tanaman Lada (Piper nigrum L.) Menggunakan Komposisi Media Gambut dan Pupuk Organik Kotoran Kambing yang Berbeda. Jurnal Agro Industri Perkebunan, 10(2), 127–140. https://doi.org/10.25181/jaip.v10i2.2593

Anita, Harimbi Setyawati, Sanny Anjarsari, Lalu Topan Sulistiyono, & Josephine Vania Wisnurusnadia. (2022). Pengaruh Variasi Konsentrasi Em4 Dan Jenis Limbah Kulit Buah Pada Pembuatan Pupuk Organik Cair (Poc). Jurnal ATMOSPHERE, 3(1), 14–20. https://doi.org/10.36040/atmosphere.v3i1.4708

Ardi, M. R., Hadijah, S., & Sulityowati, H. (2023). Respon Setek Lada Satu Ruas Terhadap Kombinasi Biochar Ampas Tebu Dan Pupuk Npk Pada Tanah Gambut. Jurnal Sains Pertanian Equator, 12(3), 666. https://doi.org/10.26418/jspe.v12i3.63372

Armanda, F., & Hermawati, T. (2021). Pertumbuhan Dan Hasil Kacang Tanah Terhadap Pemberian Pupuk Kompos Kotoran Kambing. 4(1), 26–37.

Azis H, A., Rizal, M., & Rivai, I. (2023). Pengaruh Kompos Kotoran Hewan terhadap Produksi Tanaman Terung Ungu (Solanum melongena L.). Jurnal Agrisistem, 19(1), 9–16. https://doi.org/10.52625/j-agr.v19i1.261

Devianti, Satriyo, P., Bulan, R., Thamren, D. S., & Sitorus, A. (2021). Characteristics of the macronutrient content of compost and liquid organic fertilizer from agricultural wastes. International Journal of Design and Nature and Ecodynamics, 16(3), 315–320. https://doi.org/10.18280/IJDNE.160310

Evizal, R., Esatika, E. C., Septiana, L. M., Salam, A. K., Sanjaya, P., & Pramono, S. (2022). Pengaruh Dosis Pupuk NPK Terhadap Pertumbuhan dan Produksi Stek Pohon Induk Lada Sambung (Piper nigrum/Piper colubrinum). Jurnal Agrotek Tropika, 10(1), 117. https://doi.org/10.23960/jat.v10i1.5460

Handayani, T., Dewi, T. K., Martanti, D., Suryasari, Y., Antonius, S., & Witjaksono. (2021). Application of inorganic and liquid organic bio-fertilizers affects the vegetative growth and rhizobacteria populations of eight banana cultivars. Biodiversitas, 22(3), 1261–1271. https://doi.org/10.13057/biodiv/d220323

Hariyadi, H., Sih Winarti, & Basuki, B. (2021). Kompos dan pupuk organik cair untuk pertumbuhan dan hasil cabai rawit (Capsicum frutescens) di tanah gambut. Journal of Environment and Management, 2(1). https://doi.org/10.37304/jem.v2i1.2660

Hastuti, S., Martini, T., Purnawan, C., Masykur, A., & Wibowo, A. H. (2021). Pembuatan Kompos Sampah Dapur dan Taman dengan Bantuan Aktivator EM4. Proceeding of Chemistry Conferences, 6, 18. https://doi.org/10.20961/pcc.6.0.55084.18-21

Herry, A. M. A. S. R. S. (2022). Pengaruh Pemotongan Daun Terhadap PertumbuhaSetek n Lada (Piper nigrum L .) pada Komposisi Media yang Berbeda. 21(2), 97–106.

Ilham, A., Triani, N., & Moeljani, I. R. (2024). Pengaruh Konsentrasi Zat Pengatur Tumbuh Ekstrak Bawang Merah dan Air Kelapa pada Media MS terhadap Pertumbuhan Planlet Anggrek Bulan (Phalaenopsis amabilis). 8(1), 369–377.

Indarsih, A. Y., Sulistyowati, H., & Arifin, N. (2023). Respon Pertumbuhan Setek Lada Hutan Terhadap Pemberian Berbagai Jenis Perangsang Akar Sintetis. Jurnal Sains Pertanian Equator, 12(3), 409. https://doi.org/10.26418/jspe.v12i3.64567

Inderiati, S., Qur'an, Q., & Wijaya, A. (2020). Pertumbuhan Setek Lada Satu Ruas Berdaun Satu Dengan Pemberian Zat Pengatur Tumbuh. Agroplantae: Jurnal Ilmiah Terapan Budidaya Dan Pengelolaan Tanaman Pertanian Dan Perkebunan, 9(1), 1–7. https://doi.org/10.51978/agro.v9i1.197

Ismawanti, A., Nurcahyani, E., & Farizi, S. (2022). Effect of Indole Acetic Acid (IAA) by Serratia marcescens strain MBC1 on Soybean (Glycine max L.) Germination. In Indonesian Journal of Biotechnology and Biodiversity (Vol. 6, Issue 1).

Lingkungan, J. I., Widowati, T., Nurjanah, L., & Lekatompessy, S. J. R. (2022). Pengaruh Bahan Baku Kompos terhadap Pertumbuhan dan Produksi Cabai Merah Keriting (Capsicum annuum L .). 20(3), 665–671. https://doi.org/10.14710/jil.20.3.665-671

Listiana, S. A., Budiasih, R., & Sondari, N. (2022). Pengaruh Jenis Media Dan Konsentrasi Auksin Terhadap Pertumbuhan Akar Setek Tanaman Lada (Piper ningrum L.). OrchidAgro, 2(1), 18. https://doi.org/10.35138/orchidagro.v2i1.371

Masangge, Y., Anggorowati, D., & Palupi, T. (2023). Respon Pertumbuhan Setek Lada Akibat Aplikasi Pgpr Dan Kompos Tandan Kosong Kelapa Sawit Pada Tanah Aluvial. Jurnal Sains Pertanian Equator, 12(3), 488. https://doi.org/10.26418/jspe.v12i3.61401

Netty Stam, Hidrawati, A. (2022). Response Pertumbuhan Setek Lada (Pepper nigrum L .) Terhadap Waktu Aplikasi Trichoderma Dan Konsentrasi Pupuk Organik Cair Growth Response Of Black Pepper (Pepper nigrum L .) Cuttings On Time Of Trichoderma Application And Concentration Of Liquid Organi. Jurnal Imiah Pertanian, 18(2), 117–125.

Nuke, Y., Ledheng, L., & Yustiningsing, M. (2021). Pengaruh Komposisi Media Tanam Organik Arang Sekam Dan Pupuk Kotoran Sapi Terhadap Pertumbuhan dan Kelangsungan Hidup Tanaman Cabai Merah (Capsicum annum L.) dan Cabai Rawit (Capsicum frutescens L.). Bioma : Berkala Ilmiah Biologi, 23(2), 125–132. https://doi.org/10.14710/bioma.23.2.125-132

Nuraida, & Arnis En Yulia. (2022). Pengaruh Pemberian Kompos Ampas Tahu dan Pupuk NPK Terhadap Pertumbuhan dan Produksi Tanaman terung Ungu (Solanum melongena L.). Dinamika Pertanian, 38(1), 25–34.

https://doi.org/10.25299/dp.2022.vol38(1).10418
Pembangunan, P., Manokwari, P., Sidabalok, J., Herawati, M. M., Agrotknogi, P. S., Kristen, U., & Wacana, S. (2023). Pengaruh Perbandingan Media Tanam terhadap Hasil Pertumbuhan Stek Batang Tanaman Kopi Robusta (Coffea canephora) pada Fase Pembibitian. 733–739.
Pradiksa, O. I., Setyati, W. A., & Widianingsih, W. (2022). Pengaruh Bioaktivator EM4 Terhadap Proses Degradasi Pupuk Organik Cair Cymodocea serrulata. Journal of Marine Research, 11(2), 136–144. https://doi.org/10.14710/jmr.v11i2.33771
Sudartini, T., Hartini, E., & Burhan, L. S. (2021). Pengaruh Konsentrasi Urine Sapi dan Perendaman Terhadap Pertumbuhan Setek Jambu Air King Rose (Syzygium aqueum Burn.f.Alston). Media Pertanian, 6(2), 103–112. https://doi.org/10.37058/mp.v6i2.3840
Sumawijaya, A., & Ismail Saleh. (2023). Pertumbuhan setek lada perdu (Piper nigrum) dengan pemberian ekstrak bawang merah sebagai zat pengatur tumbuh. Jurnal Pengelolaan Perkebunan (JPP), 4(2), 13–18. https://doi.org/10.54387/jpp.v4i2.31
Syahdan, M., & Karim, H. A. (2022). Peningkatan Produktivitas Tanaman Tomat (Lycopersicon esculentum mill .) dengan pemberian Berbagai Jenis Pupuk Kompos dan Komposisi NPK. 1. https://doi.org/10.35329/ja.v1i1.2818
Weihan, R. A., Saidi, A. B., & Andriani, D. (2023). Pengaruh media Tanam dan ZPT Alami Terhadao Pertumbuah Bibit. 5(1), 23–33.
Yuzairi U.S, F., Hutapea, S., & Panggabean, E. L. (2022). Pengaruh Biochar SP 50 yang di Modifikasi dan Plant Growth Promoting Rhizobacteria (PGPR) Terhadap Pertumbuhan dan Produksi Jagung Manis (Zea mays saccharata Sturt). Jurnal Ilmiah Pertanian (JIPERTA), 4(1), 45–63. https://doi.org/10.31289/jiperta.v4i1.1194