



Strategy to Increase Lettuce Plant Growth (*Lactuca sativa* L.) with fertilization optimization

Harpin Patar Halomoan Manik*, Kamsia Dorliana Sitanggang, Dini Hariyati Adam, Yudi Triyanto

Labuhanbatu University

Jl. SM Raja No. 126 A KM 3.5 Aek Tapa, Labuhanbatu Regency, Sumatera Utara
21418, Indonesia

*Email : harpinmnk@gmail.com

ABSTRACT

Lettuce is a horticultural commodity that has quite good commercial value. This research was carried out on houseland in Pondok Batu Village, Bilah Hulu District, Labuhan Batu Regency from March 2024 to May 2024. This research aimed to see the effectiveness of NPK fertilizer application on the growth and production of lettuce (*Lactuca sativa* L). This research aims to determine the type of planting media and the correct dose of NPK fertilizer for optimum growth and yield of lettuce so that it can become information that can be used by the public. Data analysis showed that plants given NPK fertilizer had higher yields and better overall health than plants without fertilizer. It is hoped that the use of NPK fertilizer will make it easier to apply in the field and can increase the required nutrient content in the soil and can be used directly by plants. This research used a Randomized Group Design (RAK) consisting of 4 treatments. P0 Soil planting media, P1 Soil planting media; dose of NPK fertilizer 100 grams, P2 Soil planting media; NPK fertilizer dose 200 grams, P3 Soil planting media; NPK fertilizer dose 300 grams.

Keywords: *Growth, Lettuce, NPK fertilizer, Organic Soil, Planting Media*

1. INTRODUCTION

Lettuce (*Lactuca sativa* L.) belongs to the group of leafy vegetables. This type of vegetable contains complete nutrition, especially vitamins and minerals, which meet human nutritional needs. As a vegetable raw material, lettuce can be used as a raw vegetable along with other food ingredients. Apart from being useful as a food ingredient, lettuce is now being widely researched as a medicinal ingredient. Considering the importance of lettuce for health, its nutritional value, and its fiber content, encourages people to love this vegetable even more. Rujak vegetables are usually eaten raw or served as a side dish. (Idha, 2018).

The leaves contain vitamins A, B, and C which are beneficial for body health. Lettuce originates from West Asia and then spreads to Asia and countries with temperate and warm climates. In Indonesia, the development of lettuce has not been as fast as commercial vegetables because the area where lettuce is planted is still limited, such as Cipanas, Pengalengan and. Lembang in West Java. Many people choose lettuce because its texture and color make the food attractive and increase appetite. Often, lettuce is eaten raw or freshly prepared, made into salads, or served in various forms of cooking. Lettuce consumption in Indonesia was 35.30 kg per capita per year in 2005, and 34.06 kg per capita per year in 2006.

Production in 2010 for lettuce plants was 41,111 tons per year-1 and experienced a decline in 2015, it was 41,111 tons of lettuce per year-1. 39,289 tons/year (BPS, 2016). Growth in lettuce production in Indonesia varied between 2010-2015, namely 5.19-6% per year. However, domestic lettuce production is still below consumption, namely 35.30 kg/head/year. Meanwhile, based on information from PPHP's Director General of International Marketing, the amount of lettuce imported in 2015 was 21.1 tons, thereby increasing production with

domestic lettuce consumption (Purba, 2020). The addition of NPK fertilizer to corn cultivation can increase production at optimal doses. The nutrients N, P, and K are essential nutrients for plants. Increasing the dose of N fertilizer in the soil can directly increase protein (N) levels and lettuce production, but adding N alone without P and K causes plants to fall easily, be susceptible to pest attacks, and reduce quality. from production. NPK mixed fertilizer is an inorganic fertilizer produced in fertilizer factories, where the fertilizer contains nutrients that plants need.

NPK fertilizer is a chemical fertilizer consisting of nitrogen-N fertilizer, phosphate-P fertilizer, and potassium-K fertilizer. Providing NPK fertilizer in the right amount at a particular location is very beneficial from an environmental perspective, both technically and economically. The optimal fertilizer dosage is determined by the soil nutrient status, fertilization efficiency, and plant nutrient requirements. Several studies show that the use of organic materials and inorganic fertilizers can increase soil pH, total nitrogen, soil P and K concentrations, plant levels and uptake of N, P, and K nutrients, and increase lettuce. The availability of NPK complex fertilizer is expected to help farmers use fertilizer according to plant needs because N, P, and K compounds can be made based on soil tests (Hadianto, 2020).

This research aims to determine the interaction of each corn plant with additional doses of NPK fertilizer, determine several appropriate doses of NPK fertilizer to obtain the best production results for each lettuce tested, and determine the protein. The content of each lettuce plant tested determines the dose of NPK fertilizer given.

2. MATERIAL AND METHODS

2.1 Materials and tools

The materials used in this research were lettuce seeds (*Lactuca sativa* L), NPK fertilizer, and organic soil.

The tools used in this research were polybags, hoes, springtime, wood, measuring tape, and other tools that supported the implementation of this research.

2.2 Research methods

The design used in this experiment was a Randomized Block Design (RAK) with four replications using one factor, namely NPK fertilizer on the growth of lettuce plants with four dose levels, namely: without NPK fertilizer treatment (Control), NPK fertilizer application 100, 200 and 300 grams

2.3 Research procedure

2.3.1 Land Clearing

The cleaning site is carried out in a location that has sufficient water sources, the area is flat and the drainage must be good, so that there is no puddle of water during heavy rain, and is safe from pests, large animals, and insects. The best time to prepare the land is at least two weeks before planting or at the same time as seed sowing.

Land cleaning is done before seeding, namely by cutting the grass and fencing the land to avoid pest attacks. This land clearing was carried out for one week. Before planting lettuce plants, fill polybags using fertile soil. The planting medium used in this research is organic soil or burnt black soil that comes from the yard around the house. Planting media is put into a polybag, and filling the planting media is done from the mouth of the polybag to the top.

For the seeding process, prepare a smooth and fertile planting medium, and place it in a polybag. New lettuce seeds do not require special treatment during the sowing process. Once the seedlings grow large enough, usually around 4-6 weeks after planting the seeds, then move them to a larger location such as a larger garden. Make sure the soil in the new location is well prepared and has good drainage to facilitate good lettuce plant growth.

2.3.2 Fertilizer Application NPK on Lettuce Plant Growth

Application of NPK fertilizer This is done by sowing it on the soil around the lettuce plants according to the research dose.

2.3.3 Maintenance

Maintenance of lettuce plants is carried out when the seedlings are ready to be transplanted at the age of 14 days after sowing (HSS) with 1 (one) seedling per polybag. The seeds planted are healthy and uniformly sized seeds that have 3 leaves. The seeds are planted up to the root collar, then covered with soil around the seeds, compacted with a little pressure, by moving the lettuce to the prepared land and the lettuce is 4-7 weeks old. to care for lettuce plants so that they grow well and produce optimal results. These maintenance steps include adequate watering, regular fertilization, pest and disease control, and pruning if necessary.

Apart from that, maintaining lettuce plants also involves selecting varieties that suit environmental conditions and good soil care. By carrying out proper maintenance, lettuce plants can grow healthy and productive. Lettuce plants also need sufficient lighting, so the planting location must be chosen well so that the plants can photosynthesize optimally. Apart from that, it is also necessary to monitor the condition of the plants regularly so that you can immediately overcome any problems that may arise. With good care, lettuce can be harvested at the right time and has good quality for consumption.

2.4 Observation Parameters

2.4.1 Plant Height (cm)

Plant height is measured in centimeters (cm), measured from the base of the stem to the highest growth point. Observations were made every 2 weeks, starting when the plants were 14 HST. Observations were carried out 3 times, namely when the lettuce plants were 14, 21, and 28 HST. The results of observations and the height of lettuce plants at the age of 28 HST after planting showed that NPK fertilizer had a very

significant effect on the height of lettuce plants at the age of 28 HST after planting.

Treatment with a 300-gram dose produced the highest lettuce plant height of 14.21 and 28 HST. The large amount of nutrients that can be provided in the soil can be absorbed by lettuce plants well, thereby increasing plant height. Plant height at 21 HST has no real effect. This is thought to be because, at a concentration of 200 grams, NPK fertilizer is not sufficient to support various processes within the plant body.

2.4.2 Number of Leaves (pieces)

Observation of the number of leaves was carried out from 2 weeks to 4 weeks after planting, by counting the total number of leaves on each plant. Leaves are a plant organ that functions as a catcher of energy from sunlight for photosynthesis. It was found that the number of fully opened leaves on each plant matched the number of leaves counted. This was done to calculate the number of leaves at 14, 21, and 28 HST.

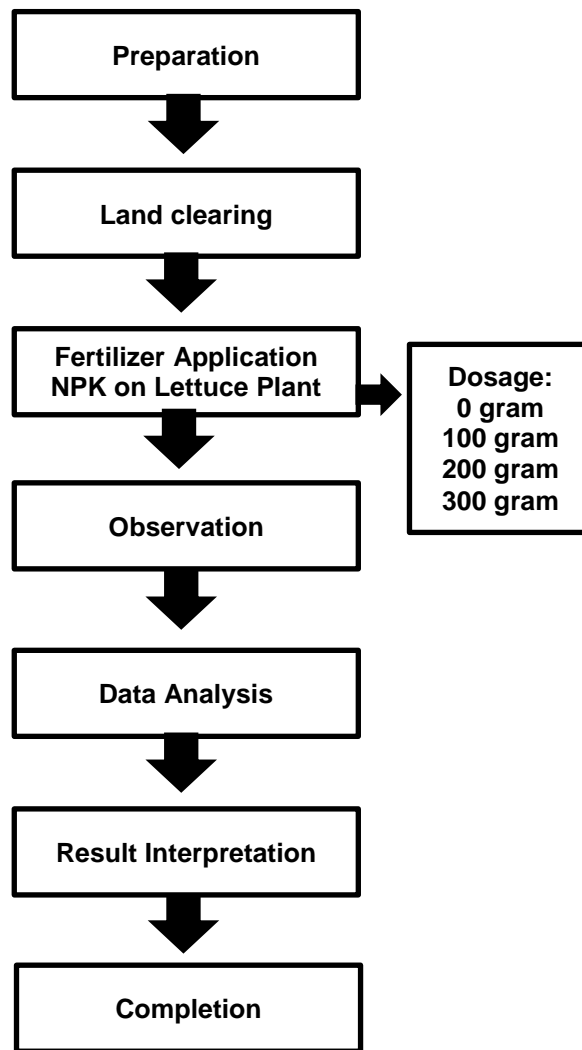


Figure 1. Research flow diagram

3. RESULT AND DISCUSSION

3.1 Plant Height (cm)

Figure 2 shows the height of lettuce plants on the influence of NPK fertilizer doses at the age of 21 and 28 DAP. The highest was found in the 300-gram treatment which was significantly different from the 200-gram, 100-gram

treatment and control. As the dose of fertilizer increases, the plants can absorb more nutrients for growth. This is because NPK Mutiara 16:16:16 fertilizer contains the macronutrients N, P, and K which are generally needed by plants and can provide a good balance of nutrients

for plant growth and production (Khodijah et al. 2021).

When compared with previous research obtained by Hidayati (2017), there are similar results, because the nitrogen, phosphorus, and potassium content in NPK fertilizer encourages plant metabolic processes to form biomass which will support the growth of plant organs.

The results of the slowest growth in height were found in the control treatment because the plants did not receive the macronutrients N, P, and K

which are very important for plant height growth.

This research investigated the impact of wood biochar application on the growth and yield of eggplant (*Solanum melongena* L.) by assessing various parameters, including plant height, leaf width, individual fruit weight, fruit count per plant, and total fruit weight per plant. The collected data were systematically analyzed and organized into multiple tables to elucidate the influence of each treatment on the measured parameters.

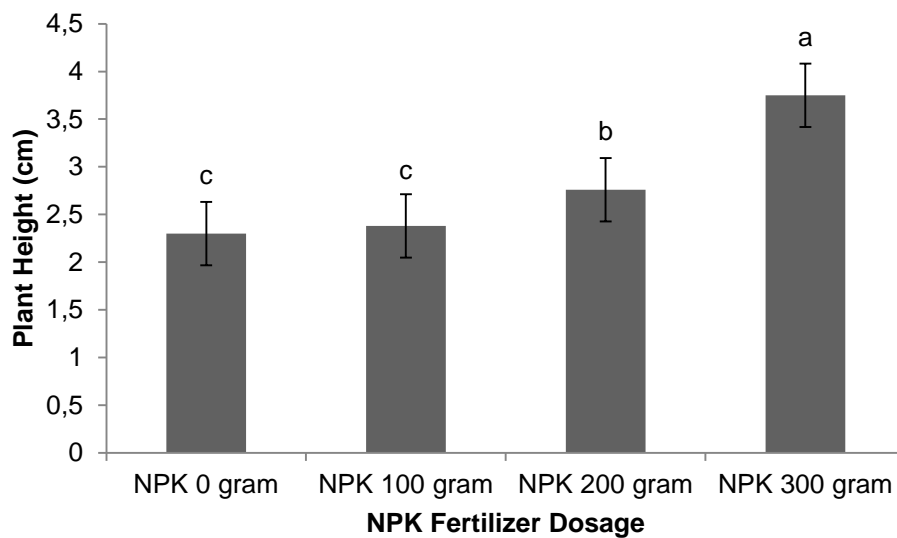


Figure 2. Average Plant Height



Figure 3. Image of plants treated with 300 grams of NPK

3.2 Number of Leaves (strands)

Based on the data in Figure 4, it shows that the highest average value at plant ages of 14 DAP and 28 DAP was produced by the treatment of 100 Grams with an average value of 6 strands and at the plant age of 21 days after planting the

highest average value was produced by the 200-gram treatment with a value of 6.5 strands and at the plant age of 28 days after planting was produced by the 300 grams treatment with a value of 7.5 strands. The best treatment was provided with 300 grams of NPK fertilizer, which

was significantly different from all treatments. This happens because physiologically a dose of 300 grams is a very good dose to increase the growth of lettuce plants (Yunidawati, 2023).

This research is compared with previous research reported by Zebua et al. (2023) obtained different results, this difference was influenced by the

differences in the commodities studied, because each plant has a different capacity and ability to absorb nutrients between types.

The lowest leaf number results were obtained in control plants because these plants did not receive sufficient nutrient intake for the formation of plant cells and organs.

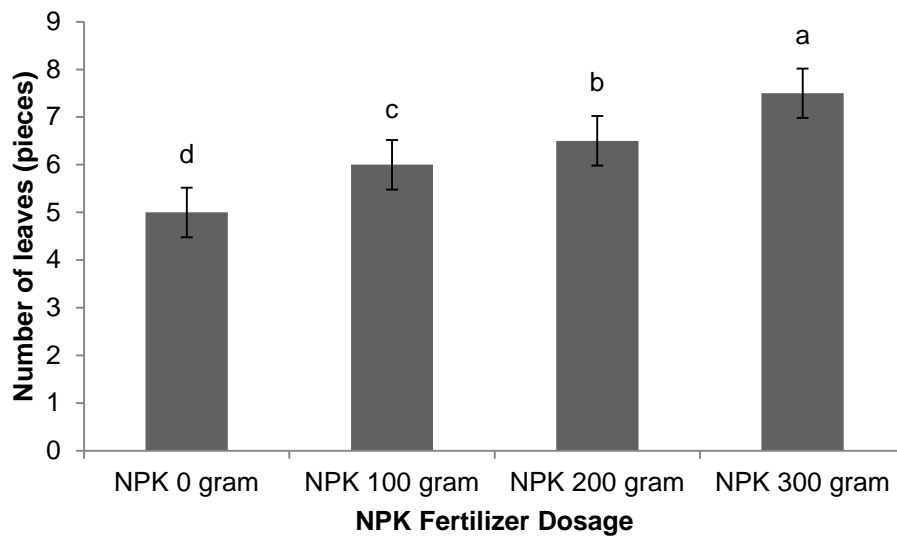


Figure 4. Average number of leaves (pieces)



Figure 5. Image of plants treated with 300 grams of NPK

4. CONCLUSION

Based on research, it is known that the reaction of giving NPK fertilizer affects the development of red chili plants at 14 DAP, 21 HST, and 28 DAT. Plant height and number of leaves are greatly influenced by the dose of NPK fertilizer of 300 grams per plant.

REFERENCES

Fauzi, R., Putra, E. T. S., & Ambarwati, E. (2013). Pengayaan oksigen di zona perakaran untuk meningkatkan pertumbuhan dan

hasil selada (*Lactuca sativa* L.) secara hidroponik. *Vegetalika*, 2(4), 63-74.

Hadi, P., & Ega, F. D. (2022). Pengaruh Pupuk Organik (Abu Sekam dan Ampas Kopi Cair) dan Konsentrasi Pupuk Daun terhadap Pertumbuhan dan Hasil Tanaman Selada Merah (*Lactuca sativa* L.). *AGROSCRIPT: Journal of Applied Agricultural Sciences*, 4(1), 8-14.

Hadianto, W., Yusrizal, Y., Resdiar, A., & Marseta, A. (2020). Pengaruh Media

- Tanam dan Dosis Pupuk NPK Terhadap Pertumbuhan dan Hasil Tanaman Selada (*Lactuca sativa* L.). *Jurnal Agrotek Lestari*, 6(2), 90-95. Idha, M. E., & Herlina, N. (2018). Pengaruh macam media tanam dan dosis pupuk NPK terhadap pertumbuhan dan hasil tanaman selada merah (*Lactuca sativa* var. *Crispa*). *Jurnal Produksi Tanaman*, 6(4), 398-406.
- Hidayati, S. (2017). Applications Liquid Organic Fertilizer And Composition Of Plant Media To Result Of Selada Plants (*Lactuca sativa* L). *Gontor AGROTECH Science Journal*, 3(2), 99-118.
- Khodijah, N. S., Kusmiadi, R., & TP, S. (2021). The Growth Of Lettuce (*Lactuca sativa*) Hydroponically In Simple Wick System On Various Types Of Nutrient Composition. *JUATIKA: Jurnal Agronomi Tanaman Tropika*, 3(2).
- Kirnadi, A. J., Zuraida, A., & Ni'mah, G. K. (2022). Budidaya dan analisis usaha tani selada (*Lactuca sativa* L) di lahan laboratorium lapangan Uniska Desa Bentok Kecamatan Bati Bati. *Prosiding Penelitian Dosen UNISKA MAB*.
- Purba, J. (2020). Efektivitas penambahan pupuk hayati dan pupuk NPK terhadap pertumbuhan dan produksi selada (*Lactuca sativa* L.). *Agroprimatech*, 4(1), 18-26.
- Raksun, A., Japa, L., & Mertha, I. G. (2019). Aplikasi pupuk organik dan NPK untuk meningkatkan pertumbuhan vegetatif melon (*Cucumis melo* L.). *Jurnal Biologi Tropis*, 19(1), 19-24.
- Ratnawati, M. I. (2020). Pemeriksaan Telur Cacing Pada Tanaman Selada Yang Dijual di Pasar Kebun Lada Binjai.
- Roudoh, L. (2022). Pemberian Pupuk Organik Cair Limbah Buah Pepaya California (*Carica papaya* L.) dan kulit bawang merah (*Allium ascolonicum* L.) Pada Tanaman Selada (*Lactuca sativa* Var. *Grand rapids*) (Doctoral dissertation, UIN RADEN INTAN LAMPUNG).
- Sumaryani, N. P., & Ari, G. W. (2016). Pengaruh Pemberian Pupuk Npk, Abmix, Dan Pupuk Kompos Cair Melalui Media Tanam Aeroponik Terhadap Pertumbuhan Tanaman Selada Keriting (*Lactuca sativa* L). *Emasains: Jurnal Edukasi Matematika dan Sains*, 5(2), 46-55.
- Warganegara, G. R., Ginting, Y. C., & Kushendarto, K. (2015). Pengaruh konsentrasi nitrogen dan Plant catalyst terhadap pertumbuhan dan hasil tanaman selada (*Lactuca sativa* L.) secara hidroponik. *Jurnal Penelitian Pertanian Terapan*, 15(2).
- Yunidawati, W. (2023). Kombinasi Pemberian Ekstrak Bawang Merah Dengan Pupuk Npk Terhadap Pertumbuhan Bibit Tanaman Kakao (*Theobroma cacao* L.). *Jurnal Penelitian Bidang Ilmu Pertanian*, 21(2), 74-86.
- Zakiah, E., Prihandono, T., & Yushardi, Y. (2023). Pengaruh Daya Lampu Ultraviolet Light Emitting Diode (Led) Growth Terhadap Pertumbuhan Fisika Tanaman Selada Sistem Hidroponik. *Jurnal Pembelajaran Fisika*, 12(2), 68-75.
- Zebua, M. Z., Harahap, R., & Jabat, Y. Y. L. B. (2023). Pengaruh Konsentrasi Nutrisi Ab-Mix Dan Konsentrasi Pupuk Npk Mutiara 16-16-16 Terhadap Pertumbuhan Dan Produksi Tanaman Tomat Ceri (*Solanum Lycopersicum* Mill) Dengan Budidaya Hidroponik Sistem Sumbu (Wick Sistem). *Fruitset Sains: Jurnal Pertanian Agroteknologi*, 11(4), 259-268.