

Effect of Giving Several Doses of NPK Fertilizer and Various Growing Media on Growth and Yield of Celery (*Apium graveolens* L.)

⁽¹⁾, Muhammad Yaser Husaini ⁽²⁾, Umar Battong,

@mail : (1). muhammadyaser45@gmail.com (2). battongumar@yahoo.co.id

Agrotechnology Study Program, Faculty of Agricultural Sciences and Digital Business, Universitas Muhammadiyah Kalimantan Timur.

ABSTRACT

*Effect of Giving of Several Doses of NPK Fertilizer and Various Growing Media on Growth and Yield of Celery (*Apium graveolens* L.). The research location was carried out in Tapis Village, Tanah Grogot District, Paser Regency with a study period of 6 months from January 02 to Juny 06. The aim of this study was to determine the effect of giving Several Doses of NPK and various Growing Media using a two-factorial randomized block design which was repeated three times. The first factor is the effect of giving several doses of NPK, namely m1 = (without 5 grams/plant), m2 = (10 grams/plant), p3 = (15 grams/plant). The second factor was the treatment of various growing media, namely y1 = (without top soil and cow manure), y2 = (top soil and palm compost fertilizer), y3 = (top soil and husk charcoal), the purpose of randomization in a study was to reduce the level of compatibility. The randomization system used in this study was a randomization system using arisan.*

Based on the results of the study, the administration Giving of Several Doses of NPK fertilizer very significantly affected the observed parameters, including the average plant height at 4 WAP, 6 WAP, number of petioles 6 WAP, number of tillers 6 WAP, harvest wet weight 6 WAP, 7 WAP, 8 WAP, root length 9 WAP. While the treatment of various growing media had a very significant effect on the parameters observed including the average plant height at 2 WAP, 4 WAP, 6 WAP, number of petioles at 6 WAP, number of tillers at 6 WAP, wet weight harvest at 6 WAP, 7 WAP, 8 WAP and root length at 9 WAP.

Effect of Giving of Several Doses of NPK Fertilizer and Various Growing Media with a doses 5 grams/plant and the use top soil and palm compost fertilizer resulted in the best celery plant growth. The interaction treatment between several doses of NPK fertilizer and various growing media had no significant effect on all observed parameters.

Keywords: Celery, NPK fertilizer, Growing Media.

Date of Submission: 10-11-2022

Date of Acceptance: 25-11-2022

I. Introduction

The celery plant is a vegetable that is quite well known by the people in Indonesia. The leaves of the celery plant can be consumed as fresh vegetables as well as decoration for dishes and the seeds can be used as a flavoring agent and even the oil extract from celery, can be used as medicine (Dinas Ketahanan Pangan NTB, 2020). Celery is good for consumption because it contains high levels of vitamin A, vitamin C, iron and other nutrients for the body (Suwarto et. all, 2014).

NPK fertilizer is organic compound fertilizer that is very efficient for use in increasing the availability of macro nutrients (N, P and K) as a substitute for single fertilizers such as KCl, Urea and SP-36 which are sometimes complicated to obtain on the market or due to the high price. Phonska NPK Fertilizer 15 : 15 : 15 is one of the NPK fertilizer products on the market. This compound fertilizer dissolves easily in water so that the nutrient contained in the fertilizer can be absorbed and used by plants effectively (Kaya, 2013).

The superiority of organic materials, bokashi or empty palm fruit bunch compost (EFB) has a high nutrient content such as; N, P, K Fe and micro-nutrients in the soil. The application of OPEFB organic matter to the planting medium can improve the physical, chemical and biological properties. In addition, palm straw compost has several beneficial properties, including improving the structure of light clay soil, helping the solubility of nutrients needed for plant growth, and reducing the risk of being a carrier of plant pests. Organic matter from OPEFB is not easily washed away by water that seeps into the soil and can be applied to various growing media (Umar et. all, 2018).

Planting media is a place for plant growth that provides several important requirements for plant growth as well as for physiological activities such as nutrients, water and air, there are several planting media

that fall into the organic category which generally come from a component of living organisms, for example parts of plants such as fruit, leaves, flowers, stems or bark. The use of organic materials is far superior when compared to the use of anorganic materials, the presence of nutrients available in organic growing media (Sutedjo, 2008). The organic fertilizer from animal manure is known as manure and can be applied in liquid or solid form (Musnawar 2003). From the description above it is considered important to conduct research entitled The Effect of Giving Several Doses of NPK Fertilizer and Various Planting Media on the Growth and Yield of Celery Plants (*Apium graveolens* L.).

II. Methodology

This research was conducted from January 2022 to June 2022 and the research location was carried out in Tapis Gang Idola Village, Tanah Grogot District, Paser Regency. The materials used in this study were celery seed of the Amigo variety, top soil, palm tree compost, cow manure, rice husk charcoal, NPK Phonska 15 : 15 : 15 fertilizer, wood, nails, rope and furadan 3 GR. The tools used in this study were hoes, machetes, saws, hammers, scissors, knives, rulers, paranet 60%, polybags measuring 8 x 15 cm, polybags measuring 30 x 30 cm, handsprayer 1 liter capacity, gembor, stationery, scales digital, 150 liter water barrel, research label, camera, soil pH (Soil Tester).

The design used in this study was a randomized block design (RBD). Which is arranged in factorial 2 factors. The factor was the administration of several doses of NPK fertilizer (M) consisting of 3 levels, namely m1 = 5 grams/plant. m2 = 10 gram/sample plant, m3 = 15 gram/sample plant. The second factor is various planting media (Y), which consists of 3 levels, namely y1 = top soil and cow manure, y2 = top soil and palm tree compost, y3 = top soil and husk charcoal. There were 3 treatments consisting of 9 combinations which were repeated 3 times. Each treatment combination consisted of 4 sample plants, so that the number of combinations in each replicate was 9 x 4 = 36 sample plants, while the total population of all replicates was 36 x 3 = 108 plants.

Data analysis was carried out to determine the effect of multiple doses of NPK fertilizer and various planting media on the growth and yield of celery plants, so the data obtained was analyzed by analysis of variance. If the variance has no significant effect ($F_{\text{treatment count}} < F_{\text{table } 0.05}$) no follow-up test is carried out, if the variance has a significant effect ($F_{\text{treatment count}} > F_{\text{table } 0.05}$) then a follow-up test is significantly different (LSD) at the level 5%.

III. Research Result

The results of analysis of variance showed that the treatment of multiple doses of NPK fertilizer (M) and various kinds of planting media (Y) had a very significant effect, while the interaction (M x Y) between the two treatments had no significant effect on the average celery plant height. The results of the BNT 0.05 test can be seen in table 1.

Table 1. Average plant height (cm) in the treatment of several doses of NPK fertilizer and various growing media on growth and yield of celery plants aged 6 WAP.

Fertilizer (M)	Growing Media (Y)			Average
	y1	y2	y3	
m1	27,85	36,81	27,81	30,82 ^a
m2	27,84	28,73	25,86	27,48 ^{ab}
m3	25,85	26,63	22,70	25,06 ^b
Rata - rata	27,18 ^{ab}	30,73 ^a	25,46 ^b	

* The average number followed by a letter that is not the same shows a significant difference based on the BNT test 0,05 (BNT = 5,21).

Based on the BNT test of 0.05, it showed that the treatment of multiple doses of fertilizer at a dose of 5 grams/plant (m1) had a higher average plant height (30.82 cm) significantly different from the m3 treatment but not significantly different from the m2 treatment. And the treatment of various planting media showed that the top soil planting medium and palm tree compost (y2) had a higher average plant height (30.73%) which was significantly different from treatment y3 but not significantly different from treatment y1.

The results of the observations showed that the growth of plant height increased in the treatment of multiple doses of NPK fertilizer at a dose of 5 grams/plant (m1) and in the treatment of various growing media with top soil growing media and palm tree compost (y2). It is suspected that this dose is the optimal dose to give

the best effect on plant metabolic processes so that it can increase vegetative growth. According to Harjadi (1996) in Mirza (2015) plants that respond to the fertilizer given will be seen in an increase in yield or appearance, the fulfillment of the nutrients needed for plants can stimulate growth and development in the vegetative parts of the plant. Lingga (2002) stated that to obtain optimal plant growth, a balance of nutrients is needed. Nainggolan (2011) states that normal growth for plants requires certain nutrients and is in certain amounts and is in a certain balance.

The results of the analysis of variance showed that the treatment of multiple doses of NPK fertilizer (M) and various kinds of planting media (Y) had a very significant effect, while the interaction (M x Y) between the two treatments had no significant effect on the average number of celery stalks. The results of the BNT 0.05 test can be seen in table 2.

This agrees with Yuwono (2005) that OPEFB compost can increase the availability of nutrients in the soil and reduce density and increase the ability of the soil to store water so that the soil becomes more fertile and nutrients can be absorbed properly by plants.

Fertilizer (P)	Growing Media (Y)			Average
	y1	y2	y3	
m1	8,00	9,67	7,83	8,50 ^a
m2	7,58	8,00	7,00	7,53 ^{ab}
m3	7,00	7,25	6,58	6,94 ^b
Rata - rata	7,53 ^{ab}	8,31 ^a	7,14 ^b	

* The average number followed by letters that are not the same shows a significant difference based on the BNT test of 0.05 (BNT = 1.04).

Based on the LSD test of 0.05, it was shown that the treatment with several doses of fertilizer at a dose of 5 grams/plant (m1) had an average number of petioles higher (8.50 pods) significantly different from the m3 treatment but not significantly different from the m2 treatment. And the treatment of various planting media showed that the top soil planting medium and palm tree compost (y2) had a higher average number of petioles (8.31 pieces), significantly different from treatment y3 but not significantly different from treatment y1.

The results of the observations showed that the growth of the number of petioles increased in the treatment of multiple doses of NPK fertilizer at a dose of 5 grams/plant (m1) and in the treatment of various growing media with top soil growing media and palm tree compost fertilizer (y2). This is because NPK fertilizer contains N elements which play a role in plant development, especially in the growth of shoots and the development of stems and leaves. This is in line with the opinion of Hasibuan (2006) which states that the development of roots and leaves and the formation of shoots in plants requires a large supply of nitrogen nutrients. Furthermore Dwijoseputro (2003) stated that the ability of plants to produce leaves is a sign of plant productivity because leaves are the place where photosynthesis occurs for plants.

Linga et. all, (2002) states that organic fertilizer is a compound containing one or more nutrients given to plants as a substitute for nutrients that have been absorbed by plants. This is in accordance with the opinion of Hastuti (2009) which states that OPEFB fertilizer has considerable potential as a soil enhancer and can be a source of nutrients for plants.

The results of the analysis of variance showed that the treatment of multiple doses of NPK fertilizer (M) and various types of planting media (Y) had a very significant effect, while the interaction (M x Y) between the two treatments had no significant effect on the average number of tillers of celery. The results of the BNT test of 0.05 can be seen in table 3.

Fertilizer (M)	Growing Media (N)			Average
	y1	y2	y3	
m1	2,00	2,83	1,92	2,25 ^a
m2	1,67	2,00	1,75	1,81 ^{ab}
m3	1,42	1,83	1,25	1,50 ^b
Rata - rata	1,69 ^b	2,22 ^a	1,64 ^b	

* The average number followed by letters that are not the same shows a significant difference based on the BNT test of 0.05 (BNT = 0.49).

Based on the BNT test of 0.05, it showed that the treatment of multiple doses of fertilizer at a dose of 5 grams/plant (m1) had a higher average number of seedlings (2.25 clumps) significantly different from the m3 treatment but not significantly different from the m2 treatment. And the treatment of various planting media showed that the top soil planting medium and palm tree compost (y2) had a higher average number of tillers (2.22 clumps), significantly different from the treatments y1 and y3.

The results of observations showed that the growth of the number of tillers increased in the treatment of multiple doses of NPK fertilizer at a dose of 5 grams/plant (m1) and the treatment of various growing media with top soil growing media and palm tree compost fertilizer (y2). This is due to the sufficient content of nutrients needed by plants so that the growth process in plants is more optimal. This is in accordance with the opinion of Qibtiyah (2018) which states that the number of plant roots is influenced by the element phosphorus so that the impact of multiplied roots is to make the number of tillers and plant height better. This is in line with the opinion of Kurniadie (2002) that the number of tillers is influenced by the elements of nitrogen and phosphorus in the soil, if the element content is sufficient for the needs of the plant, it can produce a large number of tillers.

Indriyani (1999) in Ekawati et. all, (2019) states that the results of cell enlargement and differentiation which are expressed by changes or additions to plant parts are the result of photosynthesis in plants. Followed by Elfiati et. all, (2010) stated that OPEFB compost can improve the sibiology and physical properties of the soil.

The results of analysis of variance showed that the treatment of multiple doses of NPK fertilizer (M) and various kinds of planting media (Y) had a very significant effect, while the interaction (M x Y) between the two treatments had no significant effect on fresh weight harvested. The results of the BNT test of 0.05 can be seen in table 4.

Fertilizer (M)	Growing Media (Y)			Average
	y1	y2	y3	
m1	24,67	40,67	20,00	28,44 ^a
m2	19,33	30,00	17,67	22,33 ^{ab}
m3	15,00	18,33	17,33	16,89 ^b
Rata - rata	19,67 ^b	29,67 ^a	18,33 ^b	

* The average number followed by letters that are not the same shows a significant difference based on the BNT test of 0.05 (BNT = 9.13).

Based on the LSD test of 0.05, it was shown that the treatment with several doses of fertilizer at a dose of 5 grams/plant (m1) had a higher average harvest fresh weight (22.33 grams) which was significantly different from the m3 treatment but not significantly different from the m2 treatment. And the treatment of various planting media showed that the top soil planting medium and palm tree compost (y2) had a higher average fresh weight harvest (29.67 grams) which was significantly different from the treatments y1 and y3.

The results of the observations showed that the growth of the number of petioles increased in the treatment of multiple doses of NPK fertilizer at a dose of 5 grams/plant (m1) and in the treatment of various growing media with top soil growing media and palm tree compost fertilizer (y2). This is because the nutrients and water absorbed by plants are sufficient for plant needs. Nutrients and water absorbed by the roots will affect the height and number of leaves on the plant so that the accumulation of plant height and number of leaves will affect the fresh weight of celery plants. The better the growth of plants, the weight of the plants will also increase. According to Darmanti et. all, (2009) plant growth and development refers to the final stage of vegetative development, including cell enlargement, plant cell elongation, assimilative accumulation that arises from the effect of fulfilling nutrients and water in plants.

This agrees with Nurhidayah (2005) that the weight of all plant parts is the result of fulfilling nutrients and water in plants which is supported by the size and number of plant parts. Elfiati et. all, (2010) states that OPEFB compost is able to improve soil properties including physical, biological and chemical properties. Ekawati (2019) states that the increase in height, number of shoots, number of leaves and the diameter of the stems of plants are influenced by nutrients, water and the results of photosynthesis.

The results of the analysis of variance showed that the treatment of multiple doses of NPK fertilizer (M) and various kinds of planting media (Y) had a very significant effect, while the interaction (M x Y) between the two treatments had no significant effect on root length. The results of the BNT test of 0.05 can be seen in table 5.

Fertilizer (M)	Growing Media (Y)			Average
	y1	y2	y3	
m1	12,73	14,30	12,00	13,01 ^a

m2	10,00	12,87	11,00	11,29 ^{ab}
m3	10,17	12,50	9,70	10,79 ^b
Rata - rata	10,97 ^b	13,22 ^a	10,90 ^b	

* The mean score followed by letters that are not the same shows a significant difference based on the BNT test of 0.05 (BNT = 2.21).

Based on the BNT test of 0.05, it showed that the treatment of multiple doses of fertilizer at a dose of 5 grams/plant (m1) had a higher average root length (13.01 cm) which was significantly different from the m3 treatment but not significantly different from the m2 treatment. And the treatment of various planting media showed that the top soil planting medium and palm tree compost (y2) had a higher average root length (13.22 cm) which was significantly different from the treatments y1 and y3.

The results of the observations showed that the growth of the number of petioles increased in the treatment of multiple doses of NPK fertilizer at a dose of 5 grams/plant (m1) and in the treatment of various growing media with top soil growing media and palm tree compost fertilizer (y2). This is due to the fulfillment of nutrients for plants. Marsop et. all, (2005) states that the elements N and P affect vegetative development and growth in plants. Furthermore Lingga (2002) also stated that the phosphorus content contained in NPK fertilizer is useful for stimulating plant roots.

Thabrani (2011) states that organic matter contained in OPEFB can increase soil biological activity, OPEFB compost can improve drainage and increase water holding capacity. Hardjowigeno (2004) states that organic matter will improve soil structure so that the nutrients present in the soil can be absorbed properly by plants.

IV. Conclusion

Based on the results and discussion of this study it can be concluded as follows:

1. The treatment of multiple doses of NPK fertilizer had a very significant effect on all observed plant parameters.
2. The treatment of various planting media had a very significant effect on all parameters observed
3. The interaction treatment of multiple doses of NPK fertilizer (M) and various planting media (Y) had no significant effect on all observed plant parameters.

Bibliography

- [1]. Darmanti, Sri. 2009. Struktur dan Perkembangan Daun *Acalipha indica* L. yang Diperlukan dengan kombinasi IAA dan GA Pada Konsentrasi yang Berbeda. *Bioma*. 11 (1) : 17 – 22.
- [2]. Darmoko dan Ady. 2006. Pemanfaatan Limbah dan Tandan Kosong Kelapa Sawit. Universitas Sumatra Utara.
- [3]. Dinas Ketahanan Pangan – Mataram NTB. 2020. Dipublikasikan di internet; <https://diskapang.ntbprov.go.id/detailpost/seledri-manfaat-dan-teknik-budidaya-organik-dalam-polybag>. (Diakses pada 5 November 2022).
- [4]. Dwijoseputro. 2003. Dasar-dasar Mikrobiologi. Djambatan, Jakarta. Diakses Pada 5 November 2022).
- [5]. Ekawati, Ida dan Henny, D.W, 2019. Pengaruh Media Tanam Terhadap Respon Pertumbuhan dan Produksi Genotipe *Moringa oleifera* L. *Cemara* 17 (1)
- [6]. Elfiati, D dan Siregar, M. 2010. Pemanfaatan Kompos Tandan Kosong Kelapa Sawit Sebagai Campuran Media Tumbuh dan Pemberian Mikoriza pada Bibit Minda (*Melia azedarach* L.). *J. Hidrolitan*. 1 (3) : 11 – 19.
- [7]. Hasibuan, B, E. 2006. Pupuk dan Pemupukan. USU Press. Medan.
- [8]. Hastuti, P, B. 2009. Pemanfaatan Limbah Tandan Kosong Kelapa Sawit Sebagai The Kompos Pada Tanaman Selada. *Buletin Instiper*. Yogyakarta.
- [9]. Kaya, 2013. Pengaruh Kompos Jerami dan Pupuk NPK Terhadap N- Tersedia Tanah, Serapan-N, Pertumbuhan dan Hasil Padi Sawah (*Oryza sativa* L.). *Jurnal Agroligia*, 2 (1) : 43 -50.
- [10]. Kurniadie, D, 2002. Pengaruh Kombinasi Dosis Pupuk Majemuk NPK Phonska dan Pupuk N Terhadap Pertumbuhan dan Hasil Tanaman Padi Sawah (*Oryza sativa* L.) Varietas IR 64. *Jurnal Bionatura*. 4 (3) : 137 – 147.
- [11]. Lingga, P. 2002. Petunjuk Penggunaan Pupuk. Edisi Revisi. Penebar Swadaya. Jakarta 117 Halaman.
- [12]. Marsoop dan Sigit, P, 2005. Pupuk akar dan Aplikasi. Penebar Swadaya, Jakarta, 96 Halaman.
- [13]. Mirza, A, 2015. Pengaruh Dosis Pupuk NPK Terhadap Pertumbuhan Dan Hasil Produksi Tanaman Bayam (*Amaranthus* sp). Skripsi, Fakultas Pertanian, Universitas Teuku Umar Meulaboh, Aceh.
- [14]. Musnamar, E. I, 2003. Pupuk Organik Padat: Pembuatan dan Aplikasinya. Jakarta: Penebar Swadaya.
- [15]. Nainggolan, D. 2011. Pengaruh Penyemprotan Zn, Fe dan B pada Daun Tanaman Jagung (*Zea Mays* L.) yang Ditanam di Areal Pengendapan Tailing. Skripsi. Fakultas Pertanian, Universitas Papua.
- [16]. Nurhidayah,A., 2005 . Pengaruh Sanitasi dan Masa Panen Terhadap Kandungan Diomin Pada Tanaman Seledri.Fakultas Matematika dan Ilmu Pengetahuan Alam Institut Pertanian Bobor. Bogor.
- [17]. Qibiyah, M. 2012. Kajian Waktu Pemberian Biorine dan Dosis Pupuk Phonska Terhadap Peningkatan Produksi Padi (*Oryza sativa* L.). *Jurnal Ilmu Pertanian*. 1 (2) : 18 – 27.
- [18]. Sutedjo, M. 2008. Pupuk dan Cara Pemupukan. Rineka Cipta. Jakarta.
- [19]. Suwanto, Yuke. O dan Silvia, H. 2014. Top 15 Tanaman Perkebunan. Penebar Swadaya: Jakarta.
- [20]. Thabrani, A. 2011. Pemanfaatan Kompos Ampas Tahu untuk Pertumbuhan Bibit Kelapa Sawit (*Elaeis guineensis* jacq). Skripsi. Fakultas Pertanian Universitas Riau. Pekanbaru. Skripsi.
- [21]. Umar. U, Raihani. W dan Gusti. R, 2018. Respon Pertumbuhan Dan Produktivitas Kelapa Sawit (*Elaeis Guineensis* Jacquin) Terhadap Kedalaman Dan Bobot Bahan Organik Penutup Biopori Pada Tanah Podsolik Merah Kuning. *EnviroScienteeae*. 14 (2) : 147-160.
- [22]. Yuwono, D. 2005. Kompos. Penebar swadaya, Jakarta. 60 Halaman.