International Journal of Agricultural Technology 2022Vol. 18(1):93-104
Available online http://www.ijat-aatsea.com
ISSN 2630-0192 (Online)

# Growth and yield of Chili cuttings under different compositions of inorganic fertilizer applications

**Ganefianti, D. W. [1], Arianto.[1], Romeida, A.,[1] Herawati, R. and Armadi, Y.[2*]**

[1]Department of Crop Production, Faculty of Agriculture, University of Bengkulu.Jl. W. R. Supratman Bengkulu 38121 Indonesia; [2]Faculty of Agriculture, University of Muhammadiyah Bengkulu, Jalan Bali, Bengkulu, 38119, Indonesia.

Ganefianti, D. W., Arianto., Romeida, A., Herawati, R. and Armadi, Y. (2022). Growth and yield of Chili cuttings under different compositions of inorganic fertilizer applications. International Journal of Agricultural Technology 18(1):93-104.

**Abstract** Vegetative propagation of chili by cutting offers an alternative method that produce planting materials genetically identical to the mother. The growth and yield of three hybrids chili cuttings grown with different compositions of inorganic fertilizer applications were compared. The hybrids produced as cuttings of UNIB CH13, UNIB CH73, and UNIB CH65 were studied incorporating to fertilizer compositions which consisted of control (no fertilizer applied), 250 kg Urea /ha + 500 kg TSP /ha + 400 kg KCl /ha, 1214.6 kg NPK (16:16:16)/ha, and 607.3 kg NPK (16:16:16)/ha + 125 kg Urea/ha + 250 kg TSP /ha + 200 kg KCl /ha). The results showed that the fertilizer composition and its interaction with hybrids producing cutting were not significant for all growth and yield. Also, the cuttings of UNIB CH73 produced most fruit (59.50 g/plant) with harvest date at 70.7 days after planting (dap), followed by UNIB CH13 (47.10 g/plant) with harvest date at 75.4 dap; and UNIB CH65 (21.21 g) with harvest at 64.4 dap.

**Keywords:** Hybrid chili, Cuttings, Inorganic fertilizers

## Introduction

Chili pepper (*Capsicum annuum* L.) is an important and economically viable horticultural commodity with high market demand. Besides being a cooking spice, it is used as an industrial raw material. It contains energy, protein, carbohydrates, calcium, fat, phosphorus, iron, vitamin A, vitamin C1, and vitamin B1 (SIMCABAI, 2020). In 2019, chili productivity was 9.10 tons/hectare based on the Central Statistics Agency and the Directorate General of Horticulture with a harvested area of 133,436 hectares. This has increased from the previous year which only reached 8.77 tons/hectare with a harvested area of 137,596 hectares (Ministry of Agriculture of the Republic of Indonesia, 2020). On a global scale, Indonesia is one of the chili-producing countries, but

[*] **Corresponding Author:** Ganefianti, D. W; **Email:** dw_ganefianti@unib.ac.id

when compared to China, it is still low. China's productivity reaches 22.30 tons/hectare with a harvested area of 130,856 hectares. (Pusat Data dan Sistem Informasi Pertanian (2016).

Quality seeds obtained through the use of hybrid varieties essentially increase chili productivity. However, replanted hybrid varieties produce plants that are not uniform due to segregation. Therefore, these seeds should be bought by farmers every planting season. Furthermore, hybrid varieties also have a higher selling price compared to free pollinated types, almost eight times more expensive (Balitsa, 2020). In a series of previous studies, Bengkulu University has produced hybrid varieties; UNIB CH13, UNIB C H65, and UNIB C H73 (Ganefianti *et al.*, 2013). They have the advantage of producing more than 10 tons per hectare (Ganefianti *et al*., 2017). In early testing, it was successfully propagated by cuttings (Romeida *et al*., 2020). However, a series of further studies should be conducted to obtain data on the productivity of hybrid chilies from cuttings.

Propagation by cuttings is the most common practice for annual plants to produce the same plant as the mother. The use of cuttings planting material produces plants with many branches (Wasonowati *et al*., 2018). Furthermore, sweet potatoes can be propagated by cuttings (Mardi *et al*., 2016). Pepper can be propagated by cuttings with a size of 15-30 cm (Saputra *et al*., 2019). However, cuttings propagation on chili has not been widely studied. Plants propagated from cuttings exhibit productivity deficiencies and other limitations. Therefore, fertilization application can be conducted to overcome this. The right combination of fertilization is expected to provide maximum results through organic and inorganic fertilizers (Emir *et al*., 2017). The type of fertilizer used is in the form of a single, compound or a combination of both. Furthermore, the K fertilizer application of 386.19 kg/hectare can increase the average harvest weight by 6895.47 g/plot (9.19 tons/hectare) (Widyanti and Susila, 2015). Mutmainnah and Masluki's study (2017) explains that giving Urea 2.5 g/plant + SP-36 5 g/plant + KCl 2.5 g/plant can yield fresh fruit weight per plant of 176.66 g. Meanwhile, Prasetyo and Kusberyunadi (2015) conducted a study of organic and inorganic combination fertilizers to produce chili weights of 688.77 grams per plant. Raziliano *et al.* (2015) explained that the Urea fertilizer dose of 250 kg/ha (100g/plot), TSP 500 kg/ha (200 g/plot), KCl 400 kg/ha (160 g/plot) can increase the weight of fresh fruit by an average 226.54 g/plant. Furthermore, Prasetya (2014) stated that the use of pearl NPK fertilizer at levels of 150 kg/ha, 300 kg/ha, and 450 kg/ha plus cow manure can increase the growth of chili plant height at the age of 40 dap with an average of 43 cm and 68 cm at the age of 60 dap. According to Sulistyowati (2018), the formulation of liquid NPK fertilizer (16:16:16) of 1000 kg/ha plus straw

compost can provide production of 286.2 g/plant. Susanto *et al*. (2019) explained that giving chili pruning treatment at the age of 5 and 12 dap before applying NPK fertilizer (15:15:15) at 1000 kg/ha can produce fruit weight of 148.20 g/plant. Therefore, each combination of fertilization was produced in different products, and a study of chili cuttings should be conducted with a fertilization combination of single and compound. Furthermore, this study aimed to obtain the growth and yield of three hybrid chili cuttings from various fertilization.

## Materials and methods

**T**he study was conducted from July 2019 to November 2019 at the Screen house, located in Surabaya Village, Sungai Serut Sub-district, Bengkulu City, 10 meters above sea level. Furthermore, a Factorial Completely Randomized Design (CRD) was conducted. The first factor is three varieties of hybrid chili: V1 = cuttings UNIB C H13; V2= UNIB C H73 cuttings; V3= UNIB C H65 cuttings. The second factor is the inorganic fertilizer application P0 = manure (control); P1 = Urea (250 Kg/ha) + TSP (500 Kg/ha) + KCl (400 Kg/ha) (Raziliano *et al.*, 2015); P2 = NPK (16:16:16) 1,214,6 Kg/ha; P3 = NPK (16:16:16) 607.3 Kg/ha + Urea 125 Kg/ha + TSP 250 Kg/ha + KCl 200 Kg/ha. From the factors, 12 treatments were obtained, and each was repeated 5 times to obtain 60 experimental units. Each experimental unit consisted of 2 plants to obtain 120 plants.

Preparation begins with the mother tree care that will be used for cuttings propagation. The tree was obtained from three varieties of hybrid chili plants that were ± six months old and had been harvested six times. The treatments include controlling pests and diseases, watering, removing dead twigs, and applying organic fertilizer. Furthermore, the cuttings were taken from three varieties of parent trees, with the criteria of having 3 or more buds. Then, they were treated with Growth Regulators (GR) (Romeida *et al*., 2020), and the media used consisted of a mixture of soil, husk charcoal, and manure (1:1:1). It is placed in polybags measuring 15 cm x 20 cm. Furthermore, cuttings are placed in the middle of the media, and given a single lid, to reduce evaporation. They are placed in the screen house, and cuttings that were ± 21 days old were transferred to treatment media (polybag 40x 50 cm).

Harvesting was conducted when the hybrid chilies turned red, and the variables observed were the number of live cuttings (%), plant height (cm), plant canopy area, stem diameter (mm), harvest age, fruit weight per plant, number of fruits per plant, fruit diameter, fruit length, root length. The results

of observations were conducted through variance analysis of F test at a level of 5%, then analyzed with DMRT.

## Results

This study used planting material from three varieties of UNIB chili cuttings obtained from branches or young shoots (Figure 1). At the age of one week, they show growing signs in the form of young leaves and immediately begin to flower. The advantage of cuttings propagation was a growth percentage of 91%.

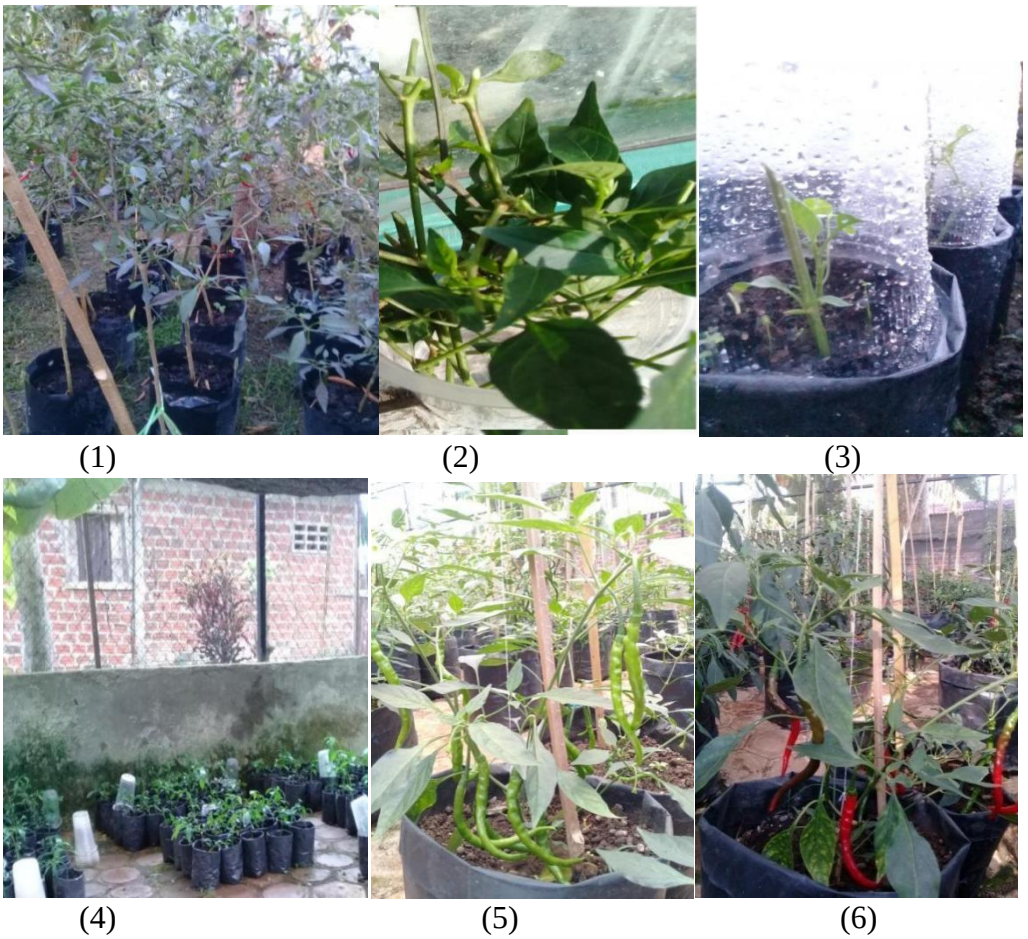


**Figure 1.** Preparation of chili cuttings: (1) mother tree, (2) cutting material, (3) cutting material that has been planted and covered, (4) cuttings ready to be moved, (5) cuttings starting to bear fruit, and (6) chili cuttings start to ripen

Chili plants propagated by cuttings have fibrous roots but do not have a taproot (Figure 2).

(a) (b)

**Figure 2.** Root view: (a) chili plant root propagated from seeds and (b) chili plant root propagated by cuttings

The analysis results showed that there was no interaction between the hybrid chilies from cuttings and a fertilizers combination. Meanwhile, the fertilizers combination showed no significant difference in all variables. Hybrid varieties from cuttings showed significant differences in all variables, except the number of fruits per plant (Table 1).

**Table 1.** The yield of growth and three chili varieties from cuttings with fertilization application

| Variable | F-count | | | KK% |
|---|---|---|---|---|
| | F | V | FxV | |
| Harvest Plant Height | 0,60 ns | 14,69 * | 1,91 ns | 26,54 |
| Stem Diameter | 1,36 ns | 8,76 * | 1,72 ns | 26,14 |
| Canopy Area | 0,59 ns | 395,07 * | 0,65 ns | 13,8 |
| Harvest Time | 0,79 ns | 3,56 * | 0,91 ns | 18,63 |
| Fruit Weight/Plant | 0,12 ns | 423,36 * | 1,01 ns | 9,96 |
| Number of Fruits/Plant | 0,32 ns | 0,14 ns | 0,27 ns | 23,61 |
| One Fruit Weight | 2,00 ns | 96,56 * | 1,07 ns | 20,97 |
| Fruit Length | 1,21 ns | 235,23 * | 1,19 ns | 14,23 |
| Fruit Diameter | 1,15 ns | 10,68 * | 1,08 ns | 8,25 |

Information: ns = insignificant influence, * = significant influence, data are analyzed using 5% Anava. P= Fertilizer, V= Variety, dap= days after planting.

Three UNIB chili varieties propagated by cuttings gave significant differences in the variables of harvested plant height, final plant height, stem diameter, canopy area, harvest time, fruit weight/plant, one fruit weight, fruit length, fruit diameter. Average data on growth observations of three hybrid chili varieties are shown in Table 2.

**Table 2.** Average data on growth observations of three hybrid chili varieties

| Variable | UNIB CH13 | UNIB CH73 | UNIB CH65 |
|---|---|---|---|
| Harvest Plant Height (cm) | 63,56 a | 49,43 b | 40,47 c |
| Stem Diameter (cm) | 0,56 a | 0,47 b | 0,40 b |
| Canopy Area ($cm^2$) | 3093,37 a | 1513,82 b | 908,49 c |

Information: Numbers followed by the same letter in the same row have an insignificant effect at 5% DMRT test

dUNIB hybrid chili propagated by cuttings had an average height from 40.47 cm – 63.56 cm. The CH13 variety was the highest, and it was significantly different from the other two varieties. The stem diameter of UNIB CH13 (0.56 cm) was the largest, and significantly different from UNIB CH73 (0.47 cm) and UNIB CH65 (0.40 cm). UNIB CH13 had the widest canopy area, followed by UNIB CH73 and UNIB CH65 (Table 2).

UNIB hybrid chili propagated by cuttings had a harvest time average of 64.4 to 75.4 dap. UNIB CH65 (64.4 dap) gave the fastest harvest time, followed by UNIB CH73 (70.7 dap) and UNIB CH13 (75.4 dap).

The average fruit weight of UNIB hybrid chili cuttings was 21.21 to 59.50 grams, and the three varieties were significantly different weights. Furthermore, the UNIB CH73 was the highest fruit weight with an average of 59.50 grams, followed by the UNIB CH13 (47.10 grams) and the UNIB CH65 (21.21 grams).

The weight of the fruit was 1.49 - 4.23 grams, where UNIB CH73 was the heaviest (Table 3), followed by the UNIB CH73, and the UNIB CH65. Furthermore, UNIB hybrid chili propagated by cuttings had a different weight.

The fruit length of UNIB hybrid chili propagated by cuttings was 4.25 – 12.54 cm. Meanwhile, UNIB CH65 (4.25 cm) was shorter than UNIB CH73 (12.42 cm) and CH13 (12.54) (Table 3).

**Table 3.** The average data observation of yield components and three hybrid chili varieties

| Variable | UNIB CH13 | UNIB CH73 | UNIB CH65 |
|---|---|---|---|
| Harvest Time (dap) | 75,4 a | 70,7 ab | 64,4 b |
| Harvest Time (g) | 47,10 b | 59,50 a | 21,21 c |
| One Fruit Weight (g) | 3,37 b | 4,23 a | 1,49 c |
| Fruit Length (cm) | 12,54 a | 12,42 a | 4,25 b |
| Number of fruit/plant | 14,45 a | 14,82 a | 15,02 a |
| Fruit Diameter (mm) | 7,36 b | 8,29 a | 8,00 a |

Information: Numbers followed by the same letter in the same row have an insignificant effect on the 5% DMRT test

The number of fruit/plant was 14.45 – 15.02, and the highest was UNIB CH65 (15.02), followed by UNIB CH73 (14.82), and UNIB CH13 (14.45). The diameter of chili fruit was 7.36 - 8.29 mm, where the UNIB CH73 (8.29 mm) was the largest, followed by UNIB CH65 (8.00 mm) and UNIB CH13 (7.36 mm). The results showed no effect of the inorganic fertilizers on all observation variables (Table 4).

**Table 4.** Average growth and yield observations of chili cuttings with combination fertilization

| Variable | P1 | P2 | P3 |
|---|---|---|---|
| Harvest Plant Height (cm) | 55,03 | 49,85 | 48,8 |
| Stem Diameter (cm) | 0,528 | 0,482 | 0,435 |
| Canopy Area ($cm^2$) | 1863,51 | 1796,76 | 1897,66 |
| Harvest Time (dap) | 71,06 | 71,53 | 72,33 |
| Fruit Weight/Plant (g) | 43,06 | 42,74 | 42,46 |
| Number of Fruits/Plant | 14,93 | 15,03 | 14 |
| One Fruit Weight (g) | 2,98 | 2,96 | 3,36 |
| Fruit Length (cm) | 9,58 | 9,54 | 10,33 |
| Fruit Diameter (mm) | 7,93 | 8,07 | 7,88 |

Information: The numbers in the same row have an insignificant effect on the 5% DMRT test.

## Discussion

As result, Chili plants propagated by cuttings had fibrous roots but do not had a taproot. The roots appeared in about 1-4 places, and according to Faizin (2016), the type of cutting material and carbohydrate content affected the root formation process and growth. Hasanah and Setiari (2007) stated that the large

number of roots that affected the area of water absorption and nutrients.

UNIB hybrid chili propagated by cuttings had an average height from 40.47 cm – 63.56 cm. The CH13 variety was the highest, and isignificantly different from the other two varieties. Based on the description, the height was 62.65 cm-103.75 cm (PVTPP Agriculture General Secretary, 2019). However, the height of the CH13 propagated by cuttings was lower than by seeds. According to Wasonowati *et al*. (2018), Ppants propagated by cuttings and seeds grew sideways and upward respectively.

The stem diameter of UNIB CH13 (0.56 cm) showed the largest, and it was significantly different from UNIB CH73 (0.47 cm) and UNIB CH65 (0.40 cm). According to Suntoyo *et al*. (2015), large stem diameter can support plant growth and yield. Furthermore, the plants support the fruit and the average stem diameter propagated by cuttings was smaller than by seeds. According to Maryono *et al*. (2019), the stem diameter of the UNIB CH73 is 0.626 cm, and it was smaller due to the fast generative phase since the stem diameter growth was divided by the flowers and fruit development.

UNIB CH13 gave the widest canopy area, followed by UNIB CH73 and UNIB CH65. A wide canopy area had a positive correlation with yield, and such plants are expected to produce a large number of fruit-growing places (Desita *et al*., 2015). The canopy area of plants propagated by cuttings was wider than by seeds. Furthermore, chili plants' growth propagated by cuttings was more directed to the side.

Hybrid chili propagated by cuttings gave a harvest time average of 64.4 to 75.4 dap. The harvest time of UNIB CH65 propagated by cuttings was faster than by seeds, and the study results similar to Maryono *et al*. (2019) who showed that the harvest time of the UNIB CH65 variety propagated by seeds was 83.6 dap. For the UNIB CH73 variety, the flowering age was 70.7 dap, and in a study conducted by Ganefianti *et al*. (2017), it was 71.2 dap. Furthermore, the cuttings of UNIB CH13 had a flowering age of 75.4 dap and 61-81 dap. Generally, chili plants propagated by cuttings had a faster harvest time than seeds. Prastowo *et al.* (2006) explained that plants propagated by vegetative (cuttings) had early fruit maturity.

The average fruit weight of UNIB hybrid chili cuttings was 21.21 to 59.50 grams, and the three varieties had significantly different weights. According to Haice *et al.* (2013), the fruit weight is influenced by plant genotype factors. The study of Maryono *et al.* (2019) showed that the same variety propagated by seeds resulted in a fruit weight average of 84.39-201.91 grams, where the highest and lowest were UNIB CH73 and UNIB CH65. When compared with plants propagated by seeds, the fruit weight propagated by cuttings was still low even with a faster harvest. UNIB hybrid chili propagated

by cuttings had a different weight. According to Fitriani *et al.* (2013), the difference in the fruit weight is influenced by genetic factors of each variety. The UNIB CH73 was the heaviest with 4.23 grams, and the variety description of the fruit weight average was 2.79 - 8.57 grams. The UNIB CH65 propagated by cuttings had a fruit length of 4.25 cm, and in a study conducted by Maryono *et al.* (2019), a fruit length of 6.68 cm was obtained. Rahmayanti (2019) explained that the UNIB CH65 had a fruit length of 4.92 cm.

The number of fruit/plant was 14.45 – 15.02, and the highest was UNIB CH65 (15.02), followed by UNIB CH73 (14.82), and UNIB CH13 (14.45). The number of fruits per plant in UNIB CH65 was lower than the varieties description of 153.67-163.75. According to Ganefianti *et al.* (2006), the number can affect the fruit weight since the number of fruits produced that depended on the height. Furthermore, the number is influenced by the nutrients absorbed by the plant. According to Sumarni and Muharam (2005), the availability of sufficient and balanced nutrients can produce high chili production and good quality. In this study, each hybrid chili variety propagated by cuttings produced the same number of fruits.

The diameter of chili fruit was 7.36 - 8.29 mm, where the UNIB CH73 (8.29 mm) was the largest, followed by UNIB CH65 (8.00 mm), and UNIB CH13 (7.36 mm). In addition, the UNIB CH13 had a larger fruit diameter than the variety description ranging from 4.95 - 6.44 mm (PVTPP Agriculture General Secretary, 2019). Similarly, the variety in the study of Maryono *et al.* (2019) showed a diameter of 5.14 mm. The larger diameter was fewer fruits which are produced to maximize its diameter. According to Bagunda *et al.* (2020), the number of fruits affect the diameter, and it was evident in watermelons of one fruit per plant having a diameter of 28 cm. The diameter was larger than three fruits per plant, which was only 23 cm.

These three fertilizer treatments resulted in the same growth and yield. Therefore, easier and cheaper fertilizers can be chosen by farmers. It is viewed from the fertilizer price, Urea and TSP ± Rp. 5,000.00/kg while for KCl ± Rp. 6,000.00/kg and NPK (16:16:16) ± Rp. 9.000,00/kg (Panca, 2019) . The price should be paid per hectare which required for a single fertilizer as Urea 250 kg = Rp. 1,250,000.00; TSP 500 kg = IDR 2,500,000.00; KCl 400 kg = IDR 2,400,000.00, total IDR 6,1500,000.00. Meanwhile, the price of compound fertilizer is NPK (16:16:16) 1,214,6 kg = IDR 10,931,400.00. Therefore, the single fertilizer is cheaper which based on the price calculation.

It concluded that three hybrid chili varieties propagated by cuttings showed fast flowering and harvesting with many fibrous roots and larger diameters than those propagated by seeds.The varieties propagated by cuttings produced fruit weights per plant ranging from 21.21- 59.50 grams, where the

heaviest was UNIB CH75 of 59.50 g. Furthermore, the yield was still lower than chilies propagated by seeds.

## References


Bagunda, M. E., Najoan, I. J. and Ogie, T. B. (2020). Pengaruh pemangkasan cabang dan bakal buah terhadap produksi tanaman semangka (*Citrullus vulgaris* schard). In COCOS. 3.

Balitsa (2020). Data Ketersediaan Benih Sumber Sayur Agustus 2020. Retrieved from http://balitsa.litbang.pertanian.go.id/ind/index.php/layanan-kami/layanan produk/upbs-unit-pengelola-benih-sumber/data-ketersediaan-benih. Accessed on October 13th, 2020.

Desita, A. Y., Sukma, D. and Syukur, M. (2015). Evaluasi karakter hortikultura galur cabai hias IPB di kebun percobaan Leuwikopo. Jurnal Hortikultura Indonesia, 6:116-123.

Emir, M. N., Aini, N. and dan Koesriharti (2017). Pengaruh Aplikasi Pupuk Organik Dan Anorganik Terhadap Pertumbuhan dan Hasil Tanaman Cabai Merah (*Capsicum annuum* L.). Jurnal Produksi Tanaman, 5.

Faizin, R. (2016). Pengaruh Jenis Stek dan Konsentrasi Zat Pengatur Tumbuh Growtone Terhadap Pertumbuhan Tanaman Nilam (*Pogestemon cablin* Benth). Jurnal Agrotek Lestari, 2.

Fitriani, L., Toekidjo and Purwanti, S. (2013). The Performance of Five Cultivated Varieties of Pepper (*Capsicum annuum* L.) at the Middleland. Jurnal Vegetalika, 2:50-63.

Ganefianti, D. W., Fahrurrozi and Sutrawati, M. (2013). Uji Keunggulan Cabai Tahan Begomovovirus Penyebab Penyakit Daun Keriting Kuning. *Laporan Penelitian Hibah Kompetensi.* Fakultas Pertanian Universitas Bengkulu. Bengkulu.

Ganefianti, D. W., Fahrurrozi, F. and Armadi, Y. (2017). Hybrid performance testing of chili pepper (*Capsicum annuum* L.) for resistance to yellow leaf curl Begomovirus grown in lowland environments. SABRAO Journal of Breeding and Genetics, 49:171-191.

Ganefianti, D. W., Pamekas, T., Alnopri and Hasanudin. (2006). Uji daya hasil pendahuluan galur-galur cabai hasil persilangan Talang Semut/Tit Super. Hasil Penelitian Hibah Bersaing. Fakultas Pertanian Universitas Bengkulu, Bengkulu.

Haice, R. N., Tarbran, G. and Deviona (2013). Keragaman hibrida hasil persilangan cabai besar x cabai keriting di lahan gambut. Makalah seminar hasil. Fakultas Pertanian Universitas Riau, Pekanbaru.

Hasanah, F. N. and Setiari, N. (2007). Pembentukan Akar pada Stek Batang Nilam (*Pogostemon cablin* Benth.) setelah direndam Iba (*Indol Butyric Acid*) pada Konsentrasi Berbeda. Buletin Anatomi dan Fisiologi. XV( 2).

Mardi, C. T., Setiado, H. and Lubis, K. (2016). Pengaruh Asal Stek dan Zat Pengatur Tumbuh Atonik Terhadap Pertumbuhan dan Produksi Dua Varietas Ubi Jalar (*Ipomoea batatas* L.) Lamb. Jurnal Agroekoteknologi Universitas Sumatera Utara, 4.

Maryono, A. T., Ganefianti, D. W., Murcitro, B. G., Rustikawati., Gusmara, H., Mukhtasar and Salamah, U. (2019). Aplikasi Tiga Jenis Pupuk Anorganik Terhadap Pertumbuhan Dan Hasil Tiga Varietas Cabai Hibrida Unib (*Capsicuum annuum* L.). Agritrop: Jurnal Ilmu-Ilmu Pertanian (Journal of Agricultural Science), 17:182-197.

Ministry of Agruculture of the Republic of Indonesia (2020). Data Lima Tahun terakhir. Retrieved from https://www.pertanian.go.id/home/?show=page&act=view&id=61. September 15th, 2020.

Mutmainnah and Masluki (2017). Pengaruh Pemberian Jenis Pupuk Organik Dan Anorganik Terhadap Pertumbuhan dan Produksi Cabe Besar Katokkon Varietas Lokal Toraja. Jurnal Pertanian Berkelanjutan, 5:21-30.

Prasetya, M. E. (2014). Pengaruh pupuk NPK mutiara dan pupuk kandang sapi terhadap pertumbuhan dan hasil tanaman cabai merah keriting varietas Arimbi (*Capsicum annuum* L.). Agrifor, 13:191-198.

Prasetyo, N. and Kusberyunadi, M. (2015). Response several varieties of red peppers (capsicum annuum l.) on different types of manure . Universitas PGRI Yogyakarta, 1-9.

Prastowo, N. H. (2006). Tehnik pembibitan dan perbanyakan vegetatif tanaman buah. World Agroforestry Centre.

Pusat Data dan Sistem Informasi Pertanian (2016). Oulook Komoditas Pertanian Sub Sektor Hortikultura Cabai Merah 2016. Oulook Cabai. Dinas Pertanian.

Pvtpp Setjen Pertanian (2019). Tanda daftar varietas hasil pemuliaan. Retrieved from http://pvtpp.setjen.pertanian.go.id/cms2017/id/?s=cabai+UNIB+C+H13. Accessed on March 10th, 2020.

Rahmayanti. (2019). Pertumbuhan dan hasil tiga varietas cabai hibrida perakitan UNIB dengan berbagai dosis Fosfor di Ultisol. *Skripsi.* Faculty of Agriculture Un iversity of Bengkulu.

Raziliano, R., Yett, H. and Yoseva, S. (2015). Pemberian abu serbuk gergaji dan pupuk Urea, TSP, KCl terhadap pertumbuhan dan produksi tanaman cabai (*Capsicum Annuum* L.) Di lahan gambut. Jom Faperta, 2:201-203.

Romeida, A., Ganefianti, D. W., Barchia, M. F. and Herawati, R. (2020). Plant growth regulator formulation for propagating red chili UNIB CH23 hybrid through stem cutting. International Journal of Agricultural Technology, 16959-974.

Saputra, H. E., Harlianto, B., Ganefianti, D. W., Inoriah, E. and Prasetyo. (2019). Pembibitan Tanaman Lada Perdu Sebagai Pengganti Lada Panjat Di Desa Pulau Panggung Kabupaten Kaur. Dharma Raflesia: Jurnal Ilmiah Pengembangan dan Penerapan IPTEKS, 17.

SIMCABAI (2020). Nilai Gizi Cabai Besar. Retrieved from http://horti.pertanian.go.id/simcabai/page/index/cabebesar-gizi. Accessed on October 13th, 2020.

Sulistyowati, D. (2018). Aplikasi Formulasi Pupuk Serta Penambahan Kompos Jerami Terhadap Produksi Cabai Merah (*Capsicum annuum* L.). Jurnal Agroekoteknologi dan Agribisnis, 2:33-43.

Sumarni, N. and Muharam, A. (2005). Budidaya tanaman cabai merah. Panduan Teknis PTT Cabai Merah, 2.

Susanto, H., Pamungkas, D. H. and Zamroni, Z. (2019). Pengaruh Saat Pemangkasan Tunas Lateral Dan Dosis Pupuk Npk Terhadap Pertumbuhan dan Hasil Tanaman Cabai Keriting (*Capsicum annum* L.). Jurnal Ilmiah Agroust, 3:10-24.

Suntoyo, L. O., Fatria and Kuswandi, D. H. (2015). Evaluasi pertumbuhan dan hasil beberapa papaya hibrida di wilayah pengembangan Bogor. The Horticulture Journal, 25:193-200.

Wasonowati, C., Sulistyaningsih, E., Indradewa, D. and Kurniasih, B. (2018). Pertumbuhan Bibit Kelor (Moringa oleifera Lamk) dari Biji dan Stek dengan Interval Pemberian Air yang Berbeda. Prosiding Seminar Nasional Fakultas Pertanian UNS, 2:A-175.

Widyanti, A. S. and Susil, A. D. (2015). Rekomendasi Pemupukan Kalium pada Budi Daya Cabai Merah Besar (*Capscicum annuum* L.) di Inceptisols Dramaga. Jurnal Hortikultura Indonesia, 6:65-74.

(Received: 22 August 2021, accepted: 30 October 2021)