

## Effect of Agrodyke and Liquid Organic Fertilizer of Coconut Water Waste on The Results of Siam Orange (*Citrus nobilis* var. *Microcarpa*L.)

Bela Agustina Maharani Dewa Ayu <sup>1</sup>, Ni Putu Anom Sulistiawati <sup>1</sup>  
Ni Komang Alit Astiari <sup>1\*</sup>

<sup>1</sup> Agrotechnology Study Program, Faculty of Agriculture, Warmadewa University

\*Corresponding author : alit.astiari@gmail.com

### Abstract

This study aims to determine the effect of the dose of Agrodyke Fertilizer and the concentration of Liquid Organic Fertilizer from Coconut Water Waste on the yield of the Siamese orange (*Citrus nobilis* Var. *Microcarpa* L.) and its interactions, which were carried out in Bayung Gede Village, Kintamani District, Bangli Regency from December 2022 until July 2023. This study used a randomized block design (RBD) with 2 factors arranged factorially. The first factor tested was the dosage of Agrodyke (A) fertilizer which consisted of 4 levels: A0(0 g/tree), A1(50 g/tree), A2 (100 g/tree), and A3 (150 g/tree). While the second factor is the dose of Liquid Coconut Water Organic Fertilizer (K) which consists of 4 levels, namely: K0 (0 cc/l), K1 (5 cc/l), K2 (10 cc/l), and K3 (15 cc/l). Thus there were 16 combination treatments, each of which was repeated 3 times so that 48 citrus trees were needed. The results showed that the interaction between the doses of potassium nitrate and magnesium sulfate (AxK) fertilizer had no significant effect on all observed variables. The Agrodyke fertilizer treatment at a dose of 150 g/tree gave the highest fruit weight per tree, namely 9.76 kg, or an increase of 54.18% when compared to the control (A0), which was only 6.33 kg. The highest fruit weight per tree was obtained in the treatment of Liquid Organic Fertilizer Coconut Water Waste dose of 15 cc/l which is 8.63 kg, there is an increase of 15.83% compared to the control (K0), which is only 7.45 kg.

Keywords: dosage, Siamese orange, agrodyke, organic

### 1. Introduction

Siamese orange (*Citrus nobilis* Var. *Microcarpa* L.) is a fruit commodity that is profitable enough to be produced in the present and in the future which has the potential to be developed as an effort to fulfill consumer demand. Therefore oranges are loved by all levels of society so the need for oranges continues to increase [1]. Approximately 70 to 80% of the types of oranges developed by farmers in Indonesia are Siamese oranges [2]. Siamese oranges are rich in nutrients and minerals, especially as a source of vitamin C, so they are important for health. Every 100 g of Siamese orange contains protein (0.9 g), fat (0.2 g), carbohydrates (11.2 g), phosphorus (23 mg), calcium (33 mg), iron (0.4 mg), vitamin A (190 IU), vitamin B1 (0.08 mg), vitamin C (49 mg) and water (87.2 g) [3].

Siamese orange is one of the horticultural crops developed in the province of Bali. Bangli Regency in particular is one of the potential developments for citrus plants in Bali, this is due to environmental conditions (soil, climate, altitude, temperature) which are very suitable for citrus cultivation [4] and [5] Profil Desa 2020. Siamese orange production in Bangli Regency was in a row, namely in 2017 (102,051 tons); in 2018 (168,476 tons); in 2019 (131,587 tons) and 2020 (104,528 tons) and in Gianyar Regency, namely in 2017 (114,509 tons); in 2018 (174,509 tons); in 2019 (351,295) and 2020 (126,101 tons) [6]. Imports of fresh oranges that continue to increase indicate that there are certain market segments (consumers) that require prime types and quality of citrus fruits that domestic producers cannot fulfill [7] dan [8]. Therefore, to support this increase in

productivity, good and correct cultivation techniques are needed, including carrying out balanced fertilization technology [9].

Fertilization is one of the efforts to provide enough nutrients into the soil so that the genetic potential of plants can be maximized or can be said as an effort to create a condition where nutrients are in a balanced state and available according to plant needs [10]. Fruit plants can produce well if they are fertilized with organic and inorganic fertilizers containing N, P, K, Ca, and Mg nutrients at the right dosage and application time [11].

Agrodyke fertilizer is a type of complete, versatile, and environmentally friendly organic fertilizer in the form of white flour and dissolves easily in water. This fertilizer is the result of the latest fertilizer industry innovation which combines the biochemical functions of various compounds, which are produced using modern technology and contain macro and nutrients micronutrients and can be used in all types of forestry, plantation, and food crops [12]. The composition of the agrodyke fertilizer content includes C organic (18.52%); C/N ratio (24.16%); Nitrogen (0.75%); P<sub>2</sub>O<sub>5</sub> (2.65%); K<sub>2</sub>O (0.85%); MO (3.7 ppm); Fe (2694 ppm); Mn (193 ppm); B (129 ppm); Cu (48 ppm) and Zn (25 ppm) [13].

Coconut water is one of the waste natural materials that can be used as liquid organic fertilizer, it contains hormones such as cytokinins 5.8 mg/l, auxin 0.07 mg/l and a little gibberellin as well as other compounds that can stimulate germination and growth. Cytokinins contained in coconut water function to stimulate cell division. In coconut water, there are also other building blocks such as protein, fat, minerals, carbohydrates, and even complete vitamins C and B complex [14]. [15] and [16] stated that until now the utilization of coconut water waste has not been carried out optimally. From various literature, it turns out that coconut water contains important nutrients such as carbohydrates, sugars, minerals, amino acids, and others. To use coconut water to become liquid organic fertilizer (POC), a decomposition process is needed through the role of microorganisms, which is better known as fermentation. During the fermentation process, microorganisms break down organic matter to produce nutrients that are easily absorbed by plants. Due to the scarcity of research results on the use of agrodyke fertilizer and liquid organic fertilizer from coconut water waste, especially on Siamese oranges, the authors want to examine the dosage of agrodyke fertilizer combined with the concentration of liquid organic fertilizer (POC) of coconut water waste to get maximum citrus yields.

[17] stated that the use of inorganic fertilizers can be reduced by adding natural organic materials, such as coconut water. Coconut water contains several nutrients and growth hormones which play a role in cell division, stem meristem formation, root growth, nutrient mobilization, and seed germination. [18] and [19] stated that coconut water contains nutrients N (0.018%), P (13.85%), K (0.12%), Na (0.002%), Ca (0.006%), Mg (0.005 %) and organic C (4.52%), while the growth hormones contained in coconut water are IAA (0.0039%), GA<sub>3</sub> (0.0018%), Cytokinin (0.0017%), Kinetin (0.0053 %) and Zeatin (0.0019%). [20] stated that the nutrients contained in coconut water can replace or reduce artificial fertilizers in planting media, as well as supply growth hormones (growth regulators) at the same time. Fulfilling the nutritional needs of plants is expected to reduce the use of inorganic fertilizer (urea). Several research results show that coconut water has an effect on plant growth. The results of research [17] showed that the use of coconut water growth regulator (ZPT) with a concentration of 50 – 100% was able to increase the growth of teak stem cuttings, including shoot length. Providing 50% coconut water increases the increase in stem diameter, number of leaves, shoot length and number of shoots in lowland tea plants [21].

## 2. Material and Methods

This research was conducted in Bayung Gede Banjar, Bayung Gede Village, Kintamanai District, Bangli Regency. The altitude of the place is between 800-900 meters above sea level, with a sloping to hilly topography, a slope of 20-40%, temperatures between 13.6-25. C. The temperature is cool and the rainfall is quite high, between 125-200 mm [14]. The materials used in this study were citrus plants, agrodyke fertilizer, coconut water waste, water, Biomol, Biomi organic fertilizer (as a substitute for EM<sub>4</sub>), sintrong leaves, banana stems, and coir. coconut and materials for chemical solutions for analysis in the laboratory. The tools used in this study were large barrels, jerry cans, filters, buckets, spaits, choppers, nylon rope, zinc, paper, hoes, pruning shears, scales, stationery, sprayer, camera, plastic, scissors, tally counter tools.

## 3. Results and Discussion

The increase in the number of fruit harvested in the A<sub>3</sub> treatment was also supported by an increase in the variable number of fruit formed per tree ( $r = 0.984^{**}$ ) (Table 1). The number of flowers per tree was obtained in treatment A<sub>3</sub>, namely 89.12 buds, in A<sub>2</sub> 89.02 buds, and in A<sub>0</sub>, only 88.17 buds (Table 1). The number of fruit formed per tree in A<sub>3</sub> was the highest with 85.67 fruit or an increase of 11.86% compared to A<sub>0</sub>, which was only 76.58 fruit (Table 1). The increase in yield in this case is the weight of harvested fruit per tree besides being supported by the increase in yield components such as the number of fruit harvested per tree, the weight per fruit, the number of flowers is also supported by the increase in the component of the number of fruit formed per tree.

The increased yield shown by the weight of fruit harvested per tree is because Agrodyke fertilizer is beneficial to the soil, namely it can open soil pores, so that oxygen can easily enter, restore and improve soil fertility, neutralize soil pH according to the needs of plants to grow and develop, activate bacteria or microorganisms in the soil and inhibit the development of pathogenic bacteria so that the growth and development of roots is better, so that the function of roots in absorbing water, nutrients contained in agrodyke fertilizer can be increased, which will ultimately affect the growth and development of plants above ground. Whereas in plants it can repair damaged tissues or cells, restore the condition of unproductive plants to be productive again, so that productive branches can be increased so that more flowers and fruit are formed and can also increase plant resistance to pest and disease attacks. Thus the plant metabolism runs smoothly, especially the formation of assimilates. The higher the assimilate that is formed the more that can be stored in the storage organs in this case is the fruit and the competition between fruits can be minimized so as to reduce fruit loss, which can be proven in the variable percentage of fruit fall. The application of Agrodyke fertilizer at a dose of 150 g/tree (A<sub>3</sub>) gave the lowest percentage of fruit fall, namely 5.36% and the highest was obtained at K<sub>0</sub> reaching 17.07% (Table 1).

Supported by the statement of [15] which states that agrodyke fertilizer is a type of complete organic fertilizer which contains several important elements, namely macro and micro nutrients which are very much needed by plants which is a versatile and environmentally friendly fertilizer in the form of white flour and dissolves easily in water. water so that it is easily absorbed by plant leaves so that plant metabolism runs smoothly. In the treatment of POC concentration of coconut water waste (K), the highest harvested fruit weight per tree was obtained in the POC treatment of coconut water waste with a dose of 15 cc/l (K<sub>3</sub>), namely 8.63 kg, an increase of 15.83% compared to control (K<sub>0</sub>) which is only 7.45 kg (Table 2). The higher fruit weight per tree in the K<sub>3</sub> treatment compared to K<sub>0</sub> was supported by an increase in the number of fruit harvested per tree ( $r = 0.994^{**}$ ), fruit diameter ( $r = 0.966^{**}$ ) and weight per fruit ( $r = 0.987^{**}$ ) (Table 3). The number of fruit harvested and the weight per fruit in the K<sub>3</sub> treatment obtained the highest respectively 75.50 fruit and 114.35

g compared to that without POC coconut water waste, namely 68.67 fruit and 107.77 g or an increase of 9.94% and 6, 10% (Tables 2).

Table 1.

The effect of the dodis treatment of agrodyke fertilizer (A) and coconut water liquid organic fertilizer (K) on the number of flowers and the number of fruit formed per tree and the percentage of fallen fruit per tree

Treatment	Number of flowers formed per tree (buds)	Number of fruit formed per tree (2-4 cm) (fruit)	Percentage of fallen fruit per tree (%)
Agrodyke fertilizer (A)			
A <sub>0</sub> (0 g/tree)	88.17 a	76.58 c	17.07 a
A <sub>1</sub> (50 g/tree)	88.33 a	78.50 c	11.30 b
A <sub>2</sub> (100 g/tree)	89.02 a	81.42 b	8.15 c
A <sub>3</sub> (150 g/tree)	89.12 a	85.67 a	5.36 d
BNT 0,05	-	2,64	2.01
POC Coconut Water (K)			
K <sub>0</sub> (0 ml/l)	85.00 a	77.17 b	11.06 a
K <sub>1</sub> (5 ml/l)	88.00 a	79.42 b	10.30 a
K <sub>2</sub> (10 ml/l)	88.00 a	82.75 a	9.57 a
K <sub>3</sub> (15 ml/l)	89.75 a	82.83 a	8,86 b
BNT 0,05	-	2.64	2,01

Note: The mean value followed by the same letter in the same treatment and column means that the difference is not significant at the 5% LSD test level

The interaction between agrodyke fertilizer and liquid organic fertilizer (POC) coconut water waste (AxK) had no significant effect on all observed variables. The Agrodyke fertilizer treatment had a very significant effect on all variables observed except for the number of flowers formed per tree. Meanwhile, the POC of coconut water waste had a significant to very significant effect on all variables observed except for the number of flowers formed per tree and fruit diameter which had no significant effect. Treatment of Agrodyke fertilizer at a dose of 150 g/tree (A<sub>3</sub>) gave the highest harvested fruit weight per tree, namely 9.76 kg or an increase of 54.18% compared to control (A<sub>0</sub>), which was only 6.33 kg (Table 2). The increase in fruit weight per tree in the A<sub>3</sub> treatment was supported by an increase in the number of fruit harvested per tree ( $r = 0.995^{**}$ ), fruit diameter ( $r = 0.992^{**}$ ) and weight per fruit ( $r = 0.985^{**}$ ) (Table 2). The highest number of fruit harvested per tree, and the highest weight per fruit was obtained in treatment A<sub>3</sub>, namely 81.08 fruit and 120.00 g, an increase of 27.68% and 20.50% compared to A<sub>0</sub>, namely only 63.50 fruit and 99.58 g (Table 2).

The increase in the number of fruit harvested per tree in OSH was supported by the higher number of fruit formed per tree ( $r = 0.976^{**}$ ) (Table 3). The number of fruit formed per tree in the K<sub>3</sub> treatment was 82.83 fruit, while in K<sub>0</sub> it was obtained 77.17 fruit or an increase of 7.33% (Table 2). It can be said that administering POC coconut water waste can improve plant growth and development better, because coconut water contains 3.5% C-organic; 2.5% N; 4.9% P; 4.3% K; 4.3% CaO 1.3%; MgO 0.5% (result of laboratory analysis). Besides containing the above nutrients it also contains ZPT, one of which is cytokinin. [22] and [19], where one of the functions of cytokinins is to prevent root suberation, so that the function of roots in absorbing water and nutrients is better, which will affect the growth and development of above-ground plants such as the process of forming food in larger leaves to prevent fruit loss due to competition between fruits in fighting over assimilate can be minimized. In this study, it was proven by the variable weight per fruit and the lower percentage of fallen fruit per tree obtained in the administration of POC waste coconut water with a concentration of 15 ml/l (K<sub>3</sub>), which was 8.86% compared to K<sub>0</sub>, which reached 11.08%. Supported by the statement [16] and [23] which states that coconut water can be used to increase plant growth to prevent flowers and fruit from falling easily. The utilization of coconut water also helps the accumulation of soil nitrogen, dissolving soil phosphorus, and potassium which results in

increased absorption and yield of nutrients. Meanwhile, the cytokinins contained also support cell division and encourage growth. Watering with old coconut water resulted in a growth in the number of leaves which continued to increase compared to the treatment without coconut water watering. Old coconut water plays an important role in the formation and growth of leaves because coconut water has cytokinin hormones that can stimulate maximum leaf formation. From various literature, it turns out that coconut water contains important nutrients such as carbohydrates, sugar, minerals, amino acids, and others [16]. [24] suggested that the cytokinin hormone functions in cambium development. The combination of auxin and cytokinin found in coconut water also affects the activity of the cambium found in orange stems. [23] and [25] added that there is the influence of cytokinins and auxins, in stimulating cambium activity so that the plant growth process improves, which in the end will affect the production of flowers and fruit.

Table 2.

The effect of the treatment of dodis agrodyke (A) and coconut water liquid organic fertilizer (K) on the variable number of fruit harvested per tree, weight per fruit, fruit diameter, and fruit weight per tree

Perlakuan	Number of harvested fruit per tree (fruit)	Heavy per fruit (g)	fruit diameter (cm)	Weight of fruit harvested per tree (kg)
Pupuk Agrodyke(A)				
A <sub>0</sub> (0 g/tree)	63.50 d	99.58 c	5.63 d	6.33 d
A <sub>1</sub> (50 g/tree)	69.83 c	109.64 b	6.11 c	7.67 c
A <sub>2</sub> (100 g/tree)	74.83 b	118.05 a	6.31 b	8.84 b
A <sub>3</sub> (150 g/tree)	81.08 a	120.00 a	6.59 a	9.76 a
BNT 0,05	2.11	4.48	0.18	0.47
POC Coconut Water (K)				
K <sub>0</sub> (0 ml/l)	68.67 c	107.77 b	5.91 a	7.45 c
K <sub>1</sub> (5 ml/l)	71.25 b	109.83 ab	6.10 a	7.70 b
K <sub>2</sub> (10 ml/l)	73.83 a	113.33 a	6,25 a	8.43 ab
K <sub>3</sub> (15 ml/l)	75.50 a	114.35 a	6.29 a	8.63 a
BNT 0,05	2.11	4.48	0.18	0.47

Note: The mean value followed by the same letter in the same treatment and column means that the difference is not significant at the 5% LSD test level

#### 4. Conclusion

The interaction between the doses of Agrodyke fertilizer and Coconut Water Liquid Organic Fertilizer had no significant effect on all observed variables. The treatment of Agrodyke fertilizer at a dose of 150 g/tree gave the highest fruit weight per tree, namely 9.76 kg, or an increase of 54.18% when compared to the control (A<sub>0</sub>), which was only 6.33 kg. The highest fruit weight per tree was obtained in the POC treatment of coconut water waste with a concentration of 15 ml/l which was 8.63 kg, an increase of 15.83% compared to the control (K<sub>0</sub>), which was only 7.45 kg.

#### References

- [1]. Sarwono, B. (2016). Jeruk dan Kerabatnya. Jakarta: Penerbit Swadaya.
- [2]. Dimiyati, A. (2015). Prospek dan arah pengembangan agribisnis jeruk. Badan Penelitian dan Pengembangan Pertanian. Kementerian Pertanian Republik Indonesia. Jakarta
- [3]. Pracaya. (2009). Syarat tumbuh tanaman jeruk siam. <http://repository.usu.ac.id/bitstream/handle/123456789/50624/Chapter%20II.pdf?sequence=4&isAllowed=y>. Diakses pada 13 November 2021
- [4]. Suamba, I. W., Wirawan, I. G. P., & Adiartayasa, W. (2014). Isolasi dan identifikasi fungi mikoriza arbuskular (FMA) secara mikroskopis pada rhizosfer tanaman jeruk (Citrus sp.) di Desa Kerta, Kecamatan Payangan, Kabupaten Gianyar. *E-Jurnal Agroekoteknologi Tropika*, 3(4), 201-208.
- [5]. Profil Desa Bayung Gede. (2018). Karakteristik Tanah dan Iklim. Kecamatan Kintamani, Kabupaten Bangli Propinsi Bali. <https://bayunggede.desa.id/>. Diakses pada 13 November 2021.

- [6]. Badan Pusat Statistik. (2021). Data Produksi Jeruk Provinsi Bali. [http://bali.bps.go.id/tabel\\_detail.php?ed=607004&od=7&id=7](http://bali.bps.go.id/tabel_detail.php?ed=607004&od=7&id=7). Diakses pada 4 desember 2020.
- [7]. Pracaya. (2009). Syarat tumbuh tanaman jeruk siam. <http://repository.usu.ac.id/bitstream/handle/123456789/50624/Chapter%20II.pdf?sequence=4&isAllowed=y>. Diakses pada 13 November 2021.
- [8]. Tyagita V., Sulistiawati, NP. And Alit Astiari. (2021). Effect of Gypsum and Etepon on Crop Yield Siamese Orange (*Citrus nobilis* Var. *Microcarpa* L.). *SEAS (Sustainable Environment Agricultural Science)*, 5(2), 136-144. <http://dx.doi.org/10.22225/seas.5.2.3873.136-144>
- [9]. Departemen RI. (2019). Keputusan Menteri Pertanian Republik Indonesia. Nomor 04 / Kpts / Sr.130 / D/6/2019. Tentang Teknis Produksi Benih Jeruk.. <https://hortikultura.pertanian.go.id/wp-content/uploads/2015/06/Kepmentan-Pedoman-Teknis-Jeruk-new-2019.pdf>
- [10]. Garhwal, P.C., P.K. Yadav, B.D. Sharma, R.S. Singh, A.S. Ramniw. (2014). Effect of Organic Manure and Nitrogen on Growth Yield and Quality of Citrus in Sandy Soil of Hot Arid Region. *African J. of Agric. Res*, 9(34), 2638-2647.
- [11]. Santi, T.K. (2011). Pengaruh Pemberian Pupuk Kompos terhadap Pertumbuhan Tanaman Jeruk (*Lycopersicum esculentum* Mill). *Jurnal Ilmiah Progresif*, 3 (9).
- [12]. Anonimus. (2015) . Brosur Penggunaan Pupuk Agrodyke Yang Diproduksi Oleh PT . Dahlia Duta Utama Indonesia dengan pendaftaran nomor : 02 . 01 . 2013027 . merek terdaftar Reg . R . 40441
- [13]. Bey, Y., W. Syafii, dan Sutrisna. (2006). Pengaruh pemberian Giberelin (GA3) dan air kelapa terhadap perkecambahan biji anggrek bulan (*Phalaenopsis amabilis* BL) secara in vitro. *Jurnal Biogenesis*, 2 (2), 41- 46.
- [14]. Suriyadi. (2021). Pupuk Organik Cair Dari Air Kelapa. Fungsional Penyuluh Pertanian Dinas TPHBUN Sul.Sel .<http://Cybex.Pertanian.Go.Id/Mobile/Artikel/98609/Pupuk-Organik-Cair-Dari-Air-Kelapa/>
- [15]. Mulyani, S. (2010). Pupuk dan Cara Pemupukan. Jakarta: Rineka Cipta. <http://download.portalgaruda.org/article.php?...The%20Effect%20of%20Type%20Bioc>. Diakses pada tanggal 23 januari 2018
- [16]. Nana, S. A., & Salamah, Z. (2014). Pertumbuhan tanaman bawang merah (*Allium cepa* L.) dengan penyiraman air kelapa (*Cocos nucifera* L.) sebagai sumber belajar biologi SMA Kelas XII. *Jupemasi*, 1 (1), 82-86.
- [17]. Renvillia, R., A. Bintoro, dan M. Riniarti. (2016). Penggunaan Air Kelapa Untuk Stek Batang Bati (*Tectona grandis*). *J. Sylva lestari*, 4(1), 61–68
- [18]. Blakeslee, J.J., T.S. Rossi and V. Kriechbaumer. (2019). Auxin biosynthesis: spatial regulation and adaptation to stress. *J. Experimental Botany*, 70(19), 5041-5049.
- [19]. Rosniawaty, S., I. R. D. Anjarsari, dan R. Sudirja. (2018). Aplikasi sitokinin untuk meningkatkan pertumbuhan tanaman teh di dataran rendah. *J. Tanaman Penyegar dan Industri*, 5(1), 31-38
- [20]. Rosniawaty, S. · C. Suherman · R. Sudirja. (2020). Aplikasi beberapa konsentrasi air kelapa untuk meningkatkan pertumbuhan bibit kakao (*Theobroma cacao* L.) kultivar icri 08 h 1119-1125. *Jurnal Kultivasi*, 19(2). <https://doi.org/10.24198/kultivasi.v19i2.26671>
- [21]. Robert, H.S. (2019). Molecular communication for coordinated seed and fruit development: what can we learn from auxin and sugars? *Int. J. Mol. Sci.*, 20(4), 936-950.
- [22]. Shin, S., J. Lee, D. Rudell, K. Evans and Y. Zhu. (2015). Transcript profiles of auxin efflux carrier and IAA-amido synthetase genes suggest the role of auxin on apple (*Malus × domestica*) fruit maturation patterns. *Amer. J. Plant Sci.*, 6, 620-632.
- [23]. Sosnowski, J., E. Malinowska, K. Jankowski, J. Krol, and P. Redzik. (2019). An estimation of the effects of synthetic auxin and cytokinin and the time of their application on some morphological and physiological characteristics of *Medicago x varia* T. Martyn. *Saudi J Biol Sci*, 26(1), 66–73. doi: 10.1016/j.sjbs.2016.12.023.
- [24]. Cabahug, R.A., S Soh and S.Y. Nam. (2016). Effects of Auxin and Cytokinin Application on Leaf Cutting Propagation in *Echeveria* Species. *Flower Research Journal*, 24(4), 264-273. DOI : <https://doi.org/10.11623/frj.2016.24.4.04>
- [25]. Amsyahputra, A., Adiwirman, dan Nurbaiti. (2016). Pemberian Berbagai Konsentrasi Air Kelapa Pada Bibit Kopi Robusta (*Coffea Canephora* Pierre). *Jurnal Online Mahasiswa Faperta*, 3 (2), 1–9.