# Potential of Immature Coconut Water and Cow Urine on the Growth of Palm Oil Seedlings in Pre-Nursery

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**Abstract:** ***This study aims to recognize the potential of immature coconut water and cow urine that have been fermented naturally on the growth of palm oil seedlings in the pre-nursery. This study used an experimental method with a factorial randomized block design with two repetitions. The first factor was the concentration of immature coconut water which consisted of 4 levels, namely 0 ml (K0), 10 ml (K1), 20 ml (K2), and 40 ml (K3). The second factor was cow urine with the levels of 0.0 (U0), 10 ml (U1), 20 ml (U2), and 40 ml (U3). The data were analyzed by using analysis of variance, followed by Duncan's Multiple Range Test. The results showed that the application of immature coconut water and naturally fermented cow urine significantly affected the growth (seedling height, leaf length, stem diameter, primary root length, fresh weight, dry weight) of oil palm seedlings at the pre-nursery stage, except for the growth in number of leaves and number of primary root. The combined application of 40 ml of coconut water and 20 ml of cow urine (K3U2) significantly increased the highest growth (seedlings height, leaf length, stem diameter, and fresh weight) of oil palm seedlings at the pre-nursery.***

**Keywords:** cow urine, immature coconut water, oil palm seedling, pre-nursery.

## 1. Introduction

Nowadays, palm oil becomes the main source of sustainable and renewable raw material for industries of food, oleochemical and world biofuel (Basiron, 2007). Palm oil is truly important both socially and economically for millions of people in tropics and subtropics area. Management of palm oil nurseries is one of the main factors limiting the productivity of palm oil. A nursery is the basis of every successful palm oil plantation in which it must produce healthy seedlings which have the potential to maintain large oil yields for 25 years or more. Approximately 35 ha can grow enough seedlings over a three-year period to plant 5,000 ha of the plantation (Mutert *et al*., 1999).

The production of palm oil has been processed in various products in order to be able to fulfill the community needs, especially as a source of vegetable oil and even recently it can be a source of phytonutrients; sources of β-carotene which can be useful as antioxidant to reduce the potential of various diseases, including vitamin A deficiency and cancer disease (Wattanapenpaiboon and Wahlqvist, 2003; Stuijvenberg *et al*., 2001). The more the population increases, the higher the demand for palm oil production. In order to fulfill the demand of the community, it is required high-quality seedlings in sufficient quantities to fulfill the extensive and continuous plantation area. One of the factors which influence the growth of oil palm seedlings is manure. The plant which is significant given organic manure has longer and wider leaves, higher shoots, and lower nitrate concentration compared to the plant which is given non-organic manure (Liu *et al.*, 2014). Organic manure derived from livestock by products significantly increases the soil pH and the concentration of Nitrogen, Phosphorus, Potassium, Calcium, and Magnesium (Han *et al*., 2016). Liquid organic fertilizer can be obtained from natural materials such as industrial waste, waste from plants and animals such as cow urine, goat urine, coconut water, water tofu waste, etc. Manure from natural materials is easier to be obtained, economical, and also environmentally friendly without residual effects.

The cow urine is usually wasted as livestock liquid waste which is ignored by many people. Its stinging smell makes people less interested in taking advantage of it. However, well-managed cow urine can be used to fulfill various human needs. The cow urine contains all substances which are naturally available within the human body (Mohanty *et al.*, 2014). Fermented cow urine contains a higher level of chloride and nitrite than fresh cow urine (Miah *et al.*, 2017). The amount of nitrogen excreted in the urine greatly varies. Most of nitrogen in the urine (from 50% to more than 90%) exist in the form of urea. Nitrogen concentrations of cow urine range from 3 - 20 g/l (Dijkstra *et al*., 2013). Urine can be an alternative solution to the lack of sanitation and high costs of mineral manure inherent in developing countries (Dubey *et al*., 2016). Application of cow urine increases the growth of several plants, including Cauliflower cv. Kathmandu Local (*Brassica oleracea* L. var. Botrytis) (Khanal *et al*., 2011), *Chlorella sp.* (Sharma and Rai, 2015), germination and growth of Khirni (*Manilkara hexandra* L.) (Shinde and Malshe, 2015), and germination and growth of papaya seedlings (Desai *et al*., 2017).

Likewise the cow urine, coconut water is a natural material that is relatively easily available, economical, and environmentally friendly. Coconut water (coconut liquid endosperm), with its excessive applications, is one of the most versatile natural product. This refreshing beverage is consumed throughout the world as it is nutritious and beneficial for health. Coconut water is traditionally used as the growth supplement in micropropagation. The extensive applications of coconut water can be justified by its unique chemical composition of sugars, vitamins, minerals, amino acids, and phytohormone, especially cytokines (Yong *et al*., 2009). The biochemical profile of coconut water varies such as ripe coconut, coconut water from 6th to 9th month, experience reduction in the concentration of Potassium, Calcium, Magnesium, Chloride, and osmolarity. Meanwhile, those which are related to sugar have increased the concentration of syrup and glucose and also the conjugation of sucrose (Vigliar *et al*., 2006). The concentration of phytohormone (auxin, cytokinin, gibberellin) contained in coconut water also changes along with the fruit ripening (Muhammad *et al*., 2015). Immature coconut water contains high nutrients of Ca, Na, K, P, and Mg (Solangi and Iqbal, 2011). Coconut water containing auxin, cytokinin, and gibberellin hormone can affect the growth of potato plant (Muhammad *et al*., 2015), mustard plant (*Brassica juncea* L.) (Tiwery, 2014), and the growth of shoot cut *Shorea leprosula* (Djamhuri, 2011). Therefore, coconut water can be used as an alternative for synthetic growth regulator (Muhammad *et al*., 2015; Djamhuri, 2011; Bamigboye *et al*., 2016). Cow urine and immature coconut water (natural hormones especially auxin) also increase the shoot's growth in stem cut of pineapple (*Ananas comosus*. L. Merr.) (Puspitorini, 2016).

Based on the description above, it can be recognized that the application of cow urine and coconut water is able to stimulate plant growth. However, no one has utilized cow urine and immature coconut water as liquid organic manure or as a source of natural hormones and minerals to stimulate the growth of oil palm seedlings until recently. Therefore, this research needs to be conducted with the goal of determining the potential of immature coconut water and cow urine which has been naturally fermented on the growth of oil palm seedlings in the pre-nursery reducing the problem of livestock waste and plant waste in overcoming environmental pollution.

## 2. Materials and Methods

This research was conducted in the community plantation area of Gaperta Ujung Medan, April-July 2018. The tools which were used include hoes, shovels, polybags, sieves, scales, bamboo, paranet, stationery, measuring instruments, labels. The materials which were used include topsoil, manure, cow urine and immature coconut water that had been fermented naturally. The method used in this study was the experimental method of factorial randomized block design with two repetitions and 16 treatments. The first factor was the concentration of immature coconut water with the levels of 0.0 (K0), 10 ml (K1), 20 ml (K2), and 40 ml (K3). The second factor was the cow urine concentration with the levels of 0 (U0), 10 ml (U1), 20 ml (U2), and 40 ml (U3). Implementation stage: immature coconut water and cow urine are naturally fermented, area of research is cleaned, beds are formed, paranet is installed, topsoil soil and manure with a ratio of 1: 2 are put into polybags, planting palm oil seeds on growing media, giving the treatment of immature coconut water and cow urine in the first period, the second period is given after one week after planting, then it is conducted the maintenance (watering, weeding, spraying pesticides when needed), observing parameters: Seedlings height, leaf length, stem diameter, number of leaves, number of roots, number of primary roots, seedlings fresh weight and seedlings dry weight were done from the 5th week after the cultivation. The data of the observation result were analyzed using ANOVA, continued with Duncan Multiple Ranges Test with 5% significance. The data analysis was done by the software of SAS Program version 9.1.3.

## 3. Result

### 1) The Height Growth of Palm Oil Seedlings in Pre-nursery

Based on the variance analysis result, the application of immature coconut water and cow urine significantly influenced on the growth of palm oil seedlings' height in pre-nursery from the 5th week to the 12th week after the cultivation. The application of 10 ml cow urine without coconut water (K0U1) was able to improve the highest growth of palm oil seedlings' height significantly in pre-nursery from the 5th week to the 10th week after the cultivation. However, in the 11th and 12th week, the highest growth of the seedlings' height was found in the treatment application result of 40 ml cow urine without immature coconut water (K0U3). The height growth of the highest plant was obtained around 26.5 cm in the 12th week after the application of 40 ml cow urine without coconut water (K0U3) (286.86 % higher than the control). The treatment potency of K0U3 was the same as the treatment of K3U2. However, it was not significantly different from the treatment of K0U1 **(Table 1)**. In this research, the application of 10 ml of cow urine was able to improve the height growth of palm oil seedlings in pre-nursery significantly from the 5th week to the 12th week after the cultivation.

### 2) The Leaf Length Growth of Palm Oil Seedlings in Pre-Nursery

Based on the variance analysis result, the application of immature coconut water and cow urine did not significantly influence on the leaf length growth of palm oil seedlings in pre-nursery from the 5th week to the 7th week after the cultivation, but from the 8th week to the 12th week immature coconut oil and cow urine application significantly influenced on the leaf length growth of palm oil seedlings in pre-nursery. The combined application of 40 ml immature coconut water and 20 ml cow urine (K3U2) was able to significantly improve the highest leaf length growth from the 8th week to the 12th week in pre-nursery. In the 12th week, the treatment application of K3U2 was able to reach the highest leaf length around 15.69 cm (241.09% higher than the control). The treatment of K3U2 was not significantly different from the application of K0U1 treatment **(Table 1)**.

### 3) The Stem Diameter Growth of Palm Oil Seedlings in Pre-nursery

Based on the variance analysis result, cow urine and immature coconut oil application did not significantly influence the stem diameter growth of palm oil seedlings in pre-nursery in from the 5th and 6th week. However, from the 7th week to the 12th week cow urine and immature coconut oil application was able to significantly improve stem diameter growth of palm oil seedlings in pre-nursery. The statistical test result showed that after the treatment application of cow urine and immature coconut water, the response of stem diameter growth varied from the 7th week to the 12th week. In the 7th week, the treatment application of

20 ml immature coconut water (K2U0) led to the highest stem diameter growth response around 0.5 cm/seedling, while in the 8th week the treatment application of K0U3, K2U0, and K2U1 led to the highest stem diameter growth response around 0.5 cm/seedling, in the 9th week the treatment application of K2U1 led to the highest stem diameter growth response around 0.55 cm/seedling, and in the 10th, 11th, and 12th week, the treatment application of K3U2 led to the highest stem diameter growth response of the palm oil seedlings. In the 12th week, the combination treatment application of 40 ml immature coconut water and 20 ml cow urine (K3U2) led to the highest diameter growth gave response around 0.68 cm/seedling (119.35% higher than the control which only reached the stem diameter growth around 0.31 cm/seedling). K3U2 treatment was not significantly different from several treatments applied such as K0U1, K0U3, K1U2, K2U0, K2U1, K3U0, and K3U3 **(Table 1)**.

**4) The Growth of Root Length, Fresh Weight, and Dry Weight of Palm Oil Seedlings**

Based on the variance analysis result, the application of immature coconut water and cow urine significantly influenced on the growth of root length, fresh weight, and dry weight of palm oil seedlings in pre-nursery in the 12th week after the cultivation. The treatment application of immature coconut water and cow urine gave various growth response on the parameter of root length, fresh weight, and dry weight of palm oil seedlings in pre-nursery in the 12th week after the cultivation. It could be more clearly seen in **Table 1**. The treatment application of 10 ml cow urine without immature coconut water (K0U1) was able to significantly improve the growth of the highest root length around 20.75/seedling in pre-nursery (157.76 % higher than the control). Then, the combined application of 40 ml immature coconut water and 20 ml cow urine (K3U2) was able to significantly improve the growth of the highest seedling fresh weight around 2.58 g/seedling (658.82% higher than the control). The treatment application of K3U2 was not significantly different from the treatment application of K0U3 and K2U0. Then, the combined application of 20 ml immature coconut water and 10 ml cow urine (K2U1) was able to significantly improve the highest seedling dry weight in pre-nursery around 0.805 g/seedling (1138.46% higher than the control). This treatment application was not significantly different from almost all applications particularly K0U1. However, it was significantly different from the treatment application of K0U2, K1U0, K1U1, K2U2, and K3U1, particularly on the control group.

**Table 1:** The influence of immature coconut water and cow urine on the growth of palm oil seedlings in pre-nursery the 12th week

| Number | Treatment | Height seedlings | Leaf lenght | Stem diameter | Root length | Fresh weight | Dry weight |
|---|---|---|---|---|---|---|---|
| 1 | K0U0 | 6.85 g | 4.6 fg | 0.31 e | 8.05 c | 0.34 ef | 0.065 d |
| 2 | K0U1 | 24.75 ab | 14 ab | 0.55 abcd | 20.75 a | 1.6 b | 0.625 abc |
| 3 | K0U2 | 14.75 e | 8.8 cdef | 0.43 de | 14.5 b | 0.6 cdef | 0.21 cd |
| 4 | K0U3 | 26.5 a | 13.92 ab | 0.66 a | 16.4 ab | 2.04 ab | 0.515 abcd |
| 5 | K1U0 | 5.65 g | 3.15 g | 0.3 e | 5.9 c | 0.44 def | 0.2 cd |
| 6 | K1U1 | 10.15 f | 3.5 g | 0.45 dce | 18.05 ab | 0.47 cdef | 0.285 bcd |
| 7 | K1U2 | 21.25 cd | 14.1 ab | 0.6 abc | 16 ab | 1.4 bcd | 0.415 abcd |
| 8 | K1U3 | 14.05 e | 5.8 efg | 0.43 de | 16.35 ab | 1.19 bcdf | 0.34 abcd |
| 9 | K2U0 | 25.25 ab | 11.57 abcd | 0.64 ab | 17 ab | 2.07 ab | 0.665 abc |
| 10 | K2U1 | 24.25 ab | 12.635 abc | 0.67 a | 19 ab | 1.6 b | 0.805 a |
| 11 | K2U2 | 14 e | 7.6 defg | 0.5 bcd | 7.15 c | 0.3 f | 0.195 cd |
| 12 | K2U3 | 20.85 d | 9.73 bcde | 0.45 dce | 15.25 ab | 1.17 bcdf | 0.46 abcd |
| 13 | K3U0 | 24.65 ab | 12.43 abc | 0.6 abc | 16.6 ab | 1.42 bc | 0.7 ab |
| 14 | K3U1 | 11.85 f | 7.25 defg | 0.45 dce | 6.5 c | 0.45 cdef | 0.06 d |
| 15 | K3U2 | 25.65 a | 15.69 a | 0.68 a | 17.15 ab | 2.58 a | 0.73 ab |
| 16 | K3U3 | 23.25 bc | 13.66 ab | 0.55 abcd | 15 ab | 1.305 bcde | 0.515 abcd |

Note: Numbers followed by the same notation were not significantly different at the level of 5%.

Based on the variance analysis result, the application of immature coconut water and cow urine did not significantly influence on the growth of the number of leaf and the number of the root of palm oil seedlings in pre-nursery from the 5th week to the 12th week.

## 4. Discussion

Organic fertilizer was generally considered as an effective way to maintain the soil fertility and plant growth. The application of organic fertilizer could improve the nutrient content and change the functional microbe community in the rhizosphere compared to inorganic fertilizer. Liquid organic fertilizer could be an effective alternative part to chemical fertilization during the early growth stage (Ji *et al*., 2017). According to Suryanto *et al*. (2015) organic fertilizer given to the palm oil seedlings could improve the morphological and physiological growth in pre-nursery. Likewise in the results of this study, immature coconut water and cow urine fermented naturally were potential to be liquid organic fertilizer which was able to significantly improve the growth of palm oil seedlings in pre-nursery either morphologically or physiologically. Palm oil seedlings with immature coconut water and cow urine had higher growth rate than those without treatment. The application of immature coconut water and cow urine could give various growth response to palm oil seedlings in pre-nursery. It was probably influenced by the type and concentration of the treatment given. The best treatment application to significantly improve the highest stem diameter, the highest leaf length, and the highest seedlings fresh weight was the combination of 40 ml immature coconut water and 20 ml cow urine (K3U2). On the other hand, the best treatment to significantly increase the highest seedlings height was by applying 40 ml of cow urine (K0U3). However, the K0U3 treatment had the same potential as the treatment of K3U2 at week 12 in the pre-nursery. The K3U2 treatment was also not significantly different from the best treatment which could increase the growth of the longest root length and the heaviest dry weight of seedlings, respectively K0U1 and K2U1. However, the K3U2 treatment was also not significantly different from the treatment of 10 ml of cow urine (K0U1) on all of the parameters, except for its fresh weight.

It showed that to increase seedling growth significantly, it was enough by giving cow urine, even at the lowest concentration (10 ml of cow urine). However, to obtain tall, strong, and large seedling growth, the combined application between immature coconut water and cow urine was required at a high concentration (40 ml of immature coconut water and 20 ml of cow urine K3U2). The potential difference of the best treatment (K3U2) to increase the growth of palm oil seedlings at the pre-nursery with a potential of the control (K0U0) can be seen more clearly in **Figure 1.** The palm oil seedlings that were treated with both coconut water and cow urine grew better than plants that had never been given immature coconut water and cow urine.

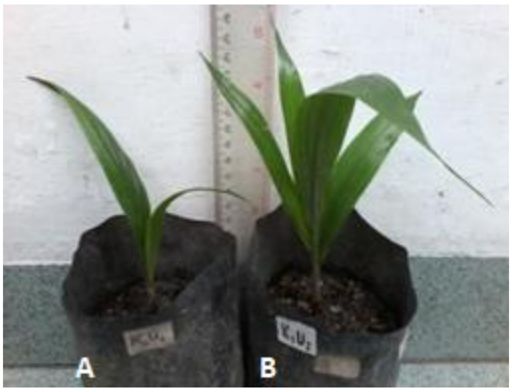


**Figure 1:** The Palm oil seedling at pre-nursery: A) without treatment (K0U0), B) Combination treatment 40 ml of coconut water with 20 ml of cow urine (K3U2)

Urine had content of NPK (Nitrogen, Phosphorus, and Potassium) and other micronutrients found in organic fertilizers (Dubey *et al*., 2016). According to Nwite (2015) the administration of urine from various sources has a higher influence on total Nitrogen, Phosphorus available, and exchange of Ca and Mg compared to controls. Cow urine could replace urea fertilizer as a nutrient needed by plants (Sharma & Rai, 2015). Nitrogen level (125 kg N/ha via urine) content in cow urine could significantly increase the vegetative properties. Substitution of 50% urea with urine produced morphological characteristics, better results, and quality compared to other combination of urine and urea (Khanal *et al*., 2011). Giving urine can increase soil fertility, plant growth, and production. Urine can increase soil pH, total N, organic carbon, availability of P, and soil cations exchange as well as crop production (Nwite, 2015). Cow urine administered to the soil as a growing medium would change to fertilize the soil. Microorganisms in the soil and water converted the component of urine N into ammonium ($NH_4^+$), and after that, it became nitrate ($NO_3^-$) (Dijkstra *et al*., 2013). These forms of Nitrogen cation and anion were likely to be the Nitrogen source needed by the palm oil seedlings for their growth and development. The water of a immature coconut also contained sugar, vitamins, minerals, amino acids, and cytokinin, auxin, and gibberellin phytohormones (Yong *et al*., 2009; Djamhuri, 2011), whose concentrations were affected by the maturity level of coconuts (Muhammad *et al*., 2015 ). In this study, the possibility of nutrients, vitamins, minerals, and hormones contained in immature coconut water and cow urine at certain concentrations can effectively stimulate the growth and development of cells in the tissue of palm oil seedlings at the pre-nursery. Therefore, the combined application of 40 ml of immature coconut water and 20 ml of cow urine (K3U2) could increase the optimum growth in palm oil seedlings at the pre-nursery, including growth in seedling height, leaf length, root length, stem diameter, fresh weight, and dry weight. However, the application of cow urine at the lowest concentration (K0U1) was also effective in stimulating an increase in almost all parameters of palm oil seedlings growth at the pre-nursery. The application of cow urine at low concentrations had the potential to increase even to accelerate the growth and development of seedlings at the pre-nursery.

Auxin and cytokinin phytohormones interacted to regulate a lot of plant growth and development processes, including the mechanisms of buds, stem, leaf, and root formation, which involve aspects of biosynthesis, inactivation, transportation, perception, and signals from hormones (Schaller *et al*., 2015). Plant hormones modulated membrane function and gene expression (Abel and Theologis, 1996; Prasad and jones, 1991) by binding to specific receptors (Prasad and Jones, 1991) in various plant tissues and cell types over a broad period of time (Abel and Theologis, 1996), to regulate the development system (cell enlargement, leaf, stem and root development). Auxin stimulated RNA polymerase activity so that it rapidly increased RNA synthesis and accumulated ribosomes in tissues to synthesize proteins (Parthier, 1989). Specific interactions occurred between the family of proteins and auxins and their consequences. The signal transduction pathway began with the auxin receptor and continued to activate auxin-responsive genes (Guilfoyle *et al*., 1998). The application of exogenous hormones showed substantial auxin stimulation of mRNA. A strong correlation occurred between expanse gene expression and growth rate (Caderas *et al*., 2000). Changes in seedling growth resulted from appropriate changes in cell size, which appeared as a function of altered cell wall changes. Expansions were involved in increasing growth by mediating cell wall easing (Choi *et al*., 2003). Auxin greatly affected turgor, elongation, division, and cell differentiation, primarily directing and forming strength in morphogenesis (Abel and Theologis, 1996). Exogenous auxin also stimulated the activity of several enzymes (such as ascorbate peroxidase, catalase, and superoxide dismutase) to increase the protein content in plants (El-Gaied *et al*., 2013). Hormones could stimulate cell growth and development in specific types and concentrations. According to Fosket (1994) auxin must be above some threshold concentration to be effective, and above this concentration, the amount of growth increased as a linear function of the increased hormone concentration. Different tissues varied greatly in the concentration of auxin effective for increasing plant growth and development. Then, according to Werner *et al*. (2001) cytokinin were a type of plant-specific hormone that played a central role during the cell cycle and affected many programs development. Cytokinin also regulated cell division in meristem and leaf primordia, initiated the development of chloroplasts, and mobilized nutrients (Fosket, 1994). While the gibberellin hormone could function to increase stem lengthening and the growth of immature leaves. The high gibberellin content could increase vegetative growth activity in the form of shoot extension and cell growth in meristem tissue (Hooley, 1994). According to Kachru *et al*. (2017) auxin hormones played a role in stimulating root growth in plants. Giving auxin and cow urine could accelerate the formation and growth of root cells in plants. Bamigboye *et al*. (2016) also argued that coconut water had more potential for the formation of new shoots but not significantly different from auxin. Thus the hormone auxin, cytokinin, gibberellin contained in the water of immature coconut and the cow urine, in addition to stimulating the formation, growth and development of cells in the meristem buds, stems, leaves, also stimulated the formation and growth of roots in the palm oil seedlings so that it could absorb nutrients faster that are also available in cow urine and immature coconut water as natural liquid organic fertilizers for fulfilling the need of cells metabolism in the palm oil seedlings' tissues so that they grew faster and developed normally. Therefore the plant became bigger (leaves became longer, stem diameter became bigger, roots became longer, and weighed higher) along with the increase in seedling height compared to seedlings that were not given treatment. The treatment of exogenous hormones accelerated cell division, stimulated the synthesis of endogenous hormones (auxin, cytokinin, and gibberellin) and stimulated carbohydrate accumulation, and then induced root formation. Exogenous hormones also increased peroxidase (POD) and polyphenol oxidase (PPO) activity, reduced IAAO activity and then stimulated root formation (Zhang *et al*., 2017).

In this study, it was also found that cow urine at the lowest concentration of 10 ml, effectively increased the growth of palm oil seedlings in the pre-nursery, but on the other hand, the application of all treatments of coconut water and cow urine had no effect on the growth of the number of leaves and the number of primary roots of palm oil seedlings. This might have something to do with the intrinsic genetic program and the anti-auxin gene in determining the shape of the palm oil seedlings at the pre-nursery stage. According to Gray (2004) plant growth and development involved the integrity of several environments and endogenous signals along with intrinsic genetic programs in determining plant shape. The basis of this process was that some growth regulators (auxin, cytokinin, and gibberellin) collectively worked at low concentrations to regulate some aspects of plant growth and development. Plants that lack cytokinin would show the inhibited growth of buds by smaller apical meristems, and produced more limited cells in leaves. On the contrary, cytokinin deficiency accelerated the development of root meristems, accelerated root growth and had more branching. Cytokinin were important regulatory factors in plant meristem activity and morphogenesis, with opposite roles in shoots and roots (Wenner *et al*., 2001). Furthermore, Romano *et al*. (1991) stated anti-auxin gene (*iaaL* gene which encoded IAA-lisin synthetic enzyme) has a role in controlling apical dominance, root growth, and vascular differentiation in the whole plants. According to Bielach *et al.* (2012) auxin and cytokinin were the central hormones which were involved in the regulation of plant growth and development, including the process of determining the root architecture. Accordingly, the concentration of endogenous and exogenous of auxin, cytokinin, and gibberellin could be determinant of leaf and root formation of palm oil seedlings in pre-nursery. The cow urine application on palm oil seedlings, besides having potential as liquid organic fertilizer and regulating growth, also consider that it had potential as biopesticide and anti-fungus. Thus, at a certain concentration, cow urine potentially increased seedling growth which eventually produced normal, healthy, and strong seedlings. According to Kumar (2013) cow urine was completely effective in hampering the growth of fungi and bacteria. Beside being biopesticide (Miah *et al*., 2017), it was also potentially able to become anti-fungus (Jandaik *et al.*, 2015). Urine in low concentration did not significantly influence in impeding the growth of fungi, but it could inhibit the growth of fungi at high concentration (Al-Abdalall, 2010).

## 5. Conclusion

The application of cow urine and immature coconut water naturally fermented significantly influenced on increasing growth (seedling height, leaf length, stem diameter, primary root length, fresh weight, and dry weight) of palm oil seedlings in pre-nursery, but there is no influence on the growth of the primary root and leaf quantity. The application of cow urine and immature coconut water led to different growth response on palm oil seedlings in pre-nursery from the fifth week to the twelfth week after cultivation. The combined application of treatment of 40 ml immature coconut water with 20 ml cow urine (K3U2) could significantly lead to the highest seedling height growth (26,5 cm), the highest leaf length (15,69 cm), the biggest stem diameter (0,68 cm), and the highest fresh weight (2,58 g) in pre-nursery. The treatment of K3U2 was not significantly different from the best treatment (K0U1) which could lead to the highest root length growth (20,75 cm) and from the highest dry seed weight of K2UI treatment (0,81 g). The treatment of K3U2 was also not significantly different from the treatment of 10 ml cow urine (K0U1) in all parameters, except for the fresh weight. The application of 10 ml cow urine was effective to increase palm oil seedling growth in pre-nursery. The potential of cow urine and immature coconut water was various on palm oil seedling growth in pre-nursery.

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