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# The Effect of Gandasil D Concentration And Planting Media on Root Cutting Growth of Breadfruit (Artocarpus Communis)

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***Abstract****: One of the obstacles encountered in the cultivation of breadfruit plants is the procurement of good seeds, because the type of breadfruit does not produce seeds so the nurseries is conducted vegetatively. Vegetative propagation techniques that can be done include transplant, natural shoots transfer, root cuttings and shoot cuttings. Gandasil D fertilizer had significant effect on the length of root, number of root 84 HST, and no significant effect on the number of buds at the age of 42, 56, 70, 84 HST and number of leaves at the age of 56, 70, and 84 HST. The best concentration of Gandasil D fertilizer was found at the concentrations of DG 20 g/10 liters of water (D2) and the concentration of DG Gandasil D 30 g/10 L of water (D3).*

***Keywords****: concentrat; Gandasil D; root; planting media*

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## I. Introduction

Breadfruit plants are one type of forestry crop that produces fruit with high nutrient content. Besides producing enough calories (carbohydrates), breadfruit also contains high levels of vitamin C, calcium and phosphorus. Therefore, this species has the potential to be developed as an alternative food staple for the people of Indonesia (Hendalastuti and Rojidin, 2006).To produce good growth and yield of breadfruit, choosing good quality of seed is needed as well, besides intensive plant maintenance. However, one of the obstacles encountered in the cultivation of breadfruit plants is the procurement of good seeds, because the type of breadfruit does not produce seeds so the nurseries is conducted vegetatively. Vegetative propagation techniques that can be done include transplant, natural shoots transfer, root cuttings and shoot cuttings. However, the common techniques are root cuttings and shoot cuttings, because through these ways, the seeds with an adequate amount will be obtained (Adinugraha, 2009).One way to produce good breadfruit seed growth can be conducted by providing Gandasil D at the beginning of the plant growth. Gandasil D can accelerate the growth of the breadfruit cuttings in the form of leaves and roots. The given dose is 10-30 grams of Gandasil D in 10 liters of water and sprayed every 8 - 10 days once, or depending on local circumstances (Muhadjir and Pamudji, 2007). The use of Gandasil D can help the growth of seedling cuttings to accelerate and fertilize the growth of the leaves. Besides it also helps the root growth on cuttings of breadfruit plants (Muhadjir and Pamudji, 2007). Besides that, in the nursery problem, the use of planting media in breadfruit nursery is also very important to be noticed. This is because the planting medium will affect the growth of good seeds and uniform and resistant to pest disease. The planting media used is in the form of mixture of several types of planting media, between the soil, and manure (Wudianto, 2002). The planting media used is top soil which is rich in organic materials and friable, so it can provide good air circulation in the nursery. Manure is an addition of organic materials that contain lots of macro and micro nutrients. So that, if this media is mixed, it will be a positive impact on the growth of the plant especially the root cuttings of breadfruit crops.Based on the above statement, the researcher is interested to conduct a research with the title "The Effect of Gandasil D Consentration and Plant Media on Root Cutting Growth of Breadfruit (Artocarpus communis)".

## II. Literature Review

### 2.1. Botanical Plant Breadfruit

According to Feryanto (2006), breadfruit plants in plant taxonomy are classified as follows:

Kingdom : Plantae (Plant)
Subkingdom : Tracheobionta (Vascular plants)
Super Divisi : Spermatophyta (produce seeds)
Divisi : Magnoliophyta (flowering plants)
Kelas : Magnoliopsida (double pieces /dicoted)
Sub Kelas : Dilleniidae
Ordo : Urticales

Family : Moraceae (tribe of jackfruits)
Genus : Artocarpus
Species : Artocarpus communis Forst

Artocarpus communis (breadfruit) is a plant of the Artocarpus genus in the family of Moraceae which is widely found in tropical regions such as Malaysia and Indonesia. The height of this plant can reach 20 meters, in Java this plant is used as cultivation plants by the people. The fruit is formed from the entire petals, shaped or rounded long and used as an alternative food. Breadfruits are not seasoned fruits although usually they flower and fruit twice a year. The skin of the fruit is yellowish green and there are segments of plots form polygonal. The polygonal segment can determine the maturity phase of breadfruit fruit (Hendalastuti and Rojidin, 2006).Breadfruit are forest plants that can reach 20 m high. The wood is soft and the bark is rough fibrous. All parts of the plant are gummy. The leaves and the stems are wide, polarized, and coarse. The trunk is large, soft, and gummy. The branches are many, the growth tends to upward (Feryanto, 2006) .

**2.2. Terms of Growing Breadfruit Crops**

Breadfruit is a tropical plant so that almost all regions in Indonesia can grow. Breadfruit can grow in the lowlands (0 m) up to the plateau (700 m asl). The optimal growth is at temperatures with a range of 20-400C.D. The cold area less supports the growth of breadfruit plants. Even if they are able to grow, they will not bear optimal, but they tend to produce lushy leaves. The moisture of the desired breadfruit is 70-90 percent. Moisture is important to support the growth, flowering, and fruit enlargement. When breadfruits are young, they prefer to be shaded but after adult they require full sun (Hendalastuti and Rojidin, 2006). Breadfruit can grow on various types of soil such as red yellow podzolic, calcareous soil, and tidal swamps. However, they will produce better in rich alluvial soil (Wudiarto, 2002).Single breadfruit flowers (female and male flowers are separated), but single home. The flowers come out from the leaf's armpits at the ends of the branches and twigs. The male flowers are long stick-shaped called ontel. The short-stemmed female flowers are like a jackfruit. The female flower is a synthetically compounded flower like the jackfruit. The skin of the fruit stands out flat, so that it looks unclear which is a blotch from a synapetic flower. In breadfruit, the bulge on the skin of the fruit is a soft thorn. Flower pollination is assisted by the wind, while the frequent insects less important role in pollination of flowers (Feryanto, 2006).

**2.3. Gandasil D**

According to Muhadjir and Pamudji (2007), Gandasil is a foliar fertilizer which means that fertilizer is given to plants by dissolving in water then sprayed evenly on twigs and leaves. In addition to Gandasil foliar fertilizer can also be applied as a fertilizer sow. Gandasil is distinguished on Gandasil B and Gandasil D. Gandasil D and B are basically the same, except only the spraying period, Gandasil D is for vegetative phase, meanwhile Gandasil B is for generative phase.Gandasil D is suitable for use of vegetative phase, when the plant is in its infancy and recovery after fruiting. The meaning of D means that Gandasil D is leaf, with the giving of this fertilizer the preferred growth is the leaf, seen from the Nitrogen (N) content which is more dominant than the other elements and compounds. Nutrients contained in Gandasil D include Nitrogen (N) = 20%, Phosphate (P205) = 15%, Potassium (K20) = 15%, and Magnesium (MgSO4) = 1%. The rest are elements and compounds such as Manganese (Mn), Boron (B), Copper (Cu), Cobalt (Co), Zinc (Zn), as well as vitamins to support the growth of Aneurine, Lactoflavin and Nicotinamide (Muhadjir and Pamudji (2007) plants.In general, fertilization through the leaves can provide many benefits for the growth and proliferation of plants. Such as the leaves are getting bushy (green) and fertile. In the provision of fertilizer to note the needs of these plants, so that plants do not get too much food substance. Plants have different fertilizer requirements, too little or too much food can be harmful to plants. Lingga (2004), reveals that the right condition and composition in a fertilization will trigger the growth, especially in the extension of the stems and the branch growth and support the growth of other growth hormone in plants. Basically the use of hyponex fertilizer or other fertilizer is one application of fertilizer application on plants through leaves, which have properties that can stimulate the root growth (Lingga, 2004).Another factor that affects the growth of a plant grows and develops well is a supportive an environmental condition. According to Dwidjoseputro (2000), there are 7 environmental factors that affect the growth of plants such as temperature, sunlight, CO2, and rainfall. The external factors (environment) that affect growth are the availability of minerals, moisture content, and air in the soil, air humidity and duration of irradiation and temperature. In addition, there are biotic factors that affect plants such as weeds, other microorganisms and pests and diseases.

**2.4. Growing Media**

According to Wudianto (2002), planting media is a major component when it will grow crops. Planting media to be used should be tailored to the type of plant to plant. Determining the appropriate and standard planting media for different types of plants is a difficult habitat. This is because each region has different humidity and wind speeds. In general, planting media should be able to keep the moisture around the roots, provide enough air, and can withstand the availability of nutrients.The type of planting medium used in each area is not always the same. In Southeast Asia, for example, since 1940 the planting media used is in the form of fractions of bricks, charcoal, coconut husk, coconut shell, or fern stem. The materials are also not only used in single, but can be combined between the materials with each lain. For example, fern and charcoal are mixed with a certain ratio to be a new planting media. Fern can also be mixed with broken bricks (Wudiarto, 2000).

In the comparison implementation of the plant media to an experiment shows that ideally planting media which is in a poly bag requires a state where the medium has a loose structure, fertile, and crumbs, and rich sources of humus. Test results on breadfruit that have been done related to the comparison between manure and soil using a ratio of 1: 1, 2: 1, 2: 2, and 3: 1 (Wudiarto, 2000).In Dicotyledoneae and Monocotyledoneae the epidermal, cortical, endodermic, pericidal (pericambium) regions share the same position of the epidermis in the outermost root, the inner cortex of the epidermis, the endodermis in the inner part of the cortex, and the inner periphery inside the endodermis. The differences in the root structure of dicotyledoneae and monocotyledoneae plants are in the vessels of xylem and phloem where the xylem in the root of the dicotyledoneae plant is centered, and is arranged radial or forming radii together with the phloem (filter vessels) and separated by cambium (Adinugraha , 2009). Meanwhile the xylem of the monocotyledoneae plant is located adjacent to the phloem and is not separated by kambium. Meanwhile the pith is located in the center of the plant dicotyledoneae and monocotyledoneae.The parts of the root organ arranger in plants from top to bottom generally can be found as follows:

1. The edge or neck of the root (collum radicis), that is the root that directly connects with the base of the stem.
2. The stem of the root (corpus radicis), part of the root that is located between the neck of the root and the tip of the root.
3. The tip of the root (apex radicis), the youngest root part consists of a network that is still growing.
4. The lateral of the root (radix lateral), that is the root branches produced by the main root (principal), and each can still have branch again. The lateral roots form a little further behind the root tip and the older part is behind it. The lateral roots are endogenous which means the lateral roots emerge from within and grow out urging the root tissue of the root so that the root tissue is broken on the outside that is at the lateral root point growing from the main root.
5. The fiber root (radix fibrilla), that is the branch of the roots which is smoother and more fibrous.
6. The hair root (pillus radicalis), which is part of the root which is the protrusion of the root epidermal cells. With the hairs will expand the surface of the roots, thereby expanding the field of water and soil salt absorption. The hair root is always formed near the tip of the root and is not near the apical meristem.
7. The root cap (kaliptra) is the root of which is at the far end, is a useful tissue to protect the young and weak root tips.

The root development occurs because of the downward movement of auxin, carbohydrates and rooting cofactors (substances that interact with auksin causing the roots) either from buds or from leaves. These substances will accumulate and further will stimulate the formation of the root of the cuttings. Adventitious roots can grow from two sources, from callus tissue and from morphological roots or primordial roots (Rochiman and Harjadi, 1973). Another description of the root formation process is proposed by Hartmann and Kester (2003) consisting of four stages as follows:

1. The joining of cells which have the same special function.
2. The formation of the next root from certain cells of the vascular tissue.
3. The composition of primordial roots.
4. The growth and appearance of primordial roots are out through the stem tissue adds with the formation of vascular joining between the primordial roots and the tissue of the vessels from the cuttings. The root-forming power of a cut plant species is influenced by the carbohydrate content and hormonal balance in the cuttings used (Mahlstede and Haber, 1957 in (Adinugraha, 2009). Soil is a place to grow for plants and providers of nutrients. The success of plant growth is largely determined by the soil properties, because the soil properties determine the suitability of plant roots environment. The top layer contains many organic materials that have the ability to suck and hold high water (Purwowidodo, 2008). The soils which are well-operated, the percentage of root formation in cuttings is higher and the quality is better (Hartmann and Kester, 1983).

## III. Materials And Research Methodology

### 3.1. Place and Time of Research

This research was conducted at Experimental Field of Faculty of Agriculture, Teuku Umar University, which was implemented from February 22 to May 16, 2016.

### 3.2. Materials and Instruments

The cutting of breadfruit roots with the age of the plant ± 5-6 years obtained from Gampong Ujong Tanjong, top soil as a mixture of planting media, manure as a mixture of planting medium. Poly bags with size 20 x 15 cm. Paranet as a protector, plastic lid as the seed cover. The wood is as a buffer, and Gandasil D fertilizer, pesticides (Dithane M-45 and Decis/Dursban) as pest and disease control. The instrument used in the research is sieve, hand sprayer, scales, meter, poly bag, HVS paper and stationery, and camera.

### 3.3. Research Method

This study uses a randomized block design (RAK) factorial pattern 4 x 3 treatment that consists of two factors:

1. Gandasil D concentration factor (D) consisting of 4 treatment level, namely:
   - $D_0$ = 0 g /10 liter of water = (0 $g.L^{-1}$)
   - $D_1$ = 10g/10 liter of water = (1 $g.L^{-1}$)
   - $D_2$ = 20g/10 liter of water = (2 $g.L^{-1}$)
   - $D_3$ = 30g/10 liter of water = (3 $g.L^{-1}$)
2. Media of planting soil and manure (K) consisting of 3 treatment levels, namely:
   - $K_1$ = 1 : 1 (soil: manure)
   - $K_2$ = 2 : 1 (soil: manure)
   - $K_3$ = 3 : 1 (soil: manure)

Thus there are 12 treatment combinations. Each combination consists of 5 experimental units. So it was obtained 180 experimental units.

**Table 1** Structure of Concentration Treatment Combination of nGandasil D and Soil Plant and Manure Media

| No | Code | Treatment Gandasil D Concentration ($g/L^{-1}$) | Media Treatment (Soil : Manure) |
|---|---|---|---|
| 1 | $D_0K_1$ | 0 | 1 : 1 |
| 2 | $D_0K_2$ | 0 | 2 : 1 |
| 3 | $D_0K_3$ | 0 | 3 : 1 |
| 1 | $D_1K_1$ | 1 | 1 : 1 |
| 2 | $D_1K_2$ | 1 | 2 : 1 |
| 3 | $D_1K_3$ | 1 | 3 : 1 |
| 1 | $D_2K_1$ | 2 | 1 : 1 |
| 2 | $D_2K_2$ | 2 | 2 : 1 |
| 3 | $D_2K_3$ | 2 | 3 : 1 |
| 1 | $D_3K_1$ | 3 | 1 : 1 |
| 2 | $D_3K_2$ | 3 | 2 : 1 |
| 3 | $D_3K_3$ | 3 | 3 : 1 |

The model of experimental systematic design is as follows:

$$Y_{ijk} = \mu + \beta_i + D_j + K_k + (DK)_{jk} + \varepsilon_{ijk}$$

Note:

$Y_{ijk}$ = The common effect generated by the D factor of the jth th and the K factor of the k-th level contained in the i-th block.
$\mu$ = Middle value (average)
ßi = Influence of the i-th block
$D_j$ = Influence on factor D at the j-th stage
$K_k$ = Influence on factor K at k-level
$(DK)_{jk}$ = Influence Interaction between factor D at j-level, with factor K at k-level
$\varepsilon_{ijk}$ = Random Effect

If $F_{test}$ shows a real effect, then continued with the follow-up test that is real honest difference test (BNJ) at 5% level. With the equation as follows:

$$BNJ_{0,05} = q_{0,05}\,(p;dbg)\ x\ \sqrt{\frac{KT\ galat}{r}}$$

Note:
$BNJ_{0,05}$ = The real difference is honest at the level of 5%
$q_{0,05}$ = Raw Value q at 5% level (number of treatment p and degrees of error free)
KT Galat = Square error
r = Number of replies

**3.4 Research Implementation**

The creation of shade for breeding is for the purpose of protecting the seeds from the heat of the sun when the plants are not ready to receive the full sunlight (direct). Shading is conducted by making simple pole using wood as the shade material support made of black paranet with 25% percentage. In this research, planting is conducted on planting medium by using poly bag as a container of media that will be used. Therefore, before planting, the planting media should be prepared with as soon as possible. The planting media used in this study is a mixture of soil media and manure that has undergone a process of decomposition. The supply of the breadfruit cuttings seeds used is taken from Gampong Ujong Tanjong, with some requirements include: parental plants which at the age of ± 5-6 years, should be free from pests, and the cuttings should be straight and 20 cm long, and 5 cm in diameter. In addition, it should be free of dried or rotten buds. Furthermore, the former pieces are given Dithane M45 fungicide. Before the planting was conducted, fist watering was conducted on the media in the polybags. Watering is conducted by using gembor. Furthermore, the breadfruit cuttings are planted with a depth of ± 3-5 cm (1 segment). Parts of the media that have been planted cuttings are slightly pressed or compacted. This is done with the aim to facilitate between cuttings and media quickly fused and given a hood until the nursery was 2 weeks old. The use of Gandasil D fertilizer is conducted by taking the fertilizer according to the dosage of the treatment used, then given a mixture of water to taste and stirred so evenly. Next it is ready to be sprayed on the breadfruit plant nursery. Spraying is done using hand sprayer. Spraying is done when the plants are 42, 56, and 70 HST and sprayed in the afternoon.As a medium of seedlings in plastic or poly bag can be used soil, manure, with a ratio of 1: 1, 2: 1, 3: 1. Insert the media as much as ¾ plastic or poly bag part. Then the root cuttings are added. The watering action remains to be done. After 1.5 months in poly bag, cuttings grow leaves buds. In addition, the roots were already formed. The seeds from these cuttings are ready to be planted after 4-6 months of age since the start of seedling. To produce a good growth of breadfruit cuttings, the maintenance of breadfruit cuttings includes several activities:

**a. Watering**

In the early growth of the breadfruit cuttings requires a lot of water. Watering was conducted twice, in the morning and in the evening or depending on rainfall conditions. However, because the breadfruit cuttings nursery is under the shade, it is still done watering as much as 2 times.

**b. Pest and Disease Handling**

In the vegetative propagation of plants (breadfruit cuttings), is also inseparable from the disruption of pests and diseases. However, new pest and disease control is carried out only in the event of an attack on the plant. To prevent or control the fungus or fungi used Dithane M-45WP fungicide. Meanwhile for controlling pests of caterpillars and insects then insecticides are used such as Decis 25EC and Durban 200EC.

**3.5 Observation**

**1. Number of Buds**

The counting of buds was conducted at the age of breadfruit seeds 42, and 56, 70, and 84 days after the planting (HST). How to calculate the breadfruit buds is conducted by looking at the number of buds on each leaf armpit.

**2. Number of Leaves**

The counting of leaves was conducted at the age of breadfruit cuttings 56, 70, and 84 HST by counting the number of leaves that have formed perfectly.

**3. Length of Roots**

The measuring of root length was conducted at the age of 84 days of HST by gradually removing the seeds in the poly bags, but before removing the seedlings should be watered, this is to facilitate the removal and to keep the roots from breaking out easily.

**4. Number of Roots**

The counting of the number of roots was conducted at the age of 84 HST by gradually removing the seeds from the poly bags.

## III. Results And Discussion

### 4.1. Results

The result of $F_{test}$ on the analysis of variance (attachment with even numbered 2 to 18) showed that the concentration of Gandasil D fertilizer had a very significant effect on the root length, the root number of 84 HST, and there was no significant effect on the buds number at 42, 56, 70, 84 HST and leaves number at the age of 56, 70, and 84 HST. The average number of buds at the age of 42, 56, 70 and 84 HST at various doses of Gandasil D Fertilizer can be seen in Table 2.

**Table 2** Average Number of Buds at Various Concentrations of Gandasil D Fertilizer at Age 42, 56, 70 and 84 HST

| Concentration of Gandasil D Fertilizer | | Number of Buds | | | |
|---|---|---|---|---|---|
| **Symbol** | **gr/10 liter of water** | **42 HST** | **56 HST** | **70 HST** | **84 HST** |
| $D_0$ | 0 | 1,33 | 2,7 | 5,41 | 9,93 |
| $D_1$ | 10 | 1,26 | 2,56 | 4,7 | 9 |
| $D_2$ | 20 | 1,30 | 2,67 | 5,26 | 9,7 |
| $D_3$ | 30 | 1,26 | 2,7 | 5,59 | 9,44 |

Table 2 shows that the largest number of buds at the age of 42 and 84 HST was found at the concentrations of DG 0g/10liter DD, at the age of 56 HST was found at the concentrations of DG 0g/10 liter DD and the concentrations of 30gr/10 liter of water (D3) whereas at age 70 HST found in the concentration of 30gr/10 liter water (D3) fertilizer although statistically it was not significantly different with other treatment. The average number of leaves of breadfruit plants at the age of 56, 70, and 84 HST at various concentrations of Gandasil D fertilizer can be seen in Table 3.

**Table 3** Average Number of Breadfruit Leaves at Various Concentrations of Gandasil D Fertilizer at Age 42, 56, 70 and 84 HST

| **Concentration of Gandasil D Fertilizer** | | **Number of Leaves** | | |
|---|---|---|---|---|
| **Symbol** | **gr/10 liter of water** | **56 HST** | **70 HST** | **84 HST** |
| $D_0$ | 0 | 1,41 | 4,22 | 4,48 |
| $D_1$ | 10 | 1,22 | 4 | 7,78 |
| $D_2$ | 20 | 1,22 | 3,93 | 8,15 |
| $D_3$ | 30 | 1,19 | 3,52 | 8,3 |

Table 3 shows that the largest number of leaves was at the age of 58 and 70 HST was found at DG concentration of D 0g/10 liter (D0) whereas at the age of 84 HST was found at concentrations of DG 30gr/10 liter of D3 although it is not statistically significant with other treatments. The average number of cuttings of breadfruit crops on various concentrations of Gandasil D Fertilizer is presented in Table 4.

**Table 4** Average Number of Cuttings of Breadfruit Root at Various Concentrations of Gandasil D Fertilizer at Age 84 HST

| **Concentration of Gandasil D Fertilizer** | | **Number of Root** |
|---|---|---|
| **Symbol** | **gr/10 liter of water** | **84 HST** |
| $D_0$ | 0 | 6,67 a |
| $D_1$ | 10 | 9,19 c |
| $D_2$ | 20 | 8,37 b |
| $D_3$ | 30 | 9,7 c |
| BNJ 0,05 | | 0,53 |

Note: The number followed by the same letter in the same column is not significant at the 5% probability level (BNJ test)

Table 4 shows that the number of root of the best breadfruit cuttings found in the concentration of DG 10 D 10 g/10 liters of water (D1) is significantly different with the concentration of DG 20 DG and 10 L water (D2) and 0 g/D0) but it is not significantly different with the concentration of DG Gandasil D 30 g/ 10 liters of water (D3).The average length of the root of the breadfruit cuttings at various concentrations of the DD is presented in Table 5.

**Table 5** Average Length of Root of Breadfruit Cuttingsat Various Concentrations of Gandasil D Fertilizer

| **Concentration of Gandasil D Fertilizer** | | **Length of Root** |
|---|---|---|
| **Symbol** | **gr/10 liter of water** | **84 HST** |
| $D_0$ | 0 | 10,24 a |
| $D_1$ | 10 | 16,43 b |
| $D_2$ | 20 | 17,76 c |
| $D_3$ | 30 | 18,16 c |
| BNJ 0,05 | | 0,64 |

Note: The number followed by the same letter in the same column is not significant at the 5% probability level (BNJ test).

Table 5 shows that the root length of the best breadfruit cuttings was found in the concentration of D3 Gandasil D 30 mg/cutting (D3) which was significantly different with the concentration of DG 10 DG /10 liters D1 and the concentration of 0 g/ 10 liters of water (D0) but it was not significantly different with the concentration of DG 20 g/10 liters of water (D2). The results of $F_{test}$ on the variation analysis (Appendix 2 to 18) showed that the soil and manure media had significant effect on the number of shoots aged 84 HST, and had no significant effect on the number of shoots at age 42, 56, 70 HST, 70, and 84 HST number of root at 84 HST and the length of root at 84 HST. The average number of breadfruit buds crops at the aged 42, 56, 70 and 84 HST on various soil cultivation media and manure can be seen in Table 6.

**Table 6** Average number of Buds on Various Soil Mediaand Manure at the Age 42, 56, 70 and 84 HST

| **Symbol** | **Soil: Manure** | **42 HST** | **56 HST** | **70 HST** | **84 HST** |
|---|---|---|---|---|---|
| $K_1$ | 1 : 1 | 1,14 | 2,56 | 5,19 | 8,44 a |
| $K_2$ | 2 : 1 | 1,31 | 2,67 | 5,03 | 10,06 b |
| $K_3$ | 3 : 1 | 1,42 | 2,75 | 5,50 | 10,06 b |
| BNJ 0.05 | | - | - | - | 0,96 |

Note: The number followed by the same letter in the same column is not significant at the 5% probability level (BNJ test).

Table 6 shows that the largest number of shoots at the age of 84 HST was shown on 2: 1 and 3: 1 planting mediums significantly different from the 1: 1 (K1) medium. At the age of 42, 56 and 70 HST the largest number of shoots were found in 3: 1 (K3) medium. Although statistically it showed there was no significant difference with other treatments. The average number of leaves of breadfruit plants aged 56, 70, and 84 HST on various planting media of manure can be seen in Table 7.

**Table** 7 Average Number of Leaves of Breadfruit Plants on Various Soil media and Manure at Age 56, 70, and 84 HST

| **Planting Media** | | **Number of Leaves** | | |
|---|---|---|---|---|
| **Symbol** | **Soil: Manure** | **56 HST** | **70 HST** | **84 HST** |
| $K_1$ | 1 : 1 | 1,33 | 4,14 | 8,65 |
| $K_2$ | 2 : 1 | 1,22 | 3,83 | 7,53 |
| $K_3$ | 3 : 1 | 1,22 | 3,78 | 8,31 |

Table 7 shows that the highest number of plant leaves at the age 56, 70, and 84 HST was found in 1: 2 (K1) media, although statistically it shows there was no significant differences with other planting media. The average number of roots on some planting media of manure after tested with BNJ0,05 can be seen in Table 8.

**Table 8** Average Number of Roots on Planting Media at 84HST

| **Plant Media** | | **Number of Root** |
|---|---|---|
| **Symbol** | **Soil: Manure** | **84 HST** |
| $K_1$ | 1 : 1 | 8,53 |
| $K_2$ | 2 : 1 | 8,69 |
| $K_3$ | 3 : 1 | 8,28 |

Table data 8 shows that the largest number of roots is found on 2: 1 (K2) planting media, although it statistically shows there is no significant difference with other planting media. The average root length on some husk planting media after being tested with BNJ0.05 can be seen in Table 9.

**Table** 9Average Length of Root on Planting Media at 84 HST

| **Planting Media** | | **Length of Root** |
|---|---|---|
| **Symbol** | **Symbol** | 84 HST |
| $K_1$ | 1 : 1 | 15,68 |
| $K_2$ | 2 : 1 | 15,39 |
| $K_3$ | 3 : 1 | 15,87 |

Note: The number followed by the same letter in the same column is not significant at the 5% probability level (BNJ test).Table 9 shows that the highest number of roots is found in 3: 1 (K3) planting media, although statistically it showed there was no significant difference with other planting media.

## IV. Discussion

The results showed that the concentration of Gandasil D fertilizer had significant effect on the root length, root number of 84 HST, and no significant effect on shoot number at 42, 56, 70, 84 HST and number of leaves at the age of 56, 70, and 84 HST.This is because the concentration of Gandasil D fertilizer in a relatively equal range to the growth of cuttings of breadfruit crops. This is in accordance with the opinion of Muhadjir and Pamudji (2007) which states that the use of Gandasil D Fertilizer at the right concentration can increase the percentage of growing cuttings of plants. Meanwhile the use of improper concentration will make the plant cuttings die. The results showed that the soil and cage manure media had significant effect on the number of shoots aged 84 HST, and the effect was not significant on the number of shoots at the age of 42, 56, 70 HST, number of leaves at the age of 56, 70, and 84 HST root number at the age of 84 HST and root length of 84 HST. This is due to the media with a larger mixture of compounds will have a large porosity space caused by the pore space that can be penetrated by the roots and contains air for root respiration so that potentially increase the length of the roots and the lack of availability of nutrients and microbial inner tubes media. The result of $F_{test}$ on the variation analysis (Appendix 2 to 18) shows that there is no significant interaction between the concentration of Gandasil D fertilizer and soil cultivation media and manure on all growth and media variables observed. This shows that differences in the response of some planting media on cuttings of breadfruit plants are not dependent on the dose as well as vice versa.

## V. Conclusion

The concentration of Gandasil D fertilizer had significant effect on the length of root, number of root 84 HST, and no significant effect on the number of buds at the age of 42, 56, 70, 84 HST and number of leaves at the age of 56, 70, and 84 HST. The best concentration of Gandasil D fertilizer was found at the concentrations of DG 20 g/10 liters of water (D2) and the concentration of DG Gandasil D 30 g/10 L of water (D3). The soil media and the cage manure significantly influenced the number of buds at the age of 84 HST, and had no significant effect on the number of buds at the age of 42, 56, 70 HST, number of leaves at the age of 56, 70, and the number of roots 84 HST at the age of 84 HST and the length of roots at the age of 84 HST. The best media is found on 3: 1 media (K3). There was no significant interaction between the concentration of D and Gandasil D fertilizer on all plant growth varieties of breadfruits.

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