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Original Research Article

Enhancing Germination and Graftability of Magnolia Jackfruit (*Artocarpus heterophyllus* L.)

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Abstract: The study was conducted at the University of Southern Mindanao Agricultural Research Center (USMARC), Kabacan, Cotabato Philippines from November 2018 to March 2019 employing a Randomized Complete Block Design (RCBD) layout and analysis. Nine media treatments replicated three times with ten samples each treatment were considered for statistical analysis. The result of the study revealed that the germination of magnolia jackfruit is unaffected by the different growing media. A 100% germination was revealed in all treatment used. In terms of plant height and diameter, vermicompost performed better compared to all other treatments. On the number of leaves, its ordinary garden soil that gave higher count. The graftability percentage success using conventional method reported that vermicompost and combination of ordinary garden soil (OGS), compost soil (CS), find sand (FS), vermicompost (VS), and vermicast (V) showed significant influence on the grafting success of the magnolia jackfruit stocks. This findings concluded that success of conventional grafting methods is dependent on the growing media.

Keywords: Horticultural crop, magnolia jackfruit, germination, growing media, graftability.

INTRODUCTION

Jackfruit, distinguished as “nangka” or “langka”, is a recognized sweet course or dish eaten at the end of a meal by many people not only Filipinos but also personages living worldwide. In reality, Philippines gives special attention in cultivating this plantation crop.

The genus Artocarpus belongs to the family Moraceae which is part of the tribe Urticales and has numerous economic important species. As claimed by Purseglove (1968), Broussonetia species are developed in the Asian tropics because of its many uses like paper pulp, rope and paper.

Jackfruit is viewed as a species that merit recognition because of its nourishing values and has proven qualities that may be developed and lead to increase the income of the farmers in a small area (Rehm and Espig, 1991) in a way that agrees with Morton (1965).

Jackfruit, scientifically known as *Artocarpus heterophyllus* L, can be propagated sexually and asexually. Each has its superior condition or circumstance for propagators. Jackfruit grown from seed will live longer and tend to produce a substantial trunk which is valuable for timber while asexual propagation fruits much sooner say two to three years. It is well recognized in horticultural crops as this saves a lot of waiting around and avoids having unproductive trees and intentionally produce genetic clones of the parent tree. Bangladesh research stations and universities are using vegetative propagation methods, including grafting and tissue culture, to produce reliable jackfruit cultivars with desirable characteristics (Haq 2006, and Haq and Hughes 2002). This research work will explore grafting technique for the germinated seedlings of magnolia jackfruit.

In addition to propagation technique, jackfruit germination using different growing media is of great importance as this will ultimately contribute to the improvement of producing jackfruit in the local area in particular and in the country in general. This aspect of research has not been fully studied in jackfruit hence this study.

Objectives of the Study

The study was conducted to determine the germination and graftability of 'Magnolia' Jackfruit. Specifically, this study was designed to:

1. Evaluate growing medium that will enhance germination of 'Magnolia' Jackfruit.
2. Determine grafting technique that will promote better success in 'Magnolia' Jackfruit rootstocks.
3. Determine the influence of the growing media on the germination of the grafted seedlings.

METHODOLOGY

Experimental Design and Treatments

The first study was carried out in a Randomized Complete Block Design (RCBD) with nine treatments replicated three times with 10 seed samples per treatment. The treatments were as follows:

T_1 – Ordinary garden soil (OGS)
T_2 – Compost Soil (CS)
T_3 – Fine Sand (FS)
T_4 – Vermicompost (VC)
T_5 – Vermicast (V)
T_6 – OGS, CS, FS (1:1:1 ratio)
T_7 – OGS, VC, V (1:1:1:1 ratio)
T_8 – OGS, CS, FS, VC,V (1:1:1:1:1 ratio)
T_9 – Ordinary Garden Soil, Rice Hull (1:3 ratio)

Location and Preparation of Experimental Area

This study was conducted from December 2018 to April 2019 at the experimental area of the University of Southern Mindanao Agricultural Research Center (USMARC), Kabacan, Cotabato Philippines.

The experimental area was thoroughly cleaned by removing grasses and other unnecessary materials. The set-up was situated under the fruit trees area to prevent from direct sunlight (Fig. 1).

Preparation of Jackfruit Seedlings

For seed germination, 270 'Magnolia' jackfruit seeds (rootstocks) with almost uniform size were properly collected from healthy and fully ripened fruits (Fig. 2). Large seeds possess better germination potential and can produce more vigorous seedlings (Sonwalkar, 1951). After extraction, the seeds were thoroughly washed with water to remove their slimy coating and soaked in water for 24 hours to enhance germination. These seeds were directly sown individually in a 5 x 5 x 10 inches size of polyethylene bags and arranged accordingly based on the specific treatment.

Sources and Variety of Planting Materials

'Magnolia' Jackfruit seeds used as planting materials in the study were obtained from Mr. Manialon of Polomolok, South Cotabato.

Fig. 1: Overview of experimental setup on enhancing germination and graftability of 'Magnolia' jackfruit (*Artocarpus heterophyllus* L.).

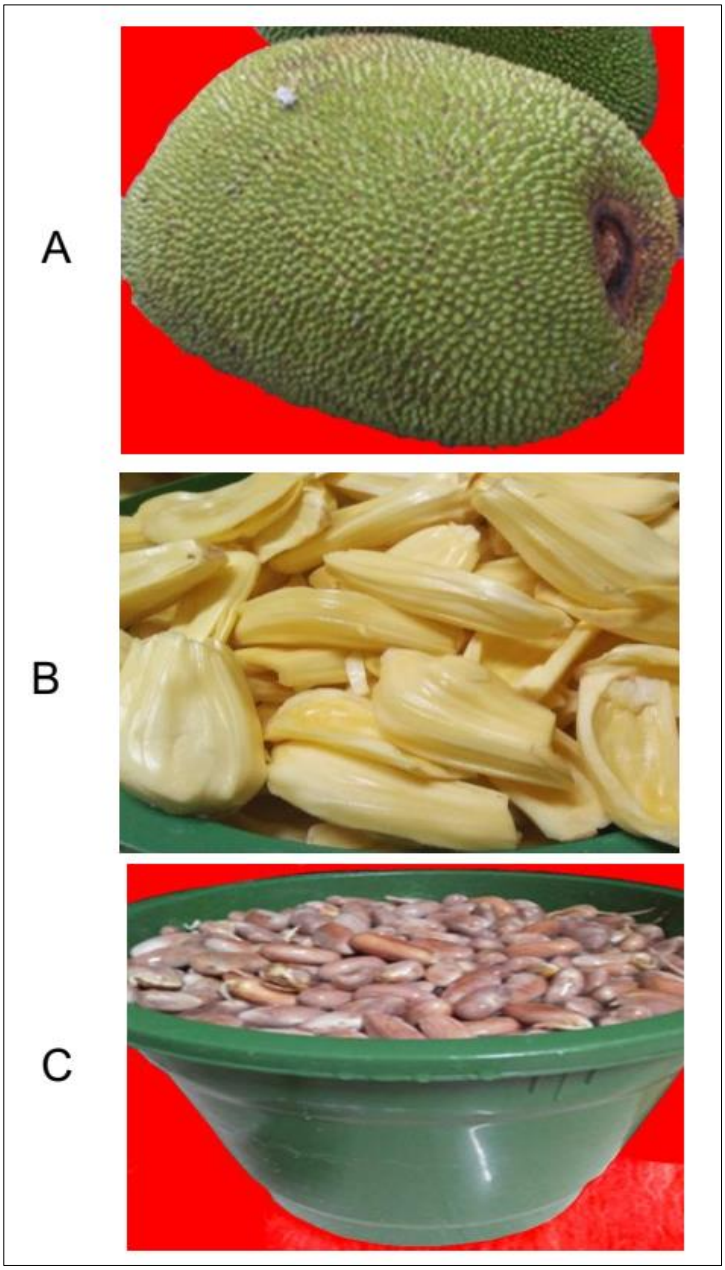

Fig. 2: Mature fruit of 'Magnolia' jackfruit (A), golden yellow aril (B), and selected uniform large seeds ready for sowing (C).

Preparation of Different Growing Media

The different growing media used were the ordinary garden soil, compost soil, fine sand, vermicompost, vermicast and rice hull. They were mixed thoroughly based on the prescribed ratio as indicated in the treatments.

Ordinary garden soil and, compost soil were collected within the area of Kabacan, Cotabato. Vermicast was obtained at Aringay, Kabacan, Cotabato, while vermicompost was taken from the income generating project of the Animal Science Department at University of Southern Mindanao, Kabacan, Cotabato. Fine sand and rice hull were purchased from the construction supplies dealer and rice mill, respectively.

Selection of Seedling Rootstocks for Conventional/Cleft Grafting

The conventional/cleft grafting was done by cutting a V shaped cleft in the rootstock, and a point in the scion (open pollinated 'Magnolia' Jackfruit variety), and then put them together using grafting cellophane. An ice candy wrapper was used to cover the tip portion of the grafts for easy removal during shoot emergence.

Selection and Source of Mother Plant for Scion Collection

Selection of scion mother plant is the important factor for the propagation of fruit plants by grafting. Quality scion mother with appropriate growing conditions assures higher percentage of graft success. Considering this fact, pest and disease free, vigorous and uniform bearing scion mother plants of 'Magnolia' Jackfruit at University of Southern Mindanao Agricultural Research Center was selected for the collection of scion shoots.

Selection of the Scion Materials

The non-flowering shoots of fresh growth having dark green color leaves, about 8-15 cm long, straight, smooth, healthy, pest and disease free with swollen terminal bud in bulging condition were selected (Crane, 2002).

Data Gathered

Days to Germination

The germination was determined after the seed begins to sprout or enlarge. This was done by counting the number of germinated seeds until 100% was completed.

Percentage Germination

This was determined upon termination of the study. The equation to calculate germination percentage was:

$$\text{Germination Percentage (\%)} = \frac{\text{No. of Seeds Germinated}}{\text{Total no. of seeds sown}} \text{ X } 100$$

Plant Height

The height (cm) of the seedlings was taken every week until grafting of conventional technique was done from the reference point (guide peg) at the base of the seedlings up to the growing tip or terminal bud.

Stem Diameter

The stem diameter (mm) was measured from the base of the stem in line with the guide peg. This was taken upon termination of the study with the use of a Vernier caliper.

Number of Leaves

The number of fully developed leaves was counted upon termination of the study. This was taken from the ten (10) sample seedlings/treatment.

Days to Graftable Stage

This was done by counting the number of days from seed germination up to days for epicotyl technique of grafting (21 days) while pencil size for cleft/conventional grafting (60 days).

Percentage Graftable Success

This was determined after 1 month of grafting operation. The percentage was computed using the formula:

$$\text{Percentage graftable seedlings} = \frac{\text{No. of graftable seedlings}}{\text{Total no. of seedlings}} \text{ X } 100$$

Statistical Data Analysis

The various data collected were subjected to appropriate statistical data analysis. Randomized Complete Block Design (RCBD) Analysis of Variance (ANOVA) was used to determine the significance among treatments using IRRI STAR Statistical Software.

RESULTS AND DISCUSSION

Days to Germination

Table 1, in column 2 shows the number of days to germination of 'Magnolia' jackfruit on different growing media. The growing media that significantly influenced the earliest number of days to germination (F= 4.09; Prob = 0.0001) was the combination of Ordinary Garden Soil + Compost Soil + Fine Sand + Vermicompost + Vermicast with a mean of 9.80 days after sowing (DAS) followed by Ordinary Garden Soil + Vermicompost + Vermicast (10.17 DAS); Vermicast (10.47 DAS), Ordinary Garden Soil + Compost Soil + Fine Sand (10.50 DAS), Vermicompost (10.60 DAS), and Ordinary Garden Soil + Rice hull (11.17 DAS). Among the 9 treatments, jackfruit seeds sown in OGS+CS+FS+VC+V had the earliest germination, however it is comparable with vermicompost, vermicast, OGS+CS+FS, OGS+VC+V and OGS+rice hull. This result implies that combination of five growing media plays a major role in successful germination of the seed as they provide nutrients necessary for growth.

Furthermore OGS+CS+FS+VC+V can enhance and cut down to 9.8 days the germination of the 'Magnolia' Jackfruit. Using this media the days to germination was shortened and it helps a lot if it is for the commercial nurseries and mass production of the seedlings.

Table 1: Number of days to germination and the germination percentage (%) of 'Magnolia' jackfruit as influenced by different growing media

Growing Media	Days to Germination	Percentage Germination (%)
Ordinary Garden Soil (OGS)	11.50[a]	100.00
Compost Soil (CS)	11.53[a]	100.00
Fine Sand (FS)	11.37[a]	100.00
Vermicompost (VC)	10.60[ab]	100.00
Vermicast (V)	10.47[ab]	100.00
OGS+CS+FS	10.50[ab]	100.00
OGS+VC+V	10.17[ab]	100.00
OGS+CS+FS+VC+V	9.80[b]	100.00
OGS+Rice hull	11.17[ab]	100.00

C.V. = 15.52%

Means in the same column with the common letter superscripts are not significantly different using Tukey's Honest Significant Difference (HSD) Test

Germination Percentage

Result for the germination percentage is presented in Table 1, column 3. All the seeds have the same germination percentage from different growing media. The result implies that the soil media tested have the same effect in the germination of the 'Magnolia' jackfruit seeds where either of the tested soil media can achieve the percentage of germination.

The same observation was noted by Sonwalker (1951) and Khan *et al.,* (2010) on their studies on jackfruit, wherein germination begins within 10 days with 100% germination within 35 - 40 days after sowing.

Plant Height

The result shows significant difference in plant height (cm) of 'Magnolia' jackfruit at 2 weeks after sowing (WAS) among the treatment means (Table 2, column 2). Vermicompost supported tallest plants of 3.72 cm (Plate 5) comparable with vermicast; mixture or combination of ordinary garden soil + Soil + Vermicompost + Vermicast with means of 3.45 and 3.23 cm respectively, and the least was Ordinary Garden Soil of 1.94 cm. Plants applied with Vermicompost were significantly taller (F=0.0004) as compared to Ordinary Garden Soil and Compost Soil but insignificantly different with Fine Sand, Vermicast, Ordinary Garden Soil + Compost Soil + Fine Sand; Ordinary Garden Soil + Vermicompost + Vermicast; Ordinary Garden Soil + Compost Soil + Fine Sand + Vermicompost + Vermicast; and Ordinary Garden Soil + Rice hull.

A consistent result was observed at the 3rd WAS the growing media that produced the tallest plant height of jackfruit was the vermicompost of 17.71 cm. followed by vermicast (17.30 cm) and the least was ordinary garden soil of

14.48cm. Analysis of variance revealed that vermicompost was significantly different with ordinary garden soil but insignificantly different with compost soil, fine sand, vermicast, OGS+CS+FS, OGS+VC+V, OGS+CS+FS+VC+V, and OGS+Rice hull (Table 2, column 3).

There was a tremendous increase of plant height from week 2 to week 3 as shown in Table 2 and Fig. 3. where the jackfruit planted in the vermicompost was the tallest among the other soil media however it was observed that there were comparable results with other soil media added with vermicompost and vermicast.

The result implies that vermicompost can increase the height increment of the jackfruit seedlings compared to OGS and compost soil. The fast growth increment will be very helpful in attaining the desired height for asexual propagation of the jackfruit seedlings. The earliest it reaches the desired height the better because it is important in the mass production in the nurseries. The result of this study confirms the findings of Arancon *et al*., (2008); and Lazcano *et al*., (2010a) that vermicompost can affect plant growth and yield production by stimulating seed germination and vegetative growth (Edwards *et al*., 2004), as well as by altering seedling morphology such as increased leaf area and root branching.

The growing media that produced the tallest plant height of jackfruit at 3 weeks after sowing was vermicompost of about 17.71 cm. followed by vermicast (17.30 cm) and the least was ordinary garden soil of 14.48 cm. Analysis of variance revealed that vermicompost was significantly different (F= 3.44; prob = 0.0006) with ordinary garden soil but insignificantly different with compost soil, fine sand, vermicast, Ordinary Garden Soil + Compost Soil + Fine Sand, Ordinary Garden Soil + Vermicompost + Vermicast; Ordinary Garden Soil + Compost Soil + Fine Sand + Vermicompost + Vermicast; and Ordinary Garden Soil + Rice hull.

There was tremendous increased of plant height from week 2 to week 3 as shown in Fig. 3. The increase of plant height was from 12.54 cm in the Ordinary Garden Soil compared with 17.71 cm in the Vermicompost (Fig. 3).

Table 2: Plant height (cm) of 'Magnolia" jackfruit seedlings at two and three weeks after sowing (WAS) as influenced by different growing media

Growing Media	2 WAS	3 WAS[1/]
Ordinary Garden Soil (OGS)	1.94[b]	14.48[b]
Compost Soil (CS)	2.12[b]	14.83[ab]
Fine Sand (FS)	2.78[ab]	16.20[ab]
Vermi compost (VC)	3.72[a]	17.71[a]
Vermicast (V)	3.45[ab]	17.30[ab]
OGS+CS+FS	2.89[ab]	15.49[ab]
OGS+VC+V	3.26[ab]	16.68[ab]
OGS+CS+FS+VC+V	3.23[ab]	16.62[ab]
OGS+Rice hull	2.37[ab]	14.76[ab]

C.V. = 33.51 %

Means in the same column with the common letter superscipts are not significantly different using Tukey's Honest Significant Difference (HSD) Test

Fig. 3: 'Magnolia' jackfruit seedlings fertilized with vermicompost at 3 weeks after sowing.

Stem Diameter

The stem diameter of the jackfruit at 3 weeks after sowing revealed that vermicompost grown seedlings got the biggest diameter of 3.70cm followed by ordinary garden soil, OGS+Rice hull, and the least was vermicast of 3.24cm. Analysis of variance revealed that there was significant difference among treatments means (F= 3.24; prob = 0.0012). Tukeys's Honest Significant Difference (HSD) Test shows that vermicompost grown plants had significantly bigger stem diameter as compared to vermicast, OGS+VC+V, and OGS+CS+FS+VC+V, however, comparable when compared to Ordinary Garden Soil, Compost Soil, Fine Sand, OGS+CS+FS, OGS+VC+V, OGS+CS+FS+VC+V, and OGS+Rice hull (Table 3).

The result implies that vermicompost as medium for the seedlings of the jackfruit can give a better result in enhancing the growth as manifested by increase of the seedling stem diameter. The shortest time it reaches the desired size of diameter is very important in asexual propagation especially in grafting and patch budding. This will help the nursery operator in producing quality planting materials in a short period of time.

Table 3: Stem diameter (mm) of 'Magnolia' jackfruit at 3 weeks after sowing as influenced by different growing media.

Growing Media	Means
Ordinary Garden Soil (OGS)	3.52^{ab}
Compost Soil (CS)	3.29^{b}
Fine Sand (FS)	3.34^{ab}
Vermicompost (VC)	3.70^{a}
Vermicast (V)	3.24^{b}
OGS+CS+FS	3.35^{ab}
OGS+VC+V	3.25^{b}
OGS+CS+FS+VC+V	3.25^{b}
OGS+Rice hull	3.38^{ab}

C.V. = 13.55%

Means in the same column with the common letter superscripts are not significantly different at 1% level using Tukeys's Honest Significant Difference (HSD) Test.

Number of Leaves

It was observed that ordinary garden soil produced most number of leaves in week 2 with a mean of 2.13 leaves/seedling, followed by compost soil of 2.01 leaves (Table 4 column 2). The rest of the treatments produced the same number of leaves of 2.00/seedling. Analysis of variance revealed significant difference among the growing media used in the study.

Tukey's Honest Significant Difference (HSD) Test reported that the ordinary garden soil perform significantly better in terms of number of leaves produced by jackfruit as compared to the rest of the treatments.

Analysis of variance revealed that there was significant difference among the growing media at 3 WAS (Table 4 column3). Ordinary garden soil gave the highest number of leaves with a mean of 3.10/seedling which was significantly different from the other treatments. Moreover jackfruit seedlings planted in compost soil, fine sand, vermicompost, vermicast, OGS+CS+FS, OGS+VC+V, OGS+CS+FS+VC+V and OGS+RICE HULL treatment means are not significantly different. The trend of number of leaves was observed in Table 4 which shows a consistent result at 2 WAS and 3 WAS where ordinary garden soil produced more leaves compared to the other seedlings planted in the various soil media. The result implies that ordinary garden soil can produce more number of leaves compared to other treatments. The more leaves produced the higher its photosynthetic activity that will enhance growth and development of the jackfruit seedlings.

Table 4: Number of leaves of 'Magnolia' jackfruit at two and three weeks after sowing (WAS) as influenced by the different growing media

Growing Media	2 WAS	3 WAS
Ordinary Garden Soil (OGS)	2.13^{a}	3.10^{a}
Compost Soil (CS)	2.01^{b}	3.01^{b}
Fine Sand (FS)	2.00^{b}	3.00^{b}
Vermicompost (VC)	2.00^{b}	3.00^{b}
Vermicast (V)	2.00^{b}	3.00^{b}
OGS+CS+FS	2.00^{b}	3.00^{b}
OGS+VC+V	2.00^{b}	3.00^{b}

Growing Media	2 WAS	3 WAS
OGS+CS+FS+VC+V	2.00[b]	3.00[b]
OGS+Rice hull	2.00[b]	3.00[b]
C.V.	6.04%	3.5%

[1/] - Means in the same column with the common letter superscripts are not significantly different using Tukey's Honest Significant Difference (HSD) Test

Graftability of 'Magnolia' Jackfruit using Conventional Technique

Percentage Success

Table 5 present the percentage success of the grafted jackfruit. Result revealed that treatments means for the percentage success are significantly different. OGS+CS+FS+VC+V and Vermicast (V) were significantly higher in percentage success as compared to other treatments.

Result implies that the different soil media affected the percentage success particularly in 'Magnolia' jackfruit. Moreover, as per experience one of the contributory factors in the success rate is the skills of the worker who perform the job and the environmental factors. This observation is similar with the study of Jose and Velselkumari (1991) that, epicotyl grafting technique depends on different factors such as temperature, relative humidity, light, soil moisture, cultivar of scion, age of rootstock and skills of the propagator. This confirms the result of the study because during the grafting operation, there was a varied climatic conditions which might be the reason of low percentage success of the grafts. Result of PAGASA forecast confirms that there was an El Niño during the 1st quarter of April, 2019 which greatly affected the percentage success of jackfruit graftage.

As to the grafting technique, Reddy and Kohli (1985) made attempts to standardize the method of epicotyl grafting in mango under Bangalore conditions. They stated that the success of epicotyl grafting was possible only when the grafts were kept inside the mist chamber or a thatched house where the temperature and humidity were higher.

The poor percentage of grafting success was expected in open condition, where no control on environment could be induced. Study conducted at Kerala by Jose and Velselkumari (1991) revealed that the absence of callus resulted in wide gap between scion and stock of dried grafts in jackfruit. The lowest percentage of success in grafting could also be attributed to the lack of an intimate contact of a cambial region of both stock and scion, due to exudation of latex (Hartmann and Kester, 1986).

Table 5: Percentage (%) success of 'Magnolia' jackfruit as influenced by conventional grafting technique and growing media

Growing Media	Mean
Ordinary Garden Soil (OGS)	23.33b
Compost Soil (CS)	23.33b
Fine Sand (FS)	7.00d
Vermicompost (VC)	10.67d
Vermicast (V)	30.00a
OGS+CS+FS	17.00c
OGS+VC+V	20.00bc
OGS+CS+FS+VC+V	33.33a
OGS+Rice hull	23.33b
Mean[ns]	20.92

C.V. = 32.50%

Means in the same letter superscripts are not significantly different using Tukey's Honest Significant Difference (HSD) Test

Plant Height

Table 6 presents the height of the grafted 'Magnolia' jackfruit at 45 days after grafting. Result revealed significant difference between growing media. The OGS+CS+FS+VC+V, vermicast, and Ordinary Garden Soil have the higher plant height of 38.08cm, 37.09cm, and 36.46cm respectively.

This observation confirms the study of Jose and Velselkumari (1991) that the age of the rootstock, cultivar of a scion and length of the scion affects the growth and success rate of the grafting techniques.

Table 6: Plant height (cm) of 'Magnolia' jackfruit at 45 days after grafting as influenced by growing media

Growing Media	Mean
Ordinary Garden Soil (OGS)	36.46ab
Compost Soil (CS)	32.54c
Fine Sand (FS)	25.53d
Vermicompost (VC)	12.97e
Vermicast (V)	37.09ab
OGS+CS+FS	24.11d
OGS+VC+V	23.20d
OGS+CS+FS+VC+V	38.08a
OGS+Rice hull	35.18b
Mean[1/]	29.46

C.V. - 14.90%

Means with the same letter subscript are not significantly different using LSD

Stem Diameter

The evaluation for the stem diameter of the 'Magnolia' jackfruit was carried out at 45 days after grafting as shown in Table 7. Result revealed that the different growing media showed significant influence on the stem diameter of 'Magnolia" jackfruit. The plant grown with vermicast, compost soil, and OGS+VC+V have significantly bigger stem diameter compared to other treatments.

Table 7: Stem diameter (mm) of 'Magnolia' jackfruit at 45 days after grafting as influenced by growing media

Growing Media	Mean[1/]
Ordinary Garden Soil (OGS)	5.91ab
Compost Soil (CS)	6.39a
Fine Sand (FS)	4.85b
Vermicompost (VC)	2.56c
Vermicast (V)	7.60a
OGS+CS+FS	3.99c
OGS+VC+V	4.69b
OGS+CS+FS+VC+V	6.10a
OGS+Rice hull	5.46ab
Mean	5.28ab

C.V. = 12.52%

[1/] - Means in the same column with the common letter superscripts are not significantly different at 5% using Tukeys's Honest Significant Difference (HSD) test

The result implies that the age of the rootstock influenced the size of the stem diameter of the grafted seedlings. The older the stem of the seedlings the more the nutrients stored in the plant and more plant food supplied to the grafted scion of the jackfruit. This can lead to faster recovery of the grafted scion.

The plant stem diameter of 'Magnolia' jackfruit at 45 days after grafting operation revealed that plants grown in vermicast got the highest stem diameter of 7.60 mm followed by compost soil of 6.39mm, OGS+VC+V of 6.10mm and the least was find sand of of only 2.56mm (Table 7).

Number of Newly Developed Leaves

The number of newly developed leaves at 45 days were shown in Table 8. The OGS+CS+FS+VC+V promoted the highest number of leaves numerically with a mean of about 6 leaves followed by OGS+VC+V with a mean of 4 leaves and the least were vermicompost and ordinary garden soil.

Table 8: Number of newly developed leaves at 45 days after grafting as influenced by different growing media

Growing Media	Mean
Ordinary Garden Soil (OGS)	2.11c
Compost Soil (CS)	0.67d
Fine Sand (FS)	0.33d
Vermicompost (VC)	0.00e

Growing Media	Mean
Ordinary Garden Soil (OGS)	0.00e
OGS+CS+FS	1.33cd
OGS+VC+V	3.67b
OGS+CS+FS+VC+V	5.67a
OGS+Rice hull	0.83d
Mean[1/]	1.66[b]

C.V. - 39.29%

Means with the same column with the common letter superscripts are not significantly different using Least Significant Difference (LSD) Test at 1% level.

The production of leaves can be translated into a more vigorous plant because the photosynthetic activity of the jackfruit seedling is higher compared to the plants with lesser number of leaves. On the later stage they will be more competitive to the weeds because the canopy was established early. Furthermore, the plant can produce more carbohydrates necessary for the plant growth and development.

Number of Shoots

The number of shoots of 'Magnolia' jackfruit at 30 days and 45 days (Table 9 showed that ordinary garden soil and OGS+CS+FS+VC+V supported the highest number of shoots numerically followed by OGS+VC+V but these differences were statistically insignificant in 30 days after grafting. However, in 45 days after grafting, ordinary garden soil, and OGS+CS+FS+VC+V significantly promotes development of new shoots in the grafted plants.

Table 9: Number of newly developed shoots of 'Magnolia' jackfruit as influenced by growing media and grafting technique and at 45 days after grafting

Growing Media	30dag	45dag
Ordinary Garden Soil (OGS)	1.67	2.33a
Compost Soil (CS)	0.33	0.67c
Fine Sand (FS)	0.00	0.00c
Vermicompost (VC)	0.00	0.00c
Ordinary Garden Soil (OGS)	0.00	0.00c
OGS+CS+FS	0.00	0.00c
OGS+VC+V	1.00	1.33b
OGS+CS+FS+VC+V	1.67	2.33a
OGS+Rice hull	0.33	0.67c
Mean	0.56	0.81

C.V. = 20.92% Means with the same column with the common letter superscripts are not significantly different using Least Significant Difference (LSD) Test at 1% level.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The findings reveal that germination of magnolia jackfruit is not affected by the different growing media. However, the grafting performance of the plant is highly dependent on the growing media. The OGS+CS+FS+VC+V and Vermicast (V) were significantly higher in percentage success as compared to other treatments. On plant height, it is OGS+CS+FS+VC+V, vermicast and ordinary garden soil that excelled.

The stem diameter is also affected by growing media. Vermicast, OGS+VC+V, and compost soil perform best. On the number of newly developed leaves, it was OGS+CS+FS+VC+V that significantly produced more number of leaves and OGS+CS+FS+VC+V and ordinary garden soil for developing new shoots among grafted magnolia jackfruit.

Recommendation

The conventional grafting technique is affected by the different growing media in its various characteristics such as percentage of success, plant heigh, stem diameter, number of leaves, and development of new shoots. It is vermicast, OGS+CS+FS+VC+V, OGS+VC+V, and ordinary garden soil that can be best growing media for growing of conventionally grafted seedlings of magnolia jackfruit.

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