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Pot and Growing Medium Effect to The Growth of Dendrobium Orchid

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Abstract
Some of the issues to achieve Dendrobium orchid with flourish flowers and maximum growth quality are to choose the suitable type of planting pots and also the right growing medium. The purpose of this research is to determine the best planting pot and growing medium for Dendrobium sp. The research was carried in Kebun Percobaan Faculty of Agriculture UPN "Veteran" Yogyakarta, Dusun Sempu, Desa Wedomartani, Kecamatan Ngemplak, Kabupaten Sleman, Special Region of Yogyakarta, from April – August 2021. The research was carried in specially designed greenhouse with two treatment factors and used Completely Randomized Design (CRD). Factor I was three different types of pots: black plastic pot, transparent plastic pot, and clay pot. Factor II was four different types of growing medium: fern, sphagum (peat moss), charcoal, and coconut coir. Each treatment combination was repeated thrice. Observed parameter consisted of agronomic parameters. Analysis of varience (ANOVA) with 5% significance rate and Duncan Multiple Range Test with 5% significance rate was used for data analyzing. The result of this research showed that black plastic and transparent pot, also sphagum and charcoal as the growing medium have better effect for the growth of Dendrobium orchid.

Keywords: Dendrobium sp., types of planting pots, growing medium

INTRODUCTION

Nature is one of the most visited toursism destination around the globe, moreover with the increasing number of destinations developed flower garden as the tourist attraction. Orchid is one of the flowers consisted of plenty different types of plant and colors to attract tourists.

Orchid has gained more popularity as decorative plants either from domestic or international enthusiasts. Orhid has more than 800 genuses and 25.000 species across the world. In Indonesia itself, there are more or less 5.000 species of orchids (Fauziah etc., 2014).

One of the most favorable orchid in Indonesia is *Dendrobium sp*. This orchid have a variety of sizes, shapes, and petal colors, also longer freshness compared to other species of orchid. That makes this orchid is more preferrable to customers (Susanto, 2018).

Dendrobium sp orchid has high economic value either as cut flower or as decorative plant on a pot (Kasutjianingati and Irawan, 2013). Besides, the added value for *Dendrobium sp* is they are easier to maintenance and bloom easier.

Every year the demand for orchid especially *Dendrobium sp* keeps increasing either in the form of seedlings, potted young plants, or as cut flowers (Suradinata, 2012). Unfortunately there is imbalance between the demand and the flower production. Orchid production in Indonesia is 24.717.840 stalks in 2018 but then decreases in 2019 to only 18.608.657 stalks (BPS, 2019).

One of the possible attempt to increase orchid production is to use superior seeds and to manage the environment to grow orchid by using suitable planting pot and medium. To find suitable planting pot and medium is to obtain orchid in maximum quality.

Orchid plants require high moisture environment but not too wet. Wet medium will cause decomposition on sprout or leaf. In order to achieve the proper environment, the proper planting pot and medium which able to maintain orchid moisture and prevent puddle is required. The requirements

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of proper pot and growth medium are able to maintain moisture and temperature well, drainage holes to prevent water pooling, also able to support the plant's root (Nurmalinda and Hayati, 2014).

Clay pot and plastic pot are some of the suitable planting containers for growing healthy orchid. Clay pot is made from clay or certain type of soil, burned in high temperture to get thick and hard wall. Clay pot is able to absorb excess water well to maintain moisture of the orchid medium. While plastic pot is made from considered safe inert material for plants. The benefit of plastic pot is that it can be recycled so it's more environmentally friendly, usually have thinner wall compared to clay pot. Another benefit for plastic pot is it can receive plenty of sunlight.

It is recommended to combine water absorbing planting pot with less absorbing growing medium, for example clay pot with fern or with charcoal. Unsuitable pot combination will cause orchid growth become obstructed or even easier to catch disease and die.

Planting medium is one of the influential external factors for orchid growth, so that choosing the suitable medium is necessary (Marlina dkk., 2019). Some of the suitable medium for *Dendrobium sp* orchid production are ferm, sphagnum moss, charcoal, and coconut coir. These mediums are expected to cater proper environment for root growth because of the plenty holes and oxygen available.

RESEARCH METHOD

The reserach was performed in Kebun Percobaan greenhouse belongs to Faculty of Agriculture UPN "Veteran" Yogyakarta, in Dusun Sempu, Wedomartani, Ngemplak, Sleman, Special Region of Yogyakarta. The research was taking place at altitude 144 masl in April – August 2021. The materials that were used for this research were *Dendrobium sp* var. *dian agrihorti* seeds (Balithi collection) of which were the result of plant tissue culture, black plastic pot, transparent plastic pot, clay pot, fern, sphagnum moss, charcoal, coconot coir, fungicide, Vitamin B1, and liquid organic fertilizer.

The tools that were used to conduct this research were ruler, graph paper, and hand sprayer. The research was designed as two factors experiment using Completely Randomized Design (CDR). The first factor was three different types of planting containers, they were black plastic pot, white transparent plastic pot, and clay pot. The second factor was four different types of planting mediums, which were fern, sphagnum moss, charcoal, and coconut coir. Each combination of treatment were repeated three times. Parameter that was observed consisted of the number of leaves, the height of the plant, leaf length, leaf width, stalk diameter, number of roots, and pimary root length.

Data observation was analyzed using analysis of variance (ANOVA) with 5% significance rate, continued using Duncan Multiple Range Test with 5% significance rate.

RESULT AND DISCUSSION

The agricultural characteristics of plant which are the height, diameter, width and length of the leaf, as experiment conducted showed healthy condition with no symptoms of pest and disease attack. The analysis results from compiled data showed that no interaction between the containers and medium toward all tested parameters.

Each treatment factor showed that planting pot type evidently influencing to the height of the plant, also to diameter, length and width of the leaf (as shown in Table 1, 2, 3, and 4). Generally, black plastic and transparent pot provided better effect for the plants in terms of height, diameter, lenght and width, compared to clay pot.

Planting medium type evidently showed influence to height, length and leaf width (Table 1, 2, and 4) but not in the case for diameter (Table 3). Each one of medium type showed specific effect on the observed agricultural characteristik. Charcoal was the best medium for plant height (Table 1), sphagnum moss and coconut coir was the best medium for leaf length (Table 3), while sphagnum and charcoal was the best medium for leaf width (Table 4).

Table 1 . Means of plant height 8 weeks after planting (cm)

Treatment	Pot			Means
	Black plastic	Transparent plastic	Clay	
Fern	7,06	7,37	7,18	7,20 c
Sphagnum	7,09	7,87	7,13	7,36 b
Charcoal	7,69	7,6	7,97	7,42 a
Coir	7,92	7,1	7,9	7,30 b
Means	7,45 p	7,49 p	7,2 q	(-)

Description: Means follows by the same letters on coloumn (a, b, c) and row (p, q, r) points no evident distinction from DMRT 5% test. Minus (-) indicates no interaction.

Analysis result showed that both black plastic pot and transparent pot produced higher plant, with lengthier and wider leaf compared to clay pot (Table 1, 3, and 4). This is because both the containers are more capable to maintain a suitable growth environment for orchid. It is possible that plastic material is able to maintain suitable temperature which is obligatory for respiration. Gunawan (1998) said that orchid is capable to adapt with any kind of pot or container, but the most crucial requirement is that the pot must be able to maintain the moisture and able to contain enough water.

According to Sari, etc. (2018), the application of suitable planting medium is a crucial factor to increase the growth. The medium must comply the requirements needed to maintain proper environment of which are to have enough holes, high oxygen availability, durable, not easily attacked by disease and pest, good aeration and drainage, pH level 5-6, well capable to bind water and nutrition, easy to obtain, and at relatively low price.

Table 2.
Means of stalk diameter 8 weeks after plantation (cm)

Treatment	Pot			Means
	Black plastic	Transparent plastic	Clay	
Fern	1,27	1,39	1,36	1,34 a
Sphagnum	1,24	1,37	1,35	1,32 a
Charcoal	1,22	1,38	1,32	1,31 a
Coir	1,26	1,42	1,24	1,31 a
Means	1,25 q	1,39 p	1,32 pq	(-)

Description: Means follows by the same letters on coloumn (a, b, c) and row (p, q, r) points no evident distinction from DMRT 5% test. Minus (-) indicates no interaction.

Sphagnum moss is a lightweight sponge-like plant. This planting medium has good aeration and drainage system because of its capability to absorb enough water without making the soil too muddy and to save water in the leaf's dead cell. Sphagnum increases the ability for the roots to grow unimpeded because of its porous characteristic (Prameswari, etc., 2014). Binawati (2012) stated that sphagnum contains nitrogen which needed to stimulate dendrobium orchid's growth.

Charcoal as planting medium showed better impact for the height and leaf width of the plant (Table 1 and 4). This medium is suitable to be used for orchid in high humidity environment because its

buffer character. The purpose of buffer on charcoal is to neutralize and to adapt uncompatible nutrient on fertilizer (Erita, 2012).

Table 3.
Means of leaf length 8 weeks after planting (cm)

Treatment	Pot			Means
	Black plastic	Transparent plastic	Clay	
Fern	7,53	7,16	7,45	7,38 c
Sphagnum	7,76	8,81	7,33	7,97 a
Charcoal	7,89	7,29	7,59	7,59 b
Coir	8,52	8,06	7,92	8,17 a
Means	7,92 p	7,83 p	7,57 q	(-)

Description : Means follows by the same letters on coloumn (a, b, c) and row (p, q, r) points no evident distinction from DMRT 5% test. Minus (-) indicates no interaction.

Table 4.
Means of leaf width 8 weeks after planting (cm)

Treatment	Pot			Means
	Black plastic	Transparent plastic	Clay	
Fern	4,42	4,56	4,27	4,41 b
Sphagnum	4,54	4,6	4,41	4,52 a
Charcoal	4,54	4,6	4,6	4,58 a
Coir	4,5	4,47	4,29	4,42 b
Means	4,5 p	4,56 p	4,39q	(-)

Description: Means follows by the same letters on coloumn (a, b, c) and row (p, q, r) points no evident distinction from DMRT 5% test. Minus (-) indicates no interaction.

CONCLUSION

Limited only for this research it is conluded as follows:

1. No interaction between treatment of pot type and planting medium
2. Black plastic pot and transparent plastic pot are more suitable for the growth of *Dendrobium sp.* var dian agrihorti
3. In terms of planting media, sphagnum and charcoal are more suitable for the growth of *Dendrobium sp.* var dian agrihorti.

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