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4 The Growth of Vanda Seedling (*Vanda sanderiana*) with some Types of Plant Media Acclimatization and Concentration of Humic Acid

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Abstract. Vanda is one type of orchid that has the potential to be developed because it has a variety of shapes and colors. Propagation of hybrid vanda seedlings through invitro culture is the right solution to meet market demand. The aim of this research is to find out the right combination of acclimation planting media and humic acid for the growth of hybrid Vanda orchids (*Vanda sanderiana*). Experiments using factorial Randomized Block Design (RCBD). The first factor is the planting media (zeolite, fern roots, and bagasse) and the second factor is the concentration of humic acid (0 mg / L, 50 mg / L, and 100 mg / L). The results showed that the interaction between the treatment types of planting media and some levels of humic acid concentration showed no significant effect on the percentage of seedling life and on plant growth parameters (height and number of leaves), but significantly different in plant height on the planting media factor. The best growing media is zeolite stone.

1. Introduction

Vanda Sanderiana belongs to the family Orchidaceae [1], has the potential to be developed due to various types of flower shapes and colors. Propagation of hybrid vanda seedlings through invitro culture is the right solution to meet market demand. The success of propagation depends on the acclimatization activity, which is the process of adjusting plants from completely controlled conditions to autotrophic conditions and able to adapt to environmental conditions (temperature, light, and humidity) [2]. Growing media in addition to functioning as a place to stand upright plants are also important to support rooting. Zeolite, a hollow three-dimensional silica alumina crystal in which contains metal ions, usually alkaline or alkaline earth and freely moving water molecules [3]. This type of media is able to increase the number of roots and affect the length of the leaf in the acclimatization of the hybrid orchid month [4]. Sugarcane bagasse media contain a lot of cellulose with a percentage of 37.65%, proven to be able to stimulate leaf growth in acclimatization of cattleya orchids [5]. Ferns containing many pores are suitable for orchid patch media, proven to provide good growth in phalaenopsis orchid plantlets with a 100% acclimatization success rate [6].

Humic acid is an organic substance that has a complex molecular structure with high molecular weight (macromolecules or organic polymers) that contains active groups. In nature, humic acid is formed through physical, chemical and biological processes from materials derived from plants and animals through the humification process. Because the structure consists of a mixture of aliphatic and aromatic organic compounds, among which is indicated by the presence of active groups of carboxylic acids and quinoids, humic acid has the ability to stimulate and activate biological and physiological



processes in living organisms in the soil [14]. Hendi [7] reported that administration of 100 mg / L humic acid was able to increase the number of leaves of tomato plants and was able to provide a leaf green color index. In addition, Sarno [8] also reported that the application of 128 mg / L humic acid in spinach was able to influence plant height growth. The aim of this research is to find out the right combination of acclimation planting media and humic acid for the growth of hybrid Vanda orchids (*Vanda sanderiana*).

2. Methods

The experiment was conducted at the Green House of Culture in the State Polytechnic of Jember Laboratory in Jember (80 m above sea level). Planting material is plantlets from the propagation of Sanderiana vanda orchid (hybrid). Planting media ingredients (zeolite, fern roots, and bagasse) and humic acid. The environmental design used was Random Group Design, consisting of two factors. The first factor is the type of planting media (zeolite, fern roots, and bagasse). The second factor is the concentration of humic acid (0, 50, 100 mg / L). The experiment was repeated 3 times. Each trial unit consists of 3 pots. Variables observed included survival (%), plant height (cm), number of leaves (strands). Data were analyzed using the F test at 5% with the BNJ test at 5%. The research was started by preparing all the ingredients, then removing the planlet from the bottle, washing the remaining media agar, soaking it with pesticides for 10 minutes and draining it, then planting it in a media pot that had been prepared according to treatment.

3. Results And Discussion

Plant height

The growth and development of vanda orchid seedlings depends on the ability of these plants to respond to the treatment of planting media. The interaction of treatment types of planting media and the types of humic acid concentrations used showed no significantly different response to plant height parameters. the influence of humic acid on the observed growth variables showed no significant difference, because the response was highly dependent on environmental conditions, plant species and ontogeny (14). The root nature of the vanda orchid is epipit, the root growth character of the seed is slow. Orchid roots function more to help plants attach to the host than to absorb nutrients. High growth response is only influenced by the use of various types of planting media, very significantly different until the 13th week, then until the 16th week was significantly higher in the zeolite media (Table 1).

The response of plant growth to the highest zeolite rock planting media treatment, due to the presence of three-dimensional silica alumina crystals with cavities in them and containing metal ions (usually alkaline or alkaline earth) and water molecules that can move freely can create conditions good for plant growth and development [3]. The response is good with various aspects of the unique physical and chemical properties of the zeolite media, namely as an absorber, ion exchange, molecular filter, and as a catalyst that is soft and dry. In agriculture, it is generally used as a soil enhancer [9] and to make efficient the nutrients (manure) because of the ability to bind and store nutrients then release them back when the plants need them so that nutrients are not easily eroded and evaporated [10]. The results of Suwardi's research [9], zeolite and humic acid were able to increase the growth of rice plants and Kurniasih et al [4], stated that zeolites affect the number of roots and growth of leaf length size in the acclimatization of hybrid moon orchids.

Table 1. Growth response of plant height (cm) Vanda Sanderiana orchid seedlings at the age of plants one week to 16 weeks against the media treatment

WAP	Plant height on the treatment type of planting media (cm)		
	Zeolite	bagasse	fern roots
1	1.9 a	1.3 b	1.2 bc
2	2.0 a	1.5 b	1.5 b
3	2.1 a	1.6 b	1.5 bc
4	2.1 a	1.6 b	1.5 bc
5	2.2 a	1.6 b	1.5 bc
6	2.3 a	1.7 b	1.7 b
7	2.3 a	1.8 b	1.7 bc
8	2.4 a	1.8 b	1.6 c
9	2.5 a	1.8 b	1.6 c
10	2.6 a	1.9 b	1.7 c
11	2.6 a	1.9 b	1.7 bc
12	2.7 a	1.9 b	1.7 bc
13	2.8 a	1.8 b	1.8 b
14	2.7 a	1.8 bc	1.9 b
15	2.9 a	1.9 b	1.9 b
16	2.9 a	2.0 b	2.0 b

Note: Numbers followed by the same letters on the same line show no significant difference in the BNJ follow-up test of 5%. WAP (Week after planting).

Number of leaves

The results of the analysis showed that the response of growth in the number of leaves of vanda Sanderiana orchids to the types of planting media and humic acid concentration did not show any significant difference (Figure 1). Kumiasih [4] the results of his experiments on hybrid moon orchids, that zeolite only significantly affected the increase in the number of roots, also did not show significantly different in addition to the number of leaves and leaf width. According to Medya [11] and Febrizawati [12], it shows that the use of a combined planting medium is better able to increase plant growth because it is possible to contribute to each other in providing nutrients for plants. The combination of sphagnum moss media and bagasse proved to increase the number of leaves in the acclimatization of dendrobium orchids.

The nature of humic acid has a structure consisting of a mixture of aliphatic and aromatic organic compounds, its ability to stimulate and activate biological and physiological processes in living organisms in the soil or media so that it is known as soil enhancer [13]. The function of humic acid is more on the process of improving the quality of the media, considering that the media used by orchids are not the type that is easy to compost, so the effect in this experiment does not show a significantly different response.

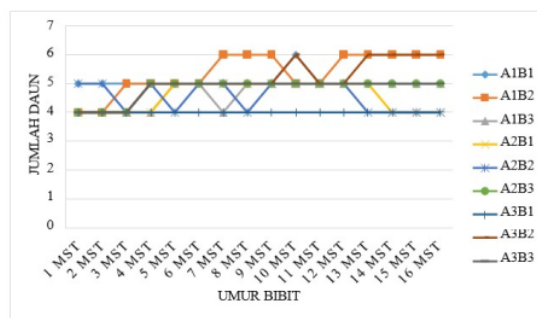


Figure 1. Response of growth of *Vanda sanderina* orchid leaf number to the treatment of various media and humic acid: A1B1 (zeolite stone + humic acid 0 mg / L); A1B2 (zeolite stone + humic acid 50 mg / L); A1B3 (zeolite stone + humic acid 100 mg / L); A2B1 (sugarcane bagasse + humic acid 0 mg / L); A2B2 (sugarcane bagasse + humic acid 50 mg / L); A2B3 (bagasse + 100 mg humic acid / L); A3B1 (fern root + humic acid 0 mg / L); A3B2 (fern root + humic acid 50 mg / L); A3B3 (fern root media + humic acid 100 mg / L)

Percentage of life

The percentage of plant life acclimatized in this experiment was not significantly different (Table 4). The main factor determining life percent is only the ability of plants to be able to adapt to environmental conditions. The nature of orchids in nature actually includes ephipite plants whose life is only attached to other plants but does not harm the host plants. Means that the composition of the media and the concentration of humic acid used does not affect the percent of plant life

Table 2. Life percentages of vanda sanderiana seedlings at 16 WAP (Week after planting)

Media combination	Life percentages
Zeolite + Humic Acid 0 mg / L	100
Zeolite + Humic Acid 50mg / L	100
Zeolite + Humic Acid 100 mg / L	99
Sugarcane bagasse + Humic Acid 0 mg / L	98
Sugarcane pulp + Humic Acid 50mg / L	89
Sugarcane pulp + Humic Acid 100mg / L	98
Chopped fern + Humic Acid 0 mg / L	89
Shredded Fern + Humic Acid 50mg / L	100
Shredded Fern + Humic Acid 100mg / L	98

4. Conclusions

The growth response of hybrid vanda orchid seedlings used for the treatment of planting media types and the concentration of humic acid interactions were not significantly different. The best growth of plant height on zeolite stone growing media.

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