ISBN : 978-602-14917-9-9

FLOWERING INDUCTION OF PHALAENOPSIS ORCHIDS WITH A COMBINATION OF BAP AND TEMPERATURE CONCENTRATION

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Abstract. The length of time needed to produce orchids both in the laboratory and to produce mature flowering plants is an obstacle in the development of orchids. Generally, it takes a long time to get the first flowers from plants that are propagated. This study aims: 1) to determine whether BAP growth regulators can stimulate flowering and growth of Phalaenopsis orchid plants, 2) whether the influence of BAP zpt depends on air temperature, 3) get the best concentration to stimulate flowering and plant growth. The research was carried out at the Lampung State Polytechnic net house from June to August 2019. The research was a factorial experiment in a completely randomized design. As factor I is BAP concentration (0, 50,100,150, 200 mg / l) and factor II is night air temperature (26 / 180C and 32/260 C). There were 10 treatment combinations were tried, with 5 replications. Observed variables include data analyzed by analysis of variance, then followed by a 5% LSD test. The results showed: From the results of this study the following conclusions can be drawn: 1) BAP concentrations can significantly stimulate flowering (spike emergence) & height growth of Phalaenopsis orchid seedlings, and significantly affect leaf length and number of leaves; 2) The effect of BAP concentration interacts/depends on air temperature; 3) The number of spikes per plant is markedly better / more formed at normal temperatures. At normal temperatures, a good concentration of BAP in producing spikes is 100 mg / l, whereas at low temperatures the amount of spike is most when given the addition of BAP 50 mg / l; and 4) At normal temperature the BAP concentration that is good for seedling growth (seedling height, leaf length, leaf width, and number of leaves) is 100 mg / l, whereas at low temperatures BAP concentration is good for seedling growth (seedling height, leaf width, and the number of leaves) is 50 mg / l.

Keywords: BAP, temperature, Phalaeonopsis orchid

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1 Introduction

1.1 Background

Phalaenopsis (Orchids month) is one of the popular orchid genus, has its charm, and much preferred by consumers. The popularity of this flower because of the figure of a beautiful flower. Its diversity in color, shape, and texture, as well as the aroma, wafted diversity complements being called one of the most beautiful flowers (Djaafarer, 2008). Also, the durability of the interest that is long enough, they cause orchid has a normal economic value. (Aminarsi, Syaifullah, and Yulianingsih, 1999).

Orchid growing demand but the demand has not been able to be met by local producers (Djaafarer 2009; Yogie, 2008). Local producers have not been able to meet the demand in terms of both quantity and quality of the flowers. To meet the orchid trade in both domestic and export Indonesia still relies on imported plants (Riri, 2016). On the other hand, according to Djaafarer (2009) in terms of quality and technical mastery of cultivation of existing local producers to compete. Usahapun perpetrators are still few and limited in several cities. This situation provides a good opportunity for businesses to develop business orchids.

Producing flowers generally be the main objective of the development of orchid farms, but the vegetative phase of orchids are generally very long (Semiarti, Purwantoro, Mercuriani, Saso, Slamet, and Utami, 2014). According to Hew and Yong (2004), Phalaenopsis very slow growth, whereby to produce flowering orchid plants grown from plantlets takes more than 2 years. Range time required to produce flowering orchid plants should be conducted with various efforts to develop good farming technology. Induction of flowering is one effort that can be done to accelerate flowering orchid plants. Phalaenopsis flowering begins with the formation of spike/flower stalk (Wu and Chang, 2009). According to Wang (1995) applications on plant growth substances can be a solution for controlling the formation of the spike. One of the growth regulators can be used to induce flowering namely BAP (benzyl amino purine). Also according to Semiarti et al. (2014) Transition, the vegetative phase to the generative phase / Flowering is regulated by environmental factors such as light and temperature right.

1.2 The aims of research

This study aims to: 1) determine whether the dossier of growth regulators can stimulate plant growth and flowering Phalaenopsis, 2) whether the effect of the concentration of BAP depends on temperature PGR air, 3) get the best concentration to stimulate flowering and plant growth.

II. Methode of Research

The experiment was conducted at the home net Lampung State Polytechnic in June and August 2019. The study was conducted in a factorial experimental design completely randomized. As the first factor is the concentration of BAP (0, 50,100,150, 200 mg / l) and the second factor is the air temperature night (30 / 180C and 32/260 C). There are 10 treatment combinations were tested, with five replications. The parameters observed: the number of spikes (flower stalk) per plant, normal plants, leaf length, leaf width, and the number of leaves. Data were analyzed by analysis of variance, followed by LSD 5%.

BAP is sprayed evenly on adult Phalaenopsis orchid plants (Figure 1) with the appropriate concentration of treatment, each of 20 ml. Spraying transactions are carried out as much as 6 times at intervals of 7 days. Plants that have been treated are placed in a room with air temperature days/ night according to treatment.

III. Result and Discussion

From the observation and analysis of variance showed that the BAP is apparent can induce the formation of spikes (flower stalk) Phalaenopsis and normal plants, leaf width, and the number of leaves. but does not affect the length of the leaf. Plant responses to a given concentration-dependent temperature BAP air (there internal si between the concentration of BAP with air temperature (Table 1).

Table 1. Analysis of variance temperature and BAP concentration-effect against The formation of the flower stalk (spike) and the growth of orchids Phalaenopsis

ISBN : 978-602-14917-9-9

sources Di-versity	Non-de-gree	Tot Spike Transf. Vx + ½	normal plant (Cm)	Long-leaf (Cm)	Leaf width (Cm)	num-ber of leaves Trans f. Vx + ½	F. Table 0:05	F. Table 0:01
Tempratur (S)	1	26.74 **	20.73 **	4.10 *	0.92 ns	5.61 **	4.17	7.56
Konsent. BAP	4	13.85 **	9.61 **	2.62 ns	11,19 **	6.86 **	2.69	4,02
S x BAP	4	6.30 **	12.29 **	4.39 **	2.94 *	3.97 *	2.69	4.02
error	30							
KK		21,28%	13,41%	18,00%	21,58%	21.72%		

The results of further tests with LSD at 5% level are obtained: in general at normal temperature (32/26ºC) Award BAP at concentrations of 100, 150, or 200 mg / l tangible increase the amount of spike that appears. However, there is no difference in the number of third spikes given BAP concentrations (Table 2). The effect of BAP concentration given depends on temperature. In normal temperature, Penberian real 100/150/200 BAP concentration increased the number of spikes is formed, but this third BAP concentration showed no difference in the number of spikes. While at low temperature, giving real 50/100/150/200 BAP can induce the formation of a Phalaenopsis orchid spike, and there is no difference in the number of spike fourth BAP concentrations.

Table 2. Response Phalaenopsis orchid spike formation to the treatment BAP concentration and temperature (Transformation Vx + 0.5)

BAP concentration (Mg / l)	Spike Formation Time (Days After Application)		Mean Number of Spike	
	Normal temperature (32/26) ^{0}C	tempera-ture Low (30/18)^{0}C	Normal tem-perature (32/26) ^{0}C	tempera-ture Low (30/18) ^{0}C
0	-	-	0.9428 b A	0.9428 b A
50	21	29	0.9428 b B	1.5792 a A
100	18	31	2.5779 a A	1.2879 ab B
150	18	32	2.4814 a A	1.5792 a B
200	16	37	2.4944 a A	1.5792 a B

Note: The value of the average, followed by the same capital letter (horizontal) and The same lowercase (vertical) shows the real test is not different LSD at 5%

The Effect of BAP concentration on the growth of plant height depends on temperature. At low temperature, giving BAP at concentrations of 50, 100, or 150 mg / l real yield better plant height of 200 mg / l, but there are differences in plant height at the third concentration. Whereas in normal temperature, BAP concentrations of 100 and 200 mg / l real give better plant height (Table 3). Temperature influence on the growth of plant height showed: In the BAP concentration of 50 mg / l better plant height growth of plants placed on normal temperature. Being on BAP concentration of 100 mg / l, the growth of plants placed on normal temperature provide high growth of plants are better than low temperatures.

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Table 3. Response increase plant height and leaf length Phalaenopsis against the concentration of BAP treatment and temperature

BAP concentration (Mg/l)	Mean Added Plant height (cm)		Mean Added Longleaf (Cm)	
	Normal temperatur (32/26)^{0}C	temperature Low (30/18) ^{0}C	Normal temperature (32/26) ^{0}C	temperature Low (30/18) ^{0}C
0	1.15 bc B	1.93 ab A	1.30 b A	1.23 a A
50	1.13 c B	2.13 a A	1.29 b A	1.03 a A
100	2.33 a A	2.10 a B	1.73 a A	1.10 a B
150	1,48 b B	1.98 ab A	1.08 b A	1.15 a A
200	2.00 a A	1.68 b B	1.03 b A	1.23 a A

Note: The value of the average, followed by the same capital letter (horizontal) and The same lowercase (vertical) indicates not different Real test LSD at 5%

Against the length of the leaves: The effect of BAP concentration on the length of leaves also depends on temperature. At low temperature, giving BAP at all concentrations do not provide the length differences leaf with plants that are not given the BAP. Whereas in normal temperature, the BAP concentration of 100 mg / l real gives better long (Table 3). Temperature influence on the growth of leaf length show: In the BAP concentration of 100 mg / l better growth leaf length on plants placed temperature PADSA normal (Table 3).

Response accretion leaf width plants placed on a low temperature BAP showed that administration with a concentration of 50 and 200 mg / l real give better accretion leaf width of 0, 100, or 150 mg / l. But there are differences in plant leaf width increase by BAP 50 and 200 mg / l. Response leaf width accretion plants placed on normal temperature BAP showed concentrations of 50 and 100 mg / l produce a wide gain a better leaf. In the BAP concentration of 50 mg / l, increase the width of the leaves of plants were placed on a low temperature does not differ with increasing width of leaves on plants placed at normal temperatures (Table 4).

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Table 4. Response increment width of leaves and number of leaves Phalaenopsis against the concentration of BAP treatment and temperature

BAP concentration (Mg / l)	Mean Added Leaf width (cm)		Mean Added Number of Leaves Transformation Vx + 0.5	
	Normal tempratur (32/26) 0C	tempera-ture Low (30/18) 0C	Normal temperature (32/26) 0C	Tempera-ture Low (30/18) 0C
0	0:28 b A	0:30 bc A	0.71 c A	0.97 b A
50	0:41 a A	0:42 a A	1:31 a A	1:31 a A
100	0:40 a A	0:30 bc B	1:40 a A	0.84 b B
150	0:20 b A	0:23 c A	1:10 ab A	0.84 b A
200	0:20 b B	ab 00:33 A	0.97 bc A	0.71 ab A

Note: The value of the average, followed by the same capital letter (horizontal) and The same lowercase (vertical) shows the real test is not different LSD at 5%

Effect of BAP concentration against temperature-dependent increase in the number of leaves. At low temperature, giving BAP at concentrations of 50 and 200 mg / l real yield gain a better leaf width of giving BAP 100, 150 mg / l and controls (not given BAP). Whereas in normal temperature, BAP administration with a concentration in the number of leaves 50/100/150 provides better than the control (Table 4). Giving BAP at a concentration of 50 mg / l at the plants placed in the lower temperature responds to the number of leaves that are not different from the plants placed in the normal temperature.

The results above show that the administration of growth regulators BAP treatment is apparent can induce the formation of flowers/spike orchids *Phalaenopsis*. This is consistent with the results of research conducted by Martha, Nurlaelih, and Waridiyati (2011) that the use of PGR especially BAP able to accelerate the induction of flowering orchids in (Phalaenopsis sp.) Similarly, research conducted at the plant Dendrobium Nobile (Wang, Wang, and Ye, 2009). According to Semiarti et al. (2014) Award of growth regulators (BA / BAP and Giberelin) can trigger gene expression PaFT (Phalaenopsis amabilis Flowering Locus T) to induce a phase transition from vegetative to generative for the initiation of flowering plants Phalaenopsis amabilis.

BAP concentration plant responses to a given plant depend on temperature laid-air venue (there is an interaction between the concentration of BAP with temperature PGR). At normal temperatures (32/26), giving the BAP response spike formation (flower stalk) faster than the spike plants at low temperatures, ie 2-3 weeks after application dossier. This is in contrast to the results of research conducted by Wu and Chang (2009) where the application BA 70 mg / l on a plant that has been given a low-temperature treatment can accelerate the formation of a spike (end of week 4). This is presumably due to the influence of the factors that influence the fluctuating nature flower initiation. According to Hew and Yong (2004), flowering Phalaenopsis amabilis needs special conditions and volatile nature. Phalaenopsis requires a temperature of 15-20 0C to stimulate the initiation of flowering (spiking). But according to Blanchard and Runkle (2004) at a constant temperature to 25 0C various Phalaenopsis can start flowering.

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IV. Conclusions

From the results of this study can be concluded as follows:

- Very real BAP concentration can stimulate flowering (emergence spike) and the growth of Phalaenopsis orchids, as well as the real influence of leaf length and number of leaves;
- Effect of BAP concentration-dependent on temperature (there is an interaction effect of the concentration of BAP with temperature).
- Giving BAP with a concentration 100/150/200 mg / l The number of spike per plant markedly better / more formed at normal temperature. In normal temperature, the concentration of BAP in yielding spike and growth (increase plant height and leaf length) is 100 mg / l, while the lower the number of spike temperature well when given the addition of BAP 50 mg / l.

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