

EFFECTIVENESS OF ALOE VERA GEL AND COCONUT WATER AS A BIOREGULATOR ON SEED GERMINATION OF DENDROBIUM ORCHID

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ABSTRACT

The study aimed to determine the effect of concentration of coconut water and aloe vera gel on seed germination of Dendrobium orchid was done in Tissue Culture Laboratory Unmas Denpasar, from the month of April to August 2010. The research method using nested completely randomized design with 3 replications. Treatment additions bioregulator on VW medium consisting of coconut water with a concentration of 0 ml/l, 150 ml/l, 200 ml/l, 250 ml/l and 300 ml/l, and aloe vera gel with a concentration of 0 g/l, 5 g/l, 10 g/l, 15 g/l and 20g/l.

The results showed that there were no initial differences in germination and percentage germination between VW medium given coconut water and given aloe vera gel. VW medium fed coconut water 150 ml/l and 200 ml/l gave the early germination and highest germination percentage. While the VW medium given aloe vera gel 5 g/l and 10 g/l gives the fastest initial germination and the highest germination percentage.

To speed up germination and increase the percentage of seed germination of Dendrobium in the culture medium in-vitro with VW, may be the addition of coconut water 150 -200 ml/l or with leaves of aloe vera gel with a concentration of 5-10 g/l.

INTRODUCTION

The island of Bali as one of the major tourist destination in Indonesia, to be able to provide a variety of tourism facilities, either in relation to the provision of tourism facilities, services and provision for tourists such as orchids. Effendi (1994) mentions that the demand for ornamental plants and cut flowers in each year has increased no less than 10 percent. Consumer tastes towards ornamental plants and orchids are determined by the manufacturer and trends overseas. At this time the dominant preference orchid is Dendrobium species (34%), followed by Oncidium Golden Shower (26%), Cattleya (20%) and Vanda (17%) and other orchids (3%) while many orchid flower color selection influenced by the purpose of its use (Widiastoety, 2004).

Dendrobium orchid preferred by many konsumen because it has high economic value in addition suitable developed at warm area and fresh live of the flowers bloom up to 30 days. For consumers, all of the Dendrobium characteristics is not easily replaced by other plants, and the price is not too expensive.

In the development of orchid plants, the important thing to note is the provision of seedlings. The propagation of orchid plants could done by vegetative and generative. Propagation through vegetative considered less effective, because the number of puppies produced is very limited. On multiplication by generatif, main problem faced is the time for seed germination long enough . This is because the size of orchid seeds are very small and has no food reserves in the endosperm as early seed germination. Besides, the germination of orchid seeds in conditions in vivo showed low germination at less than 1% (Gunawan, 2002). One way that can be done is to germination of orchid seeds in vitro using growth media. The growth medium used for germination of orchids is a medium Vacint and Went (VW). In VW's media, the culturis often add growth hormones to speed up seed germination and also to determine the direction of plant growth and development.

In everyday life, synthetic growth regulators are still difficult to find and the price is relatively expensive, so need to look for other alternatives. One of the natural plant growth regulator (bioregulator) are easy and cheap to obtain is the leaf of aloe vera gel. In the implementation of tissue culture, the addition of coconut water is commonly used. While granting leaves of aloe vera gel in vitro culture has not been widely reported. The use of Aloe vera leaf gel as a bioregulator were tested on several types of plants. Sundahri (1994) stated that aloe vera gel (*Aloe vera*, L.) concentration of 0-12% in a linear increase root growth in cuttings of cat whiskers. This is presumably because the aloe vera gel contains plant growth regulators, especially auxin, amino acids, vitamins and minerals that could encourage the growth of cuttings (Sundahri, 1994). While on vanilla cuttings with a concentration of 50% can increase the amount of leaf growth, shoot dry weight and root length. However, if the concentration is increased more than 50%, the growth of vanilla variables are decreased (Sumantra, 2002). Based on the above description, the problem are: (1) Is the provision of coconut water and aloe vera gel could increased seed germination of Dendrobium orchid. (2) What is the ideal concentration of each bioregulator. (3) Which

of these two kinds bioregulator (coconut water and aloe vera gel) is effective in promoting seed germination of dendrobium orchids

This study aims to: (1) To determine the influence of the concentration of coconut water and aloe vera leaf gel on seed germination of Dendrobium orchid. (2) To know one of the two bioregulator, which can provide a better germination.

RESEARCH METHOD

This research was conducted at Tissue Culture Laboratory of the University Mahasaraswati Denpasar, starting in April-August 2010. The research was conducted with experimental methods. The design used was a completely randomized design with nested patterns (Nested Experiment) or RAL nested with three replicatio. Two types of bioregulator who tried the coconut water and aloe vera leaf gel. Coconut water treatment consisted of 4 levels which are: coconut water 0 ml / l (A0 = control), coconut water 150 ml / l (A1), coconut water 200 ml / l (A2), coconut water 250 ml / l (A3) and coconut water 300 ml / l (A4). While the leaves of aloe vera gel bioregulator consisted of: Aloe vera gel 0 g / l (B0), leaves of aloe vera gel 5 g / l (B1), aloe vera leaf gel of 10 g / l (B2), leaves of aloe vera gel 15g / l (B3), and the leaves of aloe vera gel 20 g / l (B4).

The materials used include medium Vacint and Went (VW), coconut water, aloe vera leaf gel, sugar, 0.1 N NaOH, 0.1 N HCL, alcohol 70%, aquades sterile, chlorox, betadine, spiritus, activated charcoal, fish emulsion, paper label, aluminum foil, paper indicator, dendrobium orchid seeds, paper towels, rubber, plastics isolatif.

The tools used include laminar air flow cabinets (LAF), analytic scales, culture bottles, bottle stock, measuring cups, pipettes, stirring rods, autoclaf, blander, spray bottles, Bunsen lamp, glass chemistry, petri dish, scapel, tweezers, sowerspoon, funnel, erlenmayer, stationery, timer. Implementation of activities consists of several stages:

Making Media consists of several activities:

- a) Make a stock solution of VW and enter each stock solution into the flask peck.
- b) Each flask is then added to the treatment material that is bioregulator coconut water and aloe vera leaf gel separately.
- c) Dilute solution at point b with aquades sterile until the specified limits.

- d) Adjust the pH of the media in order to reach pH 5.5, raise low pH by adding NaOH 0.1 N and high pH lower by 0.1 N HCL.
- e) While stirring pour the gelatin that has been weighed, the volume of solution to be added 1000 ml.
- f) Continue stirring, heat the solution on the stove or hot plate until the agar dissolves.
- g) Solvent is then inserted into the culture bottles with medium thickness approximately 1.5 cm.
- h) Close the bottle culture with heat-resistant rubber lid or with aluminum foil.
- i) Sterilize the above media in the autoclave at a temperature of 121 ° C with a pressure of 17.5 psi for 20 minutes. Sowing seeds of orchids.
- j) Rinse the seeds of orchids with cotton wool soaked in alcohol 95%, cut the base of the fruit so clean from dirt.
- k) Dip fruit orchids in 95% alcohol for 1 minute.
- l) Using tweezers, baked on spritus lights until a few moments so sterile.
- m) In petridish sterile, using a sterile scalpel blade, the fruit is opened to facilitate taking the seeds.
- n) With using long tweezers, grab the orchid seeds and carefully, and culture the seeds on media that has been prepared in advance.
- o) Inkubasikan culture results in a culture room at a temperature of 25 ° C, light intensity from 1500 to 2000 lux with radiation 12 hours /24.

Observations were germination time and germination percentage. Obtained data were processed by analysis of manner. If the results of the analysis showed significantly then continued with Least Significant Difference test (LSD) at 5% level.

RESULTS AND DISCUSSION

The results showed that there is no difference between the addition of coconut water with the addition of aloe vera leaf gel on the germination time and percentage of germination of Dendrobium orchid seeds. The addition of coconut water and aloe vera gel on VW medium, orchid seeds germinate 7.2 weeks after sowing, seeds germination

with an average of 94%. The results showed that the addition of aloe vera leaf gel and coconut water separately on VW medium can increase the percentage of germination and time of seed germination of *Dendrobium* than without the provision.

VW medium plus coconut water 150 ml/l, 200 ml/l, 250 ml/l and 300 ml/l initial seed germination to 7 weeks after sowing (WAS), while without giving coconut water early germination occurred at 8 weeks after sowing. VW medium supplemented 150 ml / l and 200 ml / l, the percentage of germination reached 100%. Medium is added to 250 ml of coconut water / l and 300 ml / l, germination percentage of 98% and 95% respectively, whereas without the addition of coconut water lowest germination percentage is 80% (Figure 1 and Figure 3).

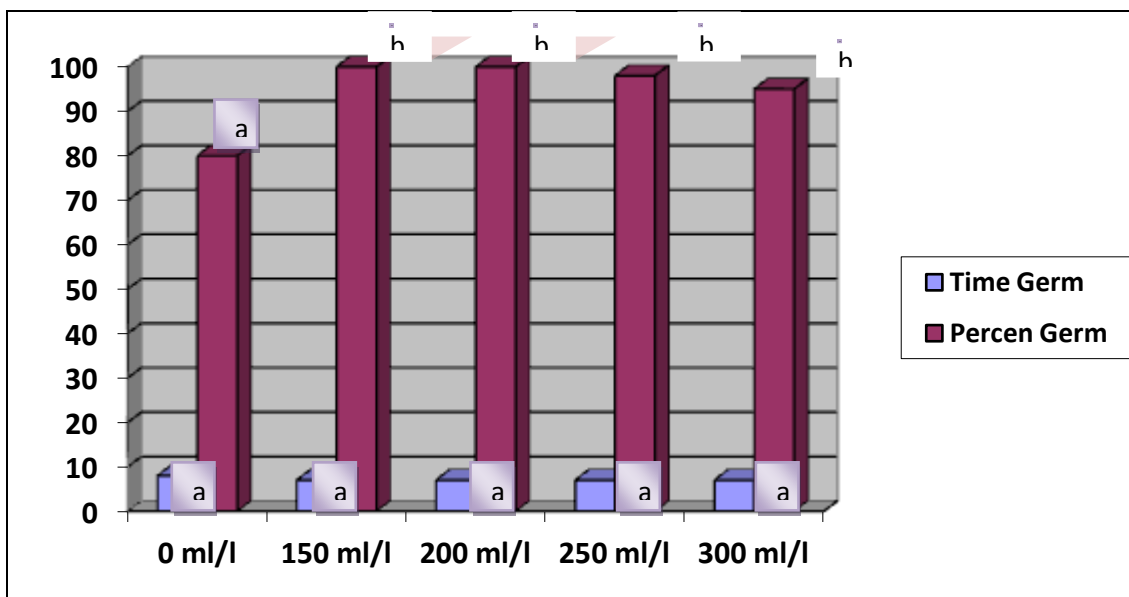


Figure 1. Germination time (WAS) and percentage germination (%) of *Dendrobium* orchid seeds on different concentrations of coconut water

This shows that with the provision of coconut water to speed up the germination of seeds. Coconut water contains many complex organic materials that are often needed for plant growth and development, it contains the hormone cytokinin 5.8 mg / l, auxin 0.07 mg / l and giberilin very little and other compounds that can stimulate the germination and growth (Morel , 1974).

VW medium supplemented with aloe vera gel produce different germination time and germination percentage differently. VW medium without aloe vera gel takes longer than 1 week with Aloe vera gel initial germination 7 MST. Granting leaves of aloe vera gel on VW medium give different values of germination percentage. VW medium supplemented aloe vera gel 5 g / l and 10 g / l produced the highest germination percentage ie 100% respectively. Addition of 15 g / l and 20 g / l, germination percentage of 98% and 90% respectively, whereas without Aloe vera leaf gel the lowest greminationom percentage of 80% (Figure 2 and Figure 4).

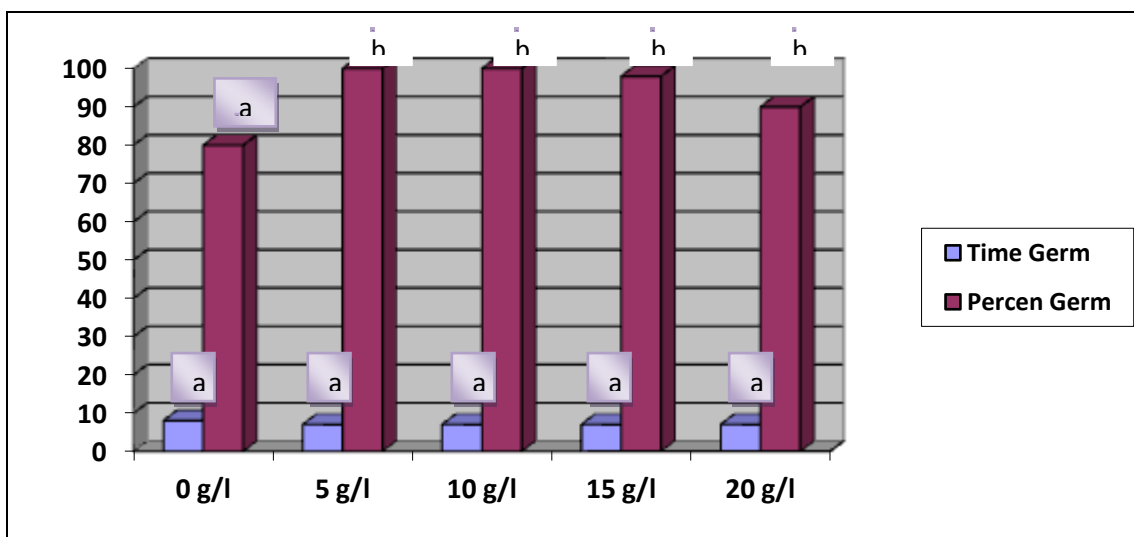


Figure 2. Germination time (WAS) percentage germination (%) Dendrobium orchid seeds at a difference concentration of aloe vera leaf gel.

This is thought that aloe vera gel contains a natural regulator of auxin as well as other compounds. Both natural and synthetic auxin can be used to stimulate and accelerate the formation of roots and to improve the quality and quantity of roots (Hartman and Kester, 1983).

Leopold and Kriedemenn (1988) states that auxin functions in cell differentiation among the leaves and stems and roots at the base of cuttings. Auxin at high concentrations promote the synthesis of ethylene, whereas ethylene inhibits cell elongation at concentrations higher than the optimum concentration. Aloe vera pulp containing pulp alonin and sap. Gum pulp composed of polysaccharides (glucomannan), krisofan acid, protease enzyme, a number of vitamins, minerals and

amino acids. Amino acids make up proteins function to help substitute the damaged cells. Vitamins and minerals into the driving circuit triggers biochemical processes necessary in the healing process. Acid krisofan promote healing of damaged cells, while glucomannan in cooperation with the bacterial enzyme can break the intruder pretease (Sundahri et al., 1996; Afzal et al., 1991).



Figure 3. Performance of Dendrobium growth on VW medium with the addition of coconut water with different concentrations.



Figure 4. . Performance of Dendrobium growth on VW medium with the addition of aloe vera gel with different concentrations.

CONCLUSIONS AND SUGGESTIONS

The results can be concluded as follows:

1. There were no initial differences in germination and percentage germination between VW medium given coconut water and given aloe vera leaf gel.
2. VW medium fed coconut water 150 ml / l and 200 ml / l gave the early germination of the fastest and highest germination percentage.
3. VW medium given aloe vera gel 5 g / l and 10 g / l gives early germination of the fastest and highest germination percentage.

To speed up germination and increase the percentage of seed germination of *Dendrobium* in the medium culture in-vitro with VW, could used coconut water 150 -200 ml / l or with leaves of aloe vera gel with a concentration of 5-10 g / l.

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