THE EFFECT OF BAP AND AMBON BANANA EXTRACT ON THE GROWTH OF CATTLEYA ORCHIDS (Sureeya Gold × Ken Arok) IN SUB-CULTURE II TISSUE CULTURE

THESIS

By :

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BACHELOR PROGRAM OF AGROECOTECHNOLOGY
FACULTY OF ANIMAL AND AGRICULTURAL SCIENCES
UNIVERSITAS DIPONEGORO
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One of the requirements to obtain
degree of Bachelor of Agriculture at the Bachelor Program of
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2025

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2. Every idea or quotation from the work of others in the form of publications or other forms in this thesis has been acknowledged in accordance with the standard procedures of the scientific discipline.
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SUMMARY

PUTRI TAYUVANI GIRSANG . 23020221140080. 2025. Influence BAP And Extract Banana Ambon To Growth Orchid Cattleya (*Sureeya) Gold × Ken Arok*) In Sub Culture II On Tissue Culture (Supervisor: **FLORENTINA KUSMIYATI** and **BAGUS HERWIBAWA**).

The research aims to examine the effect of administering *Benzyl Amino Purine* (BAP) And extract banana on growth orchid cattleya (*Sureeya Gold × Ken Arok*) on sub culture II in a way culture network. Study has implemented on November 13, 2024 – February 11, 2025 at the Tissue Culture Laboratory, Faculty of Animal Husbandry and Agriculture, Diponegoro University, Semarang.

The research method used a 4 x 4 factorial experiment using a Completely Randomized Design (CRD) with 5 replications used in the research, so that there is 80 unit unit test. Factor First is BAP with 4 levels, namely 0 ppm (control), 1.5 ppm, 3.0 ppm, 4.5 ppm. The second factor is Ambon banana extract with 4 levels, namely 0 g/L (control), 10 g/L, 20 g/L, 30 g/L. The parameters observed include the time of shoot emergence, the percentage of browning explants, percentage explanation contaminated, amount shoots And, amount leaf. The data obtained were analyzed using variance and further Honestly Significant Difference (HSD) tests.

The results of the study showed that the administration of BAP significantly affected the growth of shoot emergence time and number of leaves, namely the 4.5 ppm BAP treatment which produced the fastest shoot emergence time and 0 ppm BAP which produced a greater number of leaves, the banana extract treatment at the 20 g/L level provided the fastest shoot emergence time and number of shoots, the interaction of 1.5 ppm BAP treatment on 10 g/L banana extract was the interaction that produced the best shoot emergence time, the interaction of 0 ppm BAP and 30 g/L banana extract produced the best number of leaves. The highest percentage of browning explant media was 40% each 2 bottle Which browning on treatment B0P0 And B1P1. The highest percentage of contaminated explants was 80% in the B0P0 treatment, with 4 bottles contaminated by fungi. Based on the research that has been done, it can be concluded that the optimal growth of cattleya orchid explants in PLB growth is the BAP treatment at a level of 4.5 ppm, and Banana Extract at a level of 20 g/L and there is an interaction between the two factors, BAP and Banana Extract.

PREFACE

The Cattleya orchid is known as a genus of large-flowered epiphytic orchids with *pseudobulbs* of distinctive beauty and characteristics. Cattleya orchids originate from Costa Rica, South America, and are now part of Southeast Asia. Cattleya orchids are a popular ornamental plant, renowned for their beauty as collector's items. Approximately 20% of Indonesians own them. like orchid Cattleya orchid species, so that market demand for Cattleya orchids is increasing. Fulfilling the availability of Cattleya orchids can be done through large-scale plant cultivation. big in a relatively short time, namely by using tissue culture methods.

Gratitude to Lord Which Almighty God for giving mercy and His guidance so that writer can made easier in finish thesis that titled “The influence of BAP And Extract Ambon Banana To Growth of Cattleya Orchids (*Sureeya Gold* × *Ken Arok*) in Subculture II by Tissue Culture”. The author realizes that the preparation of this thesis cannot be separated from the assistance of various parties because they have provided prayers, support, and assistance in carrying out research and compiling the thesis.

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The author realizes that there are still many errors and shortcomings in writing this thesis. Therefore, constructive criticism and suggestions from readers are welcome. will writer look forward to it so that can repair error And the shortcomings contained in this thesis. The author hopes that the results of this research will be useful For reader, interest knowledge knowledge, And all over party competent .

Semarang, April 2025

Writer

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CHAPTER I

INTRODUCTION

1.1. Background

Cattleya orchids or known as one of the epiphytic flowering orchid genus big Which own *pseudobulb* with beauty form and characteristics a very distinctive orchid. The Cattleya orchid is native to Costa Rica, South America, and is therefore part of Southeast Asia. Cattleyas are a favorite among ornamental plants, known for their beauty as collectibles. Approximately 20% of Indonesians own them. like orchid cut cattleya species, request market will orchid cattleya the more increase (Department of Agriculture, 2015). Due to the large demand to meet these needs, cattleya orchids have a fairly high economic value and potential. to be developed in a way commercial (Andri and Tumbuan, 2015). Fulfilling the availability of cattleya orchids can be done through small-scale plant cultivation. big with time which enough short namely with use tissue culture method. Tissue culture methods can produce plants that are identical to their parent plants, healthy and free from disease (Sjahril *et al* ., 2019).

Plant tissue culture is a technology for propagating plants from cells, tissues, or organs in solid or liquid media under aseptic conditions. Tissue culture is a technique for isolating plant parts in the form of organs or tissues. cell and protoplasm (Gaikwad *et al* ., 2017). Technique culture network

aiming to propagate orchid plants, it is necessary to master the conditions that appropriate For growth and development orchid in a way *in in vitro* . Tissue culture techniques (*in vitro*) require sterile conditions, including the space, equipment, materials, and the entire process. This is because the growth of explants in the culture must always be aseptic. The success of tissue culture is greatly influenced by the equipment used. The use of culture media with the appropriate components and the ability to stimulate growth is crucial. propagation *Protocorm Like Bodies* (PLB) or shoots is an appropriate propagation technique. Cultivating plant parts in artificial media containing complete nutrients and plant growth regulators (PGRs), along with the addition of other ingredients to *Murashige and Skoog* (MS) media, requires a sterile and controlled environment (Andriani and Heriansyah, 2021). The composition of the growth medium in tissue culture is crucial for improving the quality of cattleya orchids. PGRs and organic matter (OM) can play a significant role in increasing shoot height, shoot number, leaf number, and root number.

Providing ZPT, namely BAP, in the growth medium can facilitate translocation and also active in regenerate shoots and callus. Giving BAP can induce cell division, shoot growth, and leaf formation in cattleya orchids (Yuswanti *et al* ., 2014). BAP belongs to the cytokinin group, which can influence various processes at the protein production level. Administration of cytokinins at high concentrations can reduce the level of elongation cell on shoots, so that concentration cytokinins Which low

more effective for stimulate elongation cell on shoots. Giving BAP concentration of 3.0 ppm gave the best response to the growth of subculture II cattleya orchid explants (Septianingsih *et al*.,2024). BAP is widely used in plant propagation through tissue culture because it is stable, inexpensive and readily available.

The creation of organic materials is one component that can influence the growth of cattleya orchids. The organic materials used in addition media culture This is extract banana. The addition of organic banana extract to tissue culture media is often done because generally contain source vitamin, mineral, sour amino, carbohydrates, and substance regulator grow which can increase growth and formation of plant organs (Setiawati, 2016). Bananas are an example of organic material Which added to in media culture. Contents which there is in bananas can repair growth plant. On generally type banana Ambon banana is a type of banana that is often used as an additional material in tissue culture media. The best concentration of organic material, namely Ambon banana extract, at 20 g/L, provided the best response to the growth of Cattleya orchid explants in subculture II. The administration of Ambon banana extract gave the best results at a concentration of 20 g/L on the growth of the number of shoots, the number of leaves, and the leaf area of orchids (Nuryadin *et al* ., 2020).

1.2. Objective and Benefits of Research

Objective study This is :

1. Review influence various concentration *Benzyl Amino Purine* (BAP) on the growth of cattleya orchid explants subculture II.
2. Review influence various concentration giving extract banana on the growth of cattleya orchid explants subculture II.
3. Review interaction various concentration BAP And extract banana on the growth of cattleya orchid explants subculture II.

Benefit study This is :

1. Know concentration Which best from *Benzyl Amino Purine* (BAP) in the growth of cattleya orchid explants subculture II.
2. Know concentration Which best from extract banana in growth of cattleya orchid explants subculture II.
3. Know information about interaction BAP And extract Banana in the growth of cattleya orchid explants subculture II.

1.3. Hypothesis

Hypothesis study Which tested is as following :

1. Concentration BAP 3.0 ppm give response best to growth of cattleya orchid explants subculture II.
2. The best concentration of banana extract was 20 g/L which gave the best response to the growth of subculture II cattleya orchid explants.
3. There is interaction treatment BAP And extract banana on the growth of subculture II cattleya orchid explants.

CHAPTER II

LITERATURE REVIEW

2.1. Cattleya Orchid

The cattleya orchid is a beautiful and highly sought-after orchid species in Indonesia. It is found on the islands of Papua, Kalimantan, and Sumatra. own flowers Which big And beautiful with colors Which bright and pleasant aroma. Cattleya has a larger size compared to with orchid other, as well as own diversity form and flower colors, such as pink, purple, white, and orange (Hasby *et al* ., 2018). This cattleya orchid is highly sought after by enthusiasts and collectors due to its high popularity. The name cattleya is in accordance with the name of the famous horticulturist, William Cattleya, who discovered the plant (Harahap *et al* ., 2023). Cattleya orchids in plant taxonomy are classified as follows:

Kingdom : Plantae

Division : Spermatophyta

Subdivision : Angiospermae

Class : Monocotyldoneae

Order : Asparagaceae

Family : Orchidaceae

Genus : Cattleya Lindl . (Dressler, 1993).

Cattleya orchids have a sympodial growth pattern, meaning they have more than one growing point on the main stem. Cattleya orchids have a fibrous root system. Cattleyas have roots that are generally soft and easy broken with end root Which tapered (Goddess And Widianjaya, 2018). Roots orchid cattleya have layer *velamen* Which nature *spongy* (hollow) that underneath contain chlorophyll. Orchid cattleya own long stem 3 –16 cm Which grouped meeting And own leaf Which seen more thick Compared to most plants, the flowers of the Cattleya orchid are formed at the tips of the plants and have short flower stalks. Cattleya flowers have irregularly shaped petals and sepals, and they are large. And have five part main that is leaf petals (sepal), leaf petals, stamens, pistils, and ovaries (Shela *et al* ., 2018).

Seed orchid No own endosperm or called No own Food reserves, therefore the role of sugar and other nutrients from the surrounding environment is essential for the germination and initial growth of orchid seeds. Growing or germinating orchid seeds has a high level of difficulty. Generative reproduction takes a long time because orchid seeds do not have food reserves for embryo growth like plant seeds in general (Etty and Isnawan, 2014).

2.2. Technique Plant tissue isolation method

Cattleya orchids can be propagated generatively and vegetatively. Orchid propagation through seed culture cannot be done conventionally because orchid seeds do not have endosperm (food reserves), so germination can only be done by growing them in artificial media aseptically through in *vitro seed culture* (Kurnianingsih *et al* ., 2020). The *in vitro method* from seed germination, subculture to *plantlets* ready for acclimatization requires a fairly long time of around 10–12 months (Erfa *et al* ., 2012). Tissue culture techniques aimed at orchid propagation require mastery of the right conditions for orchid growth and development *in vitro* . One of them is the use of culture media with the right components that can stimulate *protocorm-like multiplication. bodies* (PLB) or shoots. A high cytokinin-auxin ratio will encourage shoot formation, while a low cytokinin-auxin ratio will encourage root formation (Tuhuteru *et al* ., 2014). Activated charcoal added to the culture medium can function to absorb toxic compounds and create dark conditions that stimulate root growth in cultured plants (Yusnita and Handayani, 2020).

Plant tissue culture is the aseptic culture of cells, tissues, organs and other components under physical and chemical conditions *in vitro* . Plant tissue culture is technique Which used to grow develop plant parts, Good in the form of cell, network or organ in condition aseptic Which done

in a way *in vitro* (Yasmin *et al* ., 2018). Culture network means cultivate a plant tissue becomes a small plant that has characteristics like its parent. Benefit from culture network that is can produce plant new in large quantities and in a short time, with the same properties and quality. Media is place network For grow And take nutrition Which Support tissue life. Growth media provide various materials that tissues need to live and reproduce. There are two types of growth media: solid media and liquid media. Solid media generally consists of solids gel, like so that whereas media liquid is nutrition Which dissolved in water (Andriani and Heriansyah, 2021). The growing medium required for orchids is media which can save water and elements Hara as well as let it go on the roots slowly, not easily rotted, sufficient air is available for the roots, easy to obtain and relatively cheap (Tirta, 2015). The planting medium used for orchids must have many cavities so that the roots can grow. get Lots oxygen so that development root Good. Good root growth and development will impact overall plant growth (Suyanto and Ropiana, 2021). Treatment will involve adding growth regulators and organic materials to the orchid tissue culture medium. The addition of organic materials containing plant growth regulators (PGRs) and vitamins is known to improve the growth of propagated plants. through tissue culture.

2.3. BAP (*Benzyl Amino Purine*)

Plant growth regulators are An additional substance in the form of a growth hormone added to the culture medium to support plant growth. The growth regulator (PGR) used is BAP (*Benzyl Amino Purine*). BAP BAP is a plant growth regulator belonging to the cytokinin family that can stimulate shoot growth in orchids. BAP is a cytokinin-based plant growth regulator (PGR) that functions to increase cell division, shoot proliferation, and shoot morphogenesis (Kartiman *et al* ., 2018). BAP's role in plant growth includes its relationship to cell division, shoot proliferation, and morphogenesis.

Giving BAP on media culture network useful as nutrition An addition that can accelerate the formation of new shoots. BAP is a type of cytokinin that can influence various processes at the protein production level, given the acidity of the cytokinin structure with adenine, a component of DNA and RNA. Cytokinins stimulate RNA synthesis and protein formation, which are necessary for cell division and formation. network on plant (Saputri And Mukarlina, 2015). The addition of BAP can stimulate vegetative growth, especially shoots. BAP is a hormone that can stimulate cell division and morphogenesis. The balance between BAP and Kinetin is crucial for bud induction because each of these growth regulators plays a role in orchid bud induction.

2.4. Organic Materials

Addition material organic to in media culture network Lots done because generally contain source vitamin, mineral, sour amino, carbohydrates, and substance regulator grow Which can increase growth And formation of plant organs (Apriliyani and Wahidah, 2021). Bananas are an example of organic material added to the media. The content contained in bananas can be repair growth plant. On generally type banana Which often used in media additives culture The tissue is the Ambon banana variety. Administration of Ambon banana extract provided the best results for *plantlet height growth,* orchid leaf number, and area (Nursolilah *et al* ., 2022).

The addition of organic matter is one component that can influence the growth of cattleya orchids. The organic matter used in this culture medium is banana extract. Adding banana extract, potato extract, and other plant-based substances with high carbohydrate content can enhance cell growth and differentiation in plants. (Djajanegara, 2015). The organic material used, namely banana extract, using MS media for the growth of the Cattleya orchid embryo phase needs to be carried out for optimal growth with the addition of growth regulators. The vitamin content in 100 grams of banana is vitamin A 3 µg, thiamine (vitamin B1) 0.031 mg, riboflavin (vitamin B2) 0.073 mg, pyridoxine (vitamin B6) 0.367 mg, folate (vitamin B9) 20 µg, and ascorbic acid 138 (vitamin C) 8.7 mg, whereas contents other Which there is

in fruit banana is sugar 12.23 grams, energy 89 kcal, protein 1.09 grams, fat 0.33 grams And calcium 5 mg. So that addition extract fruit banana And BAP in the media is expected to be able to support the growth and development of explants.

2.5. Culture Network Orchid Plants Cattleya

Propagating Cattleya orchids using seeds is very difficult using conventional methods, but with tissue culture, approximately 99% of the millions of seeds contained in a single capsule can be grown under the appropriate media conditions. Orchid capsules or fruits that are ready for seed sowing are generally 9-12 months old. Some of the main stages involved are: done in culture network between other initiation, multiplication/subculture and the final stage is acclimatization.

Initiation is the initial stage in which explants form PLBs, and the next stage is the proliferation stage to increase the number of PLBs. Initiation, or planting of explants, is often carried out in a highly sterile environment to prevent contamination by microbes or other pathogens. Explant initiation can be carried out in *Laminar Water Flow* (LAF) Which is Wrong One method Which commonly used to achieve explant sterilization . The explant sterilization process, especially those originating from fruit, can be done by spraying the surface of the explant using alcohol before being brought into the work room and then sterilized again in the LAF by burning (Sutriana *et al* ., 2014). Explants are one of the One factor Which very important in success culture network. Election

Good explanation can have an impact on process growth plant which will be cultured, namely health explants, cleanliness of explants, age and resistance as well as morphology of the explants (Saepudin *et al* ., 2020).

Multiplication is the stage of multiplying explants by subculture, namely the repeated transfer of explants to new media containing ZPT to maintain the explants. The subculture activity is the explants that have formed... PLB aged 3 month in media previously can moved to new media using sterile tools such as tweezers and *scalpels* (Yasmin *et al* ., 2018). Explants transferred to new media will need time to adjust to the new environment, within a few days or weeks, the explants will begin to grow and develop into new plants. Subculture of cattleya orchid plants can be done 3-4 times with a subculture time span of 3 months before entering the final stage, namely acclimatization (Kartiman *et al* ., 2018).

Acclimatization is one of the crucial stages in tissue culture, the stage acclimatization that is process adaptation plantlets from in bottle Which under control to environmental conditions from heterotrophic to autotrophic conditions (Tini *et al* ., 2019). Cattleya orchid plants that are ready for acclimatization are those that are already in the form of plantlets, meaning they already have perfect roots, stems, and leaves. The process of activities during acclimatization is carried out by removing the plantlets from the culture bottle, washing the plantlets, drying the plantlets, and finally namely planting plantlets in charcoal or moss media. Plantlets that have been removed from bottle culture *in vitro* And dried can planted with use

media such as moss (Erfa *et al* ., 2019). Moss planting media is often used for planting plantlets after process acclimatization Because own characteristic Which Good to encourage healthy root growth and provide a moist environment for the plants. The media must have the ability to retain and provide sufficient water for the plants, but must not be so retentive that it causes excessive waterlogging, the media must not contain pathogen or become place develop breeding pathogen Which can cause disease in plants (Andriani and Pramushinta, 2017).

CHAPTER III

MATERIAL AND METHOD

This research was conducted on November 13, 2024 – February 11, 2024 2025 in Laboratory Culture Network Faculty Farm And Agriculture, Diponegoro University, Semarang, Central Java, followed by care and observation at the Tissue Culture Laboratory of the Faculty of Animal Husbandry and Agriculture, Diponegoro University.

3.1. Material Study

The materials that used in study this is PLB explanation plant orchid cattleya (*Sureeya Gold* × *Ken Arok*) subculture the second one is six months old and comes from the Tissue Culture Laboratory of the Department of Agriculture and Food, Magelang, Central Java, BAP, extract banana Ambon, agar-agar, sugar, media *Murashige and Skoog* (MS), Sodium Hydroxide (NaOH), Hydrochloric Acid (HCL), 70% alcohol, and distilled water. The tools used in this study were tweezers, spatulas, pipettes, petri dishes, scalpels, measuring cups, culture bottles, blenders, filters, beakers, Bunsen burners, pH meters, *hot plates, magnetic stirrers,* refrigerators, autoclaves, *Laminar Air Flow* (LAF), digital scales, labels, cameras, and stationery. Cattleya orchid explant materials can be seen in Illustration 1.

Illustration 1. Material study in the form of explanation Orchid Cattleya aged 6 month

3.2. Method Study

3.2.1. Design Test

Study This use Design Random Complete (RAL) Which arranged factorially with two factors each consisting of Factor 1 (BAP Concentration) with 4 treatment levels, namely:

B0 = 0 ppm (Treatment control)

B1 = 1.5 ppm

B2 = 3.0 ppm

B3 = 4.5 ppm

Factor 2 (Extract Banana) with 4 level treatment that is : P0

= 0 g/L (Control treatment)

P1 = 10 g/L

P2 = 20 g/L

P3 = 30 g/L

These two factors resulted in a combination of 4 x 4 = 16 treatments. And done 5 time repetition, with thus obtained number of units test as much as 80 unit test. On 1 unit test there is 1 bottle

Which containing 3 explanation cattleya orchid .

3.2.2. Procedure Study

The research was conducted in several stages, namely preparation (sterilization of tools and preparation of materials), treatment stage (making stock media and sterilizing media), planting (room sterilization, explant sterilization, multiplication or subculture) and observation (data collection).

1. **Preparation stage.** Preparation of tools and materials, including sterilization and preparation of materials. Equipment used includes tweezers, spatulas, pipettes, and cups. petri dish, *scalpel* , glass measuring, bottle culture And glass cup in sterile conditions by washing the equipment, then wrapping it neatly in paper and then sterilizing it using an autoclave at a temperature of 121℃ for 30 minute. After That all tool And material entered to LAF which has been sprayed with 70% alcohol. Ambon banana extract is added to in media, entered to in bottle Which sterile After that, it is covered and placed in the refrigerator. The BAP added to the media is then placed in a sterile bottle, then closed and stored at room temperature.

2. **Preparation of BAP stock solution** . BAP with a concentration of 100 ppm (Appendix 3). The BAP stock solution was placed in a refrigerator. The first treatment was adding various concentrations of BAP, including B0 (control) = 0 ml, B1 = 0.15 ml, B2 = 0.30 ml, B3 = 0.45 ml. Treatment control made without mix BAP in media

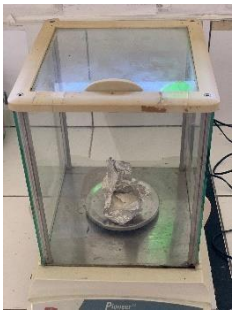
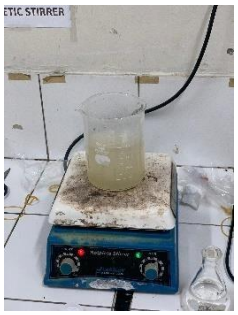
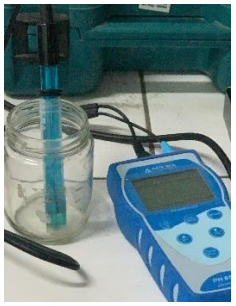
multiplication, treatment B1 was made by adding 0.15 ml BAP into the propagation medium, treatment B2 was made by adding 0.30 ml BAP into the propagation medium and, treatment B3 made with add BAP as much as 0.45 ml to in the media propagation. All treatment BAP Which has entered to in a closed culture media bottle, then sterilized.

3. **Making a stock solution of banana extract** . Making a stock solution of banana extract with a concentration of 10 g in 100 ml. Take 10 g of Ambon banana (Appendix 4) then put it into a blender along with 100 ml of distilled water after blending. The Ambon bananas were filtered using filter paper and then placed in an Erlenmeyer flask. The filtered and homogenized banana extract stock solution was then wrapped in aluminum foil and refrigerated. Treatment second done with add extract Ambon banana on media propagation with various concentration between other P0 (control) = 0 ml, P1 = 1.0 ml, P2 = 2.0 ml, P3 = 3.0 ml. Extract control treatment banana Ambon made without mix extract banana Ambon into the propagation medium, treatment P1 was made by adding 1.0 ml of Ambon banana extract into the propagation medium, treatment P2 made with add banana extract Ambon as much as 2.0 ml into the propagation medium and, treatment P3 was made by adding 3.0 ml of Ambon banana extract into the propagation medium.

4. Making media culture and sterilize media .

Making media culture network in 100 ml that is use MS 4.43 packages, agar, sugar, distilled water, BAP, Ambon banana extract are presented in (Table 1).

Table 1. Making media plant tissue isolation method in 100 ml media

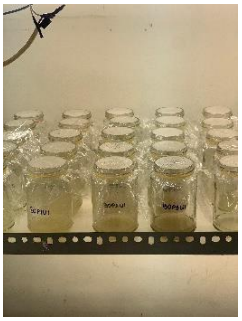
Documentation	Information
	MS weighed as much as 0.443 g, 3 g sugar, 1.2 g agar and weigh the banana extract stock as much as 1 ml, 2 ml and 3 ml.
	100 ml of distilled water is put into a beaker, the weighed material is put in according to the concentration. each BAP and banana extract treatment.
	All the ingredients that have been weighed are homogenized using a *magnetic stirrer* until dissolved.
	Then the pH of the media can be measured using pH meters with The pH acidity measurement limit is 5.6 – 5.8.

If the pH does not meet the measurement limit, 1 N NaOH solution can be added to increase the pH and 1 N HCL solution can be added to decrease the pH.

Then the media is cooked on *a hot plate magnetic stirrer* until the media boils completely.

After boiling, the media is then added into the each bottle culture as much as 20 ml/bottle, then the bottle is covered with clear plastic and sealed using rubber.

After the process of making all the treatment media, the media was then sterilized in an autoclave for 25 minutes at a temperature of 121° with a pressure of 1 atm.



Then the sterilized media is stored at room temperature 23 ° C–24 ° C in the incubation room or Also can saved temporary in LAF.

5. **Planting.** Planting includes room sterilization work, sterilization of cattleya orchid explants and multiplication or subculture. Sterilization of the work space is carried out by sterilizing the work space, such as mopping the floor using Bayclin solution, then sterilizing the LAF before use by turning on the ray UV during One O'clock, And turn on *blower* during Five minutes later, it is sprayed with 70% alcohol along with the tools and materials to be used. Sterilization of the explants is carried out by soaking the Cattleya orchid explants in distilled water three times until clean. Multiplication or subculture is carried out when the media and explants have been prepared according to sterile regulations. This explant subculture is derived from a sterile PLB of Cattleya orchid plants which is then subcultured in the LAF which is in a state of sterile condition. sterile. Cup petri dish, *scalpel* And tweezers sterilized use Bunsen flame in laminar air flow. *Scalpel* is used to cut off unused explant parts and used PLB explants. placed in on cup petri dish. Explanation Which chosen Then multiplied into new media as many as three explants in each culture bottle.

3.2.3. Parameter observation.

1. **Time Appear Shoots (HST)**

   Time appear shoots counted from emergence shoots new on moment days after planting and note on what day the shoots start to appear.

2. Amount Shoots (shoot)

Amount shoots counted on moment shoots Already appear every One time a week for 8 weeks of observation.

3. Amount Leaf (strand)

Amount strands leaf counted on moment leaf Already open perfect in week 8.

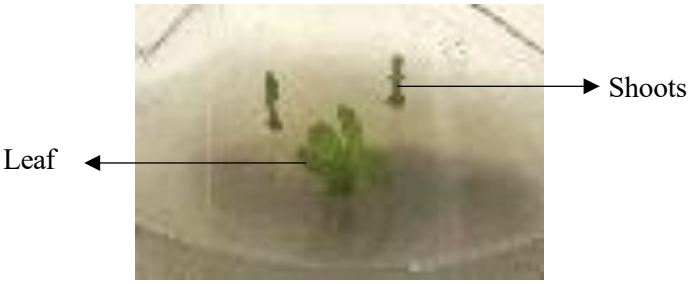


Illustration 2. Form shoots and leaf orchid explants cattleya

4. Percentage Media Explanation Browning (%)

The percentage of explant media experiencing browning was calculated weekly for once a week during the 8 weeks of observation. Criteria for browning media seen on media culture Which experience browning, then calculated using the following formula:

$$PEB = \frac{\text{Amount media explanation browning each treatment}}{\text{Total media explanation every treatment}} \text{ X } 100\%$$

5. Percentage Media Explanation Contaminated (%)

The percentage of contaminated explant media was calculated every week for one week. time in 8 Sunday observation. Criteria occurrence media contamination, namely the presence of fungi or bacteria in culture bottles, media or explants has in culture, Then counted use formula as following:

$$\text{PET} = \frac{\text{Amount media explanation contaminated each Total}}{\text{explant media treatment for each treatment}} \text{ X } 100\%$$

Analysis data

Linear mode that explain every mark observation in accordance 4 x 4 Factorial Experiment with Completely Randomized Design (CRD) is as follows:

$$\mathbf{Yijk = \mu + \alpha i + \beta j + (\alpha\beta)ij + \varepsilon ijk}$$

Information :

Yijk = Observation values due to the influence of the i-th BAP concentration and the influence of the j-th organic material concentration and the k-th repetition.

μ = Mark in the middle of the public.

αi = Influence concentration treatment BAP level i-th (i = 0, 1, 2, 3).

βj = The effect of banana extract concentration treatment at level j (j = 0, 1, 2, 3). (αβ)ij = Influence interaction between concentration BAP i-th And concentration material organic j .

ehijk = The influence of experimental error caused by the influence of the treatment of BAP concentration at level i and organic material concentration at level j.

Data analysis was conducted to determine the effect of BAP concentration and organic matter on the growth of cattleya orchids in tissue culture. Data analysis was performed using *analysis of variance* (ANOVA). If there was an effect of the treatment, it was followed by a 5% BNJ test.

Hypothesis statistics

Hypothesis Which tested covering : Factor 1st concentration BAP And Factor 2nd concentration of Ambon Banana Extract.

1. **Factor 1 concentration BAP**

   H0 : B0 = B1 = B2 = B3 = 0 (There is no effect of BAP concentration on the growth of cattleya orchids).

   H1 : Minimum There is One α i $\neq$ 0 (There is influence concentration BAP on the growth of cattleya orchids).

2. **Factor 2 Extract Ambon Banana**

   H0 : P0 = P1 = P2 = P3 = 0 (There is no effect of banana extract concentration Ambon on the growth of cattleya orchids).

   H1 : minimum There is One $\beta j \neq 0$ (There is influence concentration extract banana Ambon on the growth of cattleya orchid plants)

3. **Factor Interaction BAP And Banana Extract**

   H0 : B0 = P0 = 0 (No There is influence BAP And extract banana Ambon on the growth of cattleya orchids).

   H1: there is at least one $\alpha \beta \neq 0$ (There is an effect of BAP and Ambon banana extract on the growth of cattleya orchid plants)

CHAPTER IV

RESULTS AND DISCUSSION

4.1. Recapitulation of Data Processing Results on the Effect of Providing BAP and Extract Banana on Cattleya Orchid

Based on the research that has been carried out, the results of the analysis of variance show that single BAP treatment, single banana extract treatment and, the interaction of BAP concentration and banana extract treatment showed an effect real, Results analysis variety from giving BAP and extract banana on cattleya orchids is presented in (Table 2).

Table 2. Recapitulation Results Analysis Variety On Plant Orchid Cattleya

Parameter Observation	Treatment and Interaction		
	BAP hormone	Banana Extract	Interaction
Time Appear Shoots (HST)	*	*	*
Amount Shoots (shoots)	Mr.	*	Mr.
Amount Leaf (strand)	*	Mr.	*

Note = *different real on level 5%, Mr. = No different real

Based on (Table 2) it can be seen that the single BAP treatment has an effect real on parameter time appear shoots And amount leaf. Single treatment giving extract banana influential real on parameter time emergence of shoots and the number of shoots. Interaction treatment between BAP concentration and banana extract Also show influence real on parameter time appear shoots and number of leaves.

4.2. Time Appear Shoots

The results of the analysis of variance (Appendix 6) show that the single treatment of BAP, extract banana Ambon And interaction second factor influential real to time of appearance shoots Orchid cattleya on phase sub culture II in a way culture network. The results of the ANOVA test are presented in (Table 3).

Table 3. Average Data – Flat Time Shoots Appear

BAP Treatment (ppm)	Extract Banana (g/L)				Average
	0	10	20	30	
	---------- day after planting ----------				
0	10.0 [a]	6.1 [bc]	5.7 [bc]	5.3 [bc]	6.8 [a]
1.5	5.5 [bc]	5.8 [bc]	5.6 [bc]	6.5 [b]	5.8 [ab]
3.0	5.3 [bc]	5.4 [bc]	5.1 [bc]	5.7 [bc]	5.4 [bc]
4.5	5.3 [bc]	4.9 [c]	5.2 [bc]	5.2 [bc]	5.1 [c]
Flat - flat	6.5 [a]	5.5 [b]	5.4 [b]	5.6 [ab]	5.7

*) Superscript different on column Which The same show difference Which real ($p<0.05$)

Based on the results of the further test of BNJ 5% (Appendix 6) it shows that there is an interaction between the BAP and banana extract treatment, where the administration of BAP 0 ppm Which combined with extract banana 10 g/L, 20 g/L And 30 g/L shows that there is a difference in the time of emergence of shoots. The interaction treatment between treatment BAP 1.5 ppm, 3.0 ppm, And 4.5 ppm Which combined Experiments with banana extract at all concentrations also showed no difference in the time of shoot emergence. This is thought to be due to the high levels of cytokinins in the Cattleya orchid tissue, so that the addition of banana extract did not affect the time of shoot emergence. This is in accordance with the opinion of Tuhuteru *et al* . (2012) who stated that the response that appears in plant explants depends on the ability of the plant to produce the desired results. explanation the in absorb ZPT exogenous from media grow And

using it with endogenous ZPT in the plant so that it produces a time for shoot emergence that is not significantly different.

Addition BAP 1.5 ppm showed better shoot emergence time in combination with 10 g/L banana extract, namely 5.8 HST compared to BAP 0 ppm with banana extract. 0 g/L with shoot emergence time at 10.0 HST. Concentration interaction best the seen from aspect the economy in use BAP And extract banana Which more economical cost. Concentration The interaction of BAP and banana extract shows the parameters of the time for the emergence of shoots that are not different real Which means concentration interaction best can chosen from economic aspect to save on usage costs and expenses.

The time for the emergence of shoots in this study was faster compared to the study by Setiawati *et al* . (2016) which stated that there was an interaction between BAP. And material organic extract banana on concentration best BAP 2 ppm With 10 g/L banana extract, the results showed a shoot emergence time of 36.30 days after planting. The rapid growth of the explants was due to the precise interaction between the explant's endogenous hormones and the addition of exogenous hormones. This interaction resulted in effective physiological processes in the explants, ultimately resulting in capable spur beginning growth shoots. Matter This in accordance with The opinion of Nurhanis *et al* . (2019) which states that different plants can respond to hormones in various concentrations differently, this is caused by difference hormone endogen That Alone. Factor BAP And extract banana This has an optimal concentration that has reached a balance in the growth of orchid shoots, which is calculated from the time the shoots appear.

4.3. Amount Shoots

The results of the analysis of variance (Appendix 7) show that there is no interaction between BAP and Banana Extract treatments on the number of shoots parameter. Treatment BAP No give influence real (P<0.05) to number of shoots. Banana extract treatment had a significant effect (P>0.05) on the number of shoots. The results of the ANOVA test are presented in (Table 4).

Table 4. Average Number of Shoots Based on the Combination of BAP and Banana Extract

BAP (ppm)	Extract Banana (g/L) 0	10	20	30	Average
	----------shoots----------				
0	0.6	2.4	1.8	2.5	1.8
1.5	1.9	1.7	3.4	1.6	2.1
3.0	2.1	1.7	2.0	1.3	1.8
4.5	1.2	2.7	3.9	3.1	2.7
Flat - flat	1.4 [c]	2.1 [b]	2.7 [a]	2.2 [b]	2.1

*) Superscript different on column Which The same show difference Which real (p<0.05)

Based on the results of the 5% BNJ further test (Appendix 7), it can be seen that the treatment of 10 g/L banana extract, namely 2.1 shoots, was not significantly different from the 30 g/L banana extract, namely 2.2 shoots and was significantly different from the number of shoots of 0 g/L banana extract, namely 1.4 shoots and 20 g/L banana extract, namely 2.7 shoots. The treatment of 20 g/L Banana Extract concentration was significantly different from the treatment of banana extract. banana 0 g/L (control), 10 g/L And, 30 g/L . Treatment extract banana 20 g/L shows the best average of 2.7 shoots, which means that the extract treatment banana 20 g/L is treatment Which own amount shoots the highest compared to other banana extract treatments. The banana extract concentration treatment show that concentration maximum giving extract banana No

recommended exceed 20 g/L so that No happen decline along with increased concentration extract banana Which given on growth amount shoots. Matter This is in accordance with the opinion of Nurfadilah *et al* . (2018) who stated that giving extract banana Which too tall with concentration 25 g/L until 100 g/L with results amount shoots that is 2.1 shoots, so that with concentration it will can lower activity division cell on *protocom* , Because Excessive concentrations of banana extract can disrupt cell division, which can stimulate cell differentiation in shoots. The number of shoots can be used to indicate the success of subculture II in this tissue culture study. Documentation of the research results is presented in Illustration 3.

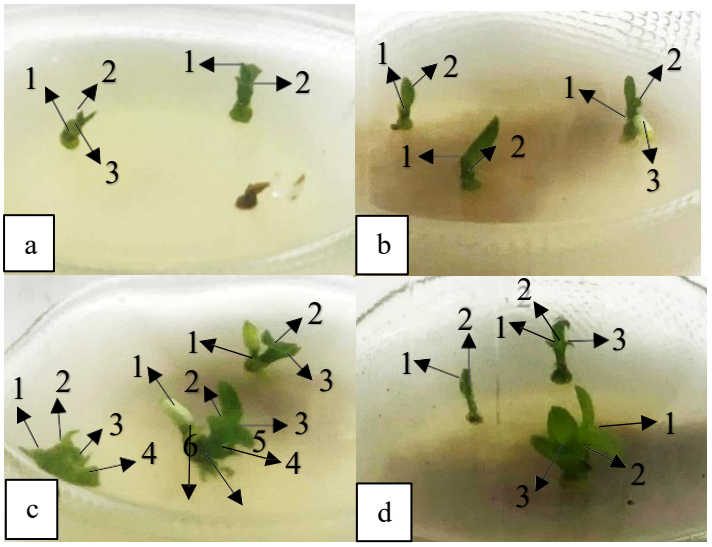


Illustration 3. Amount Shoots on various treatment extract banana, (a) extract a) banana 0 g/L, (b) banana extract 10 g/L, (c) banana extract 20 g/L, (d) banana extract 30 g/L. The number indicates the number of shoots, the arrow indicates the position of the shoots.

The concentration of BAP and the interaction between BAP and banana extract did not provide influence real on parameter amount shoots. Matter This can seen on (Table 4) that results average amount shoots on treatment BAP And interaction BAP and extract banana No different real on level 0 ppm, 1.5 ppm, 3.0 ppm And 4.5

ppm, namely 2.1 shoots. The results of this study also obtained growth results shoots different on each treatment. Amount shoots Which The differences are thought to be influenced by the explant's ability to absorb nutrients in MS media, growth regulators, and the organic materials provided. This is in accordance with the opinion of Reddy *et al* . (2014) who stated that growth regulator hormones such as cytokinins can regulate plant physiological processes even at low concentrations. This is because cytokinin activity is related to the growth and development processes in the cell cycle.

4.4. Amount Leaf

Results from analysis variety (Attachment 8) show that there is interaction between treatment BAP And Extract Banana to parameters amount cattleya orchid leaves. BAP treatment had an effect (P>0.05) on the number of leaves. Banana Extract treatment had no effect (P<0.05) on the number of leaves. The results of the ANOVA test are presented in (Table 5).

Table 5. Average Number of Leaves Based on the Combination of BAP and Banana Extract

BAP (ppm)	Extract Banana (g/L)				Average
	0	10	20	30	
	----------strands----------				
0	0.60 ^{b}	1.70 ^{ab}	1.40 ^{ab}	3.50 ^{a}	9.00 ^{a}
1.5	1.50 ^{ab}	1.30 ^{ab}	2.10 ^{ab}	1.00 ^{b}	7.40 ^{ab}
3.0	0.50 ^{b}	1.10 ^{b}	0.90 ^{b}	0.60 ^{b}	3.90 ^{b}
4.5	0.94 ^{b}	0.90 ^{b}	1.00 ^{ab}	4.30 ^{b}	5.40 ^{ab}
Flat - flat	4.50	6.10	7.30	7.70	6.40

*) Superscript different on column Which The same show difference Which real (p<0.05)

Based on the results of the BNJ 5% further test (Appendix 8) it shows that there is interaction treatment BAP And extract banana Where giving BAP 0 ppm on treatment extract banana 0 g/L, 10 g/L And 20 g/L produce amount The number of leaves was not significantly different. The administration of 0 ppm BAP to the 30 g/L banana extract treatment resulted in a significantly different number of leaves, which means it was able to increase the number of leaves with the highest value being 3.50 leaves. which means BAP treatment 0 ppm on extract banana 30 g/L is treatment interaction best. This matter show that cytokinins Which There is in in network plant Already enough so that by adding 30 g/L of organic banana extract it can trigger the process differentiation with induce formation leaf new. Matter This supported by the research results of Nursolilah *et al* . (2022) which stated that the best treatment, namely administration without BAP (0 ppm) with 40 g/L banana extract, produced a leaf count of 19.7 leaves.

Addition extract banana 30 g/L capable produce amount leaf more compared to all combination treatments. This is in accordance with the opinion of Nurfadilah *et al* . (2018) who stated that Ambon banana extract contains the highest glucose content compared to other bananas, so that the basic glucose material can produce energy to stimulate the growth of shoot and leaf cells. The organic material provided is thought to interact with endogenous cytokinins to stimulate the formation of Cattleya orchid leaves, so that the growth of the number of leaves in Cattleya orchids can grow optimally.

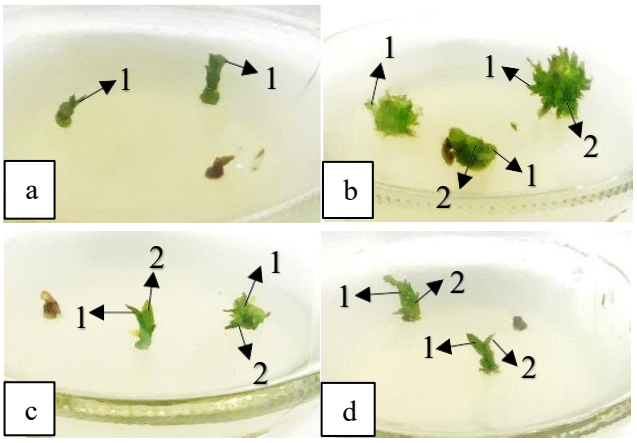


Illustration 4. Amount Leaf on various *Benzyl* treatment *Amino Purine* (BAP), (a) BAP 0 ppm, (b) BAP 1.5 ppm, (c) BAP 3.0 ppm, (d) BAP 4.5 ppm. The numbers indicate the number of leaves, the arrows indicate the leaf positions.

Administration of BAP 1.5 ppm, 3.0 ppm and 4.5 ppm in all banana extract concentration treatments resulted in a constant or no different number of leaves. real. Matter This show occurrence interaction between ZPT exogenous BAP and banana extract can stimulate new leaf growth in cattleya orchids. This aligns with Nurkapita's (2021) opinion, which states that cytokinins and auxins work together to stimulate cell division and influence cell differentiation. Cytokinins administered alone have no effect, but when combined with organic materials such as banana extract, the cells can divide. banana which given at PLB cattleya orchid allegedly can changing the cytokinin ratio in cattleya orchid tissue so that it can interact with BAP to stimulate leaf growth in cattleya orchids.

4.5. Percentage Media Browning explant

Based on data results study which has obtained (Attachment 9) It is known that the percentage of *browning explant media* in subculture II of the cattleya orchid plant is presented in (Table 6).

Table 6. Percentage Media Browning explant

Treatment	Test	Amount Browning explant (bottle)	Browning Percentage (%)	Documentation
B0P0	5	2	40	
B1P0	5	1	20	
B1P1	5	2	40	
B3P0	5	1	20	
B3P2	5	1	20	

B0 : 0 ppm, B1 : 1.50 ppm BAP, B3 : 4.50 ppm BAP, P0 : 0 g/L, P1 : 10 g/L banana extract, P2 : 20 g/L banana extract.

The percentage data of browning explant media (Table 6) shows that from 16 treatments with 5 replications contained 7 bottles of *browning explant media* , the highest percentage of browning explant media was 40% and the lowest was 20%. The treatments that experienced the highest browning explant media were treatments B0P0 and B1P1 with the number of browning media being 2 bottles each. The treatments that experienced the lowest browning explant media were treatments B1P0, B3P0 and B3P2 with the number of browning media that is each treatment 1 bottle. *Browning* (browning) the

occurs because there are phenolic compounds in plant explants which, when injured or cut so will happen oxidation. Matter This in accordance with opinion Helena *et al* . (2022) stated that browning, or what is usually called *browning,* occurs as a result of the oxidation reaction of phenol compounds that accumulate during the explant cutting process by the enzyme Polyphenol Oxidase (PPO). The browning of the explant media is also followed by the growth of fungi on the media, as seen in (Table 6). This is thought to be due to the culture media containing nutrition which tall and own humidity which enough can become an ideal place for fungi to grow, and an inappropriate media pH or nutritional imbalance can also trigger fungal growth followed by *browning of the explant media* .

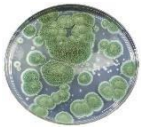
In the early stages of subculture, orchid explants were fresh green, then the explants began to brown at the cut site several weeks after planting. In the B0P0 treatment, the cattleya orchid explant media experienced *browning* in the 4th week, the B1P0 treatment in the 3rd week, the B1P1 treatment in the 3rd and 4th weeks, the B3P0 treatment in the 4th week and, the B3P2 treatment in the 4th week. After experiencing *browning ,* there were no signs of development from the explants, indicating that the explants had died. This is in accordance with the opinion of Saputro *et al* . (2020) who stated that explant death in general can happen Because injury Which excessive on moment explanation cut, *browning* , high levels of growth regulators, old age of the explants, and soaking alcohol Which too long And environment *in vitro* Which No in accordance.

Browning also can happen consequence factor external that is condition environment Incorrect culture and explant cutting process. Lighting in the culture room or culture bottle storage room after subculture that is too bright can stimulate production compound phenolic. Matter this according to with opinion Ariany *et al* . (2013) stated that the distance between the explant bottle and the light source should be between 40 cm – 50 cm from the light source to avoid stimulation of the explants that have accumulated phenolic compounds.

4.6. Percentage Media Contaminated Explants

Based on the research data obtained (Appendix 10), it is known that there are suspected types of fungi in this study, as presented in (Table 7). The percentage of contaminated explant media is presented in (Table 8).

Table 7. Type mold Which found on media study contaminated

Picture Mold on Study	Picture Mold Reference	Type Mold
		*Aspergillus sp.*
		*Penicillium sp .*
		*Rhizopus sp.*
		*Rhizoctonia sp.*

Allegations type mold on media explanation Which contaminated by mold from results study.

Fungal contamination in this study was detected 2 weeks after subculture. This is consistent with the findings of Sulikah *et al* . (2022) who stated that state that mold can grow and detected in Sunday first to second week after planting. On B0P0 media treatment cattleya orchid explants start grow mold on Sunday 2nd, 3, And 4th, treatment B0P1 in the 4th and 5th week, B0P2 treatment in the 2nd week, B0P3 treatment in the 2nd week, B1P0 treatment in the 3rd and 4th week, B1P1 treatment in the 2nd and 3rd week, B1P2 treatment in the 5th week, B1P3 treatment in the 2nd week 4th, treatment B2P1 on Sunday the 3rd, treatment B3P0 on Sunday 6th and, B3P2 treatment in the 4th week. Fungal contamination can be indicated by the presence of *mycelium* that has various colors around the explant media.

Explant media contaminated by fungi can be seen in (Table 7). The fungi causing contamination in the laboratory consist of four types: *Aspergillus sp.* , *Penicillium sp* ., *Rhizopus sp.* , and *Rhizoctonia sp* . This is in accordance with the opinion of Andriani and Heriansyah, (2021) who stated that the fungi that generally contaminate explant media in the laboratory are *Rhizopus sp* . *Aspergillus sp.* , *Rhizoctonia sp.* And *Penicillium sp.* . On This study suspected that there were fungi of the type *Aspergillus sp.* there were 12 bottles of explants, fungi of the type *Penicillium sp* . there were 3 bottles of explants, types *Rhizopus sp.* there were 1 bottle of explants and fungi of the type *Rhizoctonia sp.* there were 2 bottles of explants.

Table 8. Percentage Media Contaminated Explants

Treatment	Test	Amount Contaminated Explant (bottle)	Contamination Percentage (%)	Information
B0P0	5	4	80	3 Mold *Aspergillus sp.* 1 Mold *Penicillium sp.*
B0P1	5	2	40	2 Mold *Aspergillus sp.*
B0P2	5	1	20	1 Mold *Aspergillus sp.*
B0P3	5	1	20	1 Mold *Rhizoctonia sp.*
B1P0	5	2	20	2 Mold *Aspergillus sp.*
B1P1	5	3	60	1 Mold *Rhizoctonia sp.* 1 Mold *Rhizopus sp.* 1 Mold *Aspergillus sp.*
B1P2	5	1	20	1 Mold *Penicillium sp* .
B1P3	5	1	20	1 Mold *Penicillium sp* .
B2P0	5	0	0	
B2P1	5	1	20	1 Mold *Aspergillus sp.*
B2P2	5	0	0	
B2P3	5	0	0	
B3P0	5	1	20	1 Mold *Aspergillus sp.*
B3P1	5	0	0	
B3P2	5	1	20	1 Mold *Aspergillus sp.*
B3P3	5	0	0	

B0 : 0 ppm, B1 : 1.5 ppm BAP, B2: 3 ppm BAP, B3: 4.5 ppm BAP, P0 : 0 g/L banana extract, P1 : 10 g/L extract banana, P2 : 20 g/L extract banana, P3 : 30 g/L extract banana.

Data on the percentage of contaminated explant media (Table 8) shows that out of 16 treatments and 5 replications, there were 18 bottles of contaminated explant media. by mold, percentage media explanation contaminated Which The highest percentage of explant media was 80% and the lowest percentage of explant media was 20%. The treatment with the highest percentage of contaminated explant media was the B0P0 treatment with the number of media contaminated by fungi being 4 bottles of explant media. Which experience media explanation contaminated lowest that is treatments B0P2, B0P3, B1P2, B1P3, B2P1, B3P0 and B3P2 with the amount of media contaminated by fungi, namely 1 bottle for each treatment.

Contaminated explant media has a black-gray, white, green, or yellow surface, is slimy, and has a foul odor. This is consistent with the opinion of Andriani and Heriansyah (2021) who stated that contamination caused by by mold can marked with emergence a layer of white or black-gray hyphae found on the surface of the media. Contamination of the explant media by fungi can be caused by external factors. And internal that is on moment sterilization tool and material Which not enough optimal, sub-culture actors who are not sterile, explants that are not good and not tightly closing the plastic bottle cap and plastic wrap on the culture bottle. Media that has been sterilized in an autoclave and placed under light can also cause occurrence condensation in in bottle culture so that matter this can cause contaminants easy enter and grow on media culture. This matter in accordance with opinion Apriliyani and Wahidah (2021) Which state that sterile media can be contaminated by fungi and bacteria if the culture bottle is in save on rack culture Which exposed direct with light light which can result in bottle culture will Lots produce steam And condense so that fungi and bacteria can easily grow in sterile media.

4.7. Correlation Parameter

Correlation between parameter time appear shoots, amount shoots and amount Cattleya orchid explant leaves (Appendix 11). The parameter correlation graph can be seen in Illustration 5.

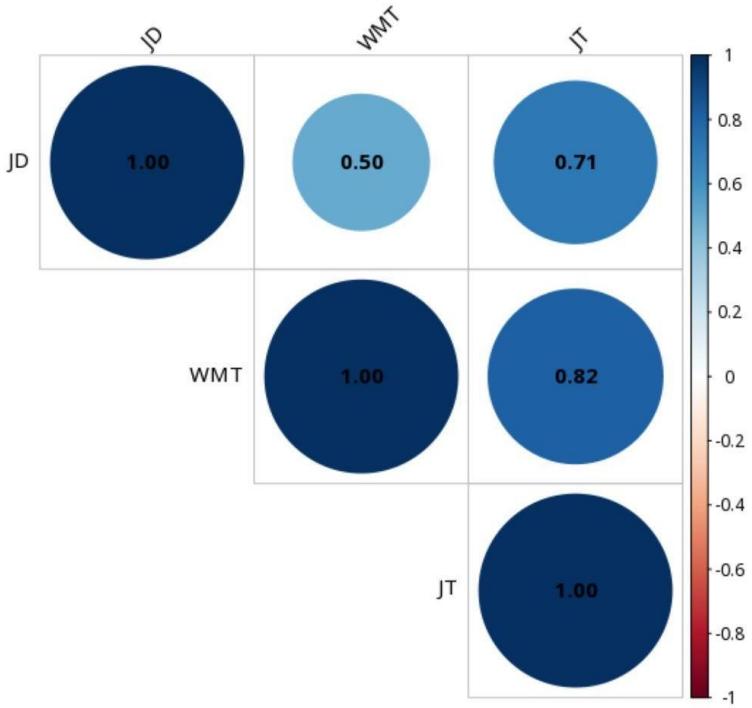


Illustration 5. Chart correlation parameter

Pearson correlation test results graph on the time of emergence of shoots, the number of shoots and the number of leaves shows that the correlation coefficient varies. This indicates that the relationship between the observation parameters of the time of emergence of shoots and the number of shoots is 0.82 (very high), the parameter of the time of emergence of shoots and the number of leaves is 0.82 (very high). leaf 0.50 (moderate/sufficient) And parameter amount shoots with amount leaf 0.71 (high). This is in accordance with the opinion of Ernanda and Sugiyono (2017) who stated that the coefficient interval in the Pearson correlation test is 0.00 – 0.199 (very high). low), 0.20 – 0.399 (low), 0.40 – 0.599 (currently), 0.60 – 0.799 (tall)

And 0.80 – 1,000 (very tall). Correlation between parameter This have a positive correlation means that both variables are moving towards the same goal and direction The same. Color And big small chart circle on chart correlation This shows that the larger the circle graph, the higher the correlation value between parameters and vice versa, and the darker the color of the circle graph, the higher the correlation value between parameters and vice versa.

A very high positive correlation between the time of emergence of shoots and the number of shoots shows that the faster the time of emergence of shoots, the more likely it is that... big amount shoots Which also produced more Lots. Matter This This is in accordance with the opinion of Nurhanis *et al* . (2019) who stated that cytokinin growth regulators such as BAP and organic materials can be factors in cell division and induce a greater number of shoots in explants. A moderate/sufficient positive correlation between the time of shoot emergence and the number of leaves indicates that shoots that emerge later will affect growth. number of leaves so that can produce number of leaves which is less than optimal. Matter This in accordance with opinion Widayanti *et al* . (2014) Which stated that suboptimal provision of light, plant growth regulators, and nutrient availability in the media can affect cell division performance, thereby reducing leaf growth activity in explants. High positive correlation on amount shoots with amount leaf show that the more the more shoots are produced, the more leaves will grow, because every shoots new will develop become leaf new. Matter This in accordance with

opinion Anur *et al* . (2024) Which state that process photosynthesis Which can be done on orchid plant explants through a light source which is very good for the development of the number of leaves so that the explants can grow well.

CHAPTER V

CONCLUSION AND SUGGESTION

5.1. Conclusion

Based on the research that has been conducted, it can be concluded that administering 4.5 ppm of BAP can accelerate the time for shoot emergence. banana 20 g/L capable speed up time appear shoots And amount shoots. Interaction between BAP And extract banana happen on parameter time appear shoots and number of leaves.

5.2. Suggestion

Suggestions for further research are to optimize the laboratory sterilization stage so that it is hoped that the level of contamination will be low, as well as the explant bottles. Which contaminated mold can separated from bottle explanation Which not contaminated so as not to be contaminated with other explant bottles.

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ATTACHMENT

Attachment 1. Layout Test

B0P3U3	B1P3U5	B0P2U1	B0P0U4	B1P1U2	B1P0U3	B1P0U2	B3P1U1
B2P2U2	B0P3U5	B0P2U2	B3P1U5	B3P0U1	B0P0U1	B2P3U5	B3P0U1
B2P0U3	B2P0U2	B0P1U5	B3P3U5	B1P3U2	B0P1U2	B2P3U1	B1P1U1
B0P2U3	B2P3U3	B0P2U4	B3P1U3	B1P0U4	B0P1U3	B3P2U2	B2P1U1
B3P3U4	B2P2U4	B0P2U5	B0P0U3	B3P3U2	B2P1U2	B3P2U4	B1P0U5

B2P1U5	B2P0U4	B3P1U4	B1P0U1	B0P3U2	B2P2U3	B1P1U3	B1P2U2
B3P2U1	B3P0U5	B0P1U1	B3P3U1	B1P1U5	B2P2U1	B3P1U2	B3P3U3
B1P3U3	B3P2U3	B2P1U3	B2P3U2	B1P3U4	B2P1U4	B3P0U4	B2P0U5
B1P3U1	B0P1U4	B1P1U4	B0P0U5	B2P3U4	B0P3U4	B1P2U3	B1P2U4
B2P0U1	B3P0U2	B0P0U2	B0P3U1	B3P2U5	B1P2U1	B2P2U5	B1P2U5

Information :

Treatment BAP (Benzyl Amino Purine)
B0 : 0 ppm
B1 : 1.5 ppm
B2 : 3.0 ppm
B3 : 4.5 ppm

Treatment Extract Ambon Banana
P0 : 0 g/L
P1 : 10 g/L
P2 : 20 g/L
P3 : 30 g/L

Appendix 2. Composition Media Base *Murashige and Skoog* (MS)

Component	Amount (mg/L)
Macronutrients	
KNO3	1,900
NH4NO3	1,650
CaCl2.2H2O	440
MgSO4.7H2O	370
KH_2PO_4	170
Micronutrients	
MnSO4.4H2O	22.3
ZnSO4.7H2O	8.6
H_3BO_3	6.2
Cl	0.83
Na2MoO4.5H2O	0.25
CuSO4.5H2O	0.025
$CoCl_2.6H_2O$	0.025
$FeSO_4.7H_2O$ (dissolved with Na2EDTA 37.3 mg/l)	27.8
Vitamin	
Thiamin- HCl	0.1
Nicotinic AC ID	0.5
Pyridoxine HCl	0.5
Glycine	2
Myo-inositol	100
Sucrose	30,000
pH 5.5 – 5.8	

Attachment 3. Calculation Hormone Concentration *Benzyl Amino Purine* (BAP)

Formula : $V_1 \times M_1 = V_2 \times M_2$

Information : V_1 = Volume media Which will made (ml) V_2 = Volume of stock to be taken (ml)

M_1 = Concentration BAP Which will made (ppm)

M_2 = Concentration stock BAP Which will taken (ppm)

Calculation volume BAP Which will used For make 100 ml media from 100 ppm BAP:

1. Preparation of BAP Solution 0

   ppm $V_1 \times M_1$ = V_2 x M 2

   100 ml x 0 ppm = V_2 x 100

   ppm V_2 = 0 ml

2. Making Solution BAP 1.5 ppm V $_1 \times M_1$ = V_2 x M 2

   100 ml x 0.15 ppm = V_2 x 100

   ppm V_2 = 0.15 ml

3. Making Solution BAP 3.0 ppm V $_1$ x M_1 = V_2 x M 2

   100 ml x 0.30 ppm = V_2 x 100

   ppm V_2 = 0.30 ml

4. Making Solution BAP 4.5 ppm V $_1$ x M_1 = V_2 x M 2

   100 ml x 0.45 ppm = V_2 x 100

   ppm V_2 = 0.45 ml

Attachment 4. Calculation Concentration Extract Banana Ambon

The weight of Ambon bananas needed to make Ambon banana extract stock is 10 g. with a volume of 100 ml:

$$\frac{WI}{V1} = \frac{W2}{V2}$$

$$\frac{100\ g}{1000\ ml} = \frac{W2}{100\ ml}$$

W2 = 10 g

Formula : V1 × M1 = V2 × M2

Information : V1 = Volume media Which will made (ml)

V2 = Volume of stock to be taken (ml)

M1 = Concentration extract banana Which will made (g/L)

M2 = Concentration of banana extract stock (g/L)

Calculation of the stock volume to be used for each banana extract concentration:

1. Making Solution Extract Banana 0 g/L V

   $_1 \times M_1 = V_2 \times M_2$

   100 ml x 0 g/L = V_2 x 100 g/L

   V_2 = 0 ml

2. Making Solution Extract Banana 10 g/L V

   $_1 \times M_1 = V_2 \times M_2$

   100 ml x 1.0 g/L = V_2 x 100

   g/L V_2 = 1 ml

3. Making Solution Extract Banana 20 g/L V

   $_1 \times M_1 = V_2 \times M_2$

   100 ml x 2.0 g/L = V_2 x 100

   g/L V_2 = 2 ml

4. Making Solution Extract Banana 30 g/L V

$_1 \times M_1 = V_2 \times M_2$

100 ml x 3.0 g/L = V_2 x 100

g/L V_2 = 3 ml

Appendix 5. Research Documentation

Preparation tool and materials

Washing bottles and tools

Murashige and Skoog And BAP

PLB orchid 6 month old cattleya

Sterilization tool and materials

Storage bottle and tools after sterilization

Weighing material

Storage media after sterilization

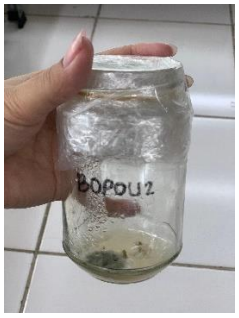
Preparation sub culture II

Attachment 5. (Advanced)

Sub culture II cattleya orchid

Storage of culture bottles after sub culture

Observation time of emergence of shoots 1st week



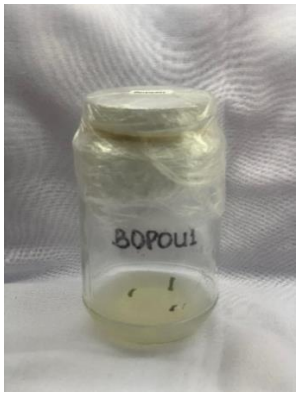
Observation contaminated explants

Explanatory observation browning

Growth observation number of shoots

Observation number of leaves

Making banana extract



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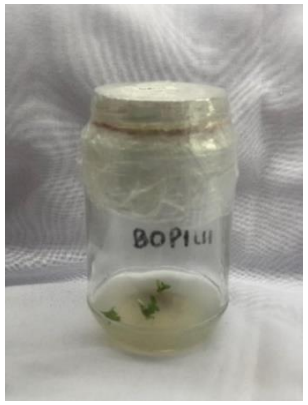

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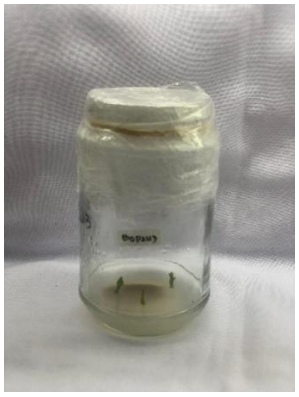


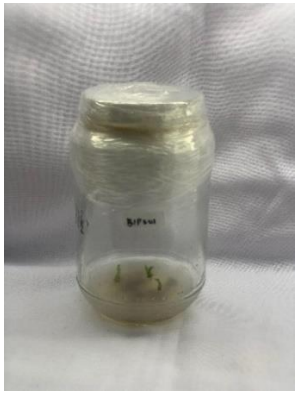
B0P2U3

B0P3U2

B1P0U2

B1P1U4

B1P2U5

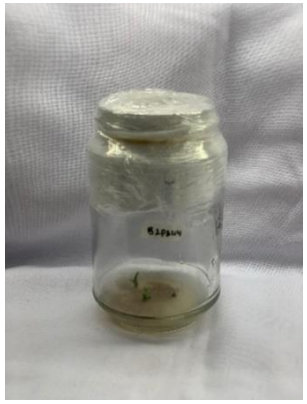


B1P3U1

B2P0U5

B2P1U4

B2P2U2



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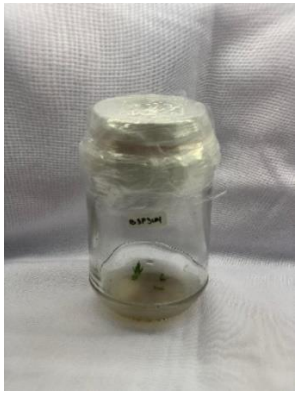

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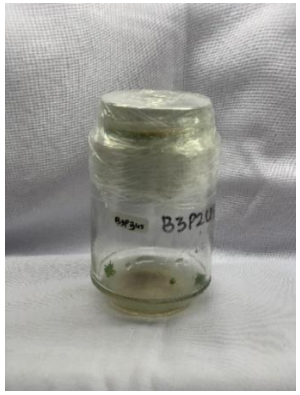

B3P3U5

Attachment 6. Time Data Appear Shoots (HST)

BAP (B)	Test	Extract Banana (P)				Amount	Flat-flat
		0 g/L	10 g/L	20 g/L	30 g/L		
0 ppm	1	10.7	5.7	5.3	6.0	27.7	6.9
	2	12.3	6.7	6.7	6.0	31.7	7.9
	3	9.7	6.7	5.7	4.7	26.8	6.7
	4	8.3	5.3	5.7	6.0	25.3	6.3
	5	9.0	6.3	5.0	4.0	24.3	6.1
Amount		50.0	30.7	28.4	26.7	135.8	34.0
Average		10.0	6.1	5.7	5.3	27.1	6.8
1.5 ppm	1	5.3	5.3	5.7	6.7	23.0	5.8
	2	5.0	4.3	4.7	6.0	20.0	5.0
	3	6.0	6.7	6.7	7.7	27.1	6.8
	4	6.7	6.0	5.7	6.3	24.7	6.2
	5	4.3	6.7	5.0	6.0	22.0	5.5
Amount		27.3	29.0	27.8	32.7	116.8	29.2
Average		5.5	5.8	5.6	6.5	23.4	5.8
3.0 ppm	1	5.7	5.0	4.7	6.7	22.1	5.5
	2	5.0	6.0	4.0	4.7	19.7	4.9
	3	5.0	5.7	6.3	5.3	22.3	5.6
	4	5.3	4.7	5.0	5.7	20.7	5.2
	5	5.3	5.7	5.7	6.3	23.0	5.8
Amount		26.3	27.1	25.7	28.7	107.8	27.0
Average		5.3	5.4	5.1	5.7	21.6	5.4
4.5 ppm	1	6.0	5.0	4.3	4.7	20.0	5.8
	2	4.3	5.3	5.7	5.7	21.0	5.3
	3	5.3	4.3	5.7	5.7	21.0	5.3
	4	4.7	5.3	5.3	4.7	20.0	5.0
	5	6.0	4.7	5.0	5.0	20.7	5.2
Amount		26.3	24.6	26.0	25.8	102.7	25.7
Average		5.3	4.9	5.2	5.2	20.5	5.1
Amount		129.9	111.4	107.9	113.9	463.1	
Average		6.5	5.5	5.4	5.6	5.8	

Attachment 6. (Advanced)

BAP	Extract Banana				Average
	0 g/L	10 g/L	20 g/L	30 g/L	
0 ppm	10.0	6.1	5.7	5.3	6.8
1.5 ppm	5.5	5.8	5.6	6.5	5.8
3.0 ppm	5.3	5.4	5.1	5.7	5.4
4.5 ppm	5.3	4.9	5.2	5.2	5.1
Average	6.5	5.5	5.4	5.6	5.7

Calculation :

1. Factor Correct (FK)

$$FK = \frac{(463.1)^2}{5\times4\times4}$$

$$= 2{,}680.77$$

2. Amount Square Total

$$\text{Jakarta} = 10.7^{\,2} + 12.3^{\,2} + \ldots, + 5.0^{\,2} - 2{,}680.77$$

$$= 148.16$$

3. Amount Square Treatment

$$JKP = \frac{50^{\,2} + 27.3^{\,2} + \ldots, + 25.8^{\,2}}{5} - 2{,}680.77$$

$$= 10{,}957.5$$

4. Amount Square Treatment B

$$JK\,(B) = \frac{135.8^{\,2} + 116.8^{\,2} + 107.8^2 + 102.7^{\,2}}{5\times4} - 2{,}680.77$$

$$= 31.8$$

5. Amount Square Treatment P

$$JK\,(P) = \frac{129.9^{\,2} + 111.4^{\,2} + 107.9^2 + 113.9^{\,2}}{5\times4} - 2{,}680.77$$

$$= 14.2$$

Attachment 6. (Advanced)

6. Amount Square Treatment Interaction

$$JK\,(BP) = \frac{50^2 + 30.7^2 + \ldots, + 25.8^2}{5} - 2{,}680.77 - 31.8 - 14.2$$

$$= 61.0$$

7. Amount Square Error

$$JKG = 148.2 - 31.8 - 14.2 - 61.0$$

$$= 41.1$$

8. ID card $= \frac{\text{JK Treatment}}{\text{db Treatment}} \quad \frac{10{,}957.5}{15}$

$$= 730.5$$

9. $KT\,(B) = \frac{JK\,(B)}{db\,(B)} = \frac{31.8}{3}$

$$= 10.6$$

10. $KT\,(P) = \frac{JK\,(P)}{db\,(P)} = \frac{14.2}{3}$

$$= 4.7$$

11. $KT\,(BP) = \frac{JK\,(BP)}{db\,(BP)} = \frac{61.0}{9}$

$$= 6.8$$

12. $KT\ Error = \frac{JKG}{db\,(G)} = \frac{41.1}{64}$

$$= 0.6$$

Attachment 6. (Advanced)

13. F Calculate P = $\frac{\text{KT Treatment}}{\text{KT Error}} = \frac{730.5}{0.6}$

$= 1{,}137.4$

14. F Count (B) = $\frac{\text{KT (B)}}{\text{KT Error}} = \frac{10.6}{0.6}$

$= 16.5$

15. F Count (P) = $\frac{\text{KT (P)}}{\text{KT Error}} = \frac{4.7}{0.6}$

$= 7.4$

16. F Count (BP) = $\frac{\text{KT (BP)}}{\text{KT Error}} = \frac{6.8}{0.6}$

$= 10.6$

17. Table ANOVA

Sources of Diversity	DB	JK	KT	F count	F table 0.05	Sig
Treatment	15	10,957.5	730.5	1137.4	1.8	*
BAP (B)	3	31.8	10.6	16.5	2.7	*
Extract Banana (P)	3	14.2	4.7	7.4	2.7	*
Interaction (BP)	9	61.0	6.8	10.6	2.0	*
Error	64	41.1	0.6			
Total	79	148.2				

Information : Significant (F count > F table), Mr. : No significant (F count < F table)

18. Coefficient of Diversity

KK $= \frac{\sqrt{0.6}}{5.8} \times 100\% = 33\%$

Because KK >20% so data is transformed use $\sqrt[2]{x}$

Attachment 6. (Advanced)

Transformation Data Time Appear Shoots (HST)

BAP (B)	Test	Extract Banana (P)				Amount	Flat-flat
		0 g/L	10 g/L	20 g/L	30 g/L		
0 ppm	1	3.3	2.4	2.3	2.4	10.4	2.6
	2	3.5	2.6	2.6	2.4	11.1	2.8
	3	3.1	2.6	2.4	2.2	10.3	2.6
	4	2.9	2.3	2.4	2.4	10.0	2.5
	5	3.0	2.5	2.2	2.0	9.7	2.4
Amount		15.8	12.4	11.9	11.5	51.6	12.9
Average		3.2	2.5	2.4	2.3	10.3	2.5
1.5 ppm	1	2.3	2.3	2.4	2.6	9.6	2.4
	2	2.2	2.1	2.2	2.4	8.9	2.2
	3	2.4	2.6	2.6	2.8	10.4	2.6
	4	2.6	2.4	2.4	2.5	9.9	2.5
	5	2.1	2.6	2.2	2.4	9.3	2.3
Amount		11.6	12.0	11.8	12.8	48.1	12.0
Average		2.3	2.4	2.3	2.6	9.6	2.4
3.0 ppm	1	2.4	2.2	2.2	2.6	9.4	2.3
	2	2.2	2.4	2.0	2.2	8.9	2.2
	3	2.2	2.4	2.5	2.3	9.4	2.4
	4	2.3	2.2	2.2	2.4	91	2.3
	5	2.3	2.4	2.4	2.5	9.6	2.4
Amount		11.5	11.6	11.3	12.0	46.3	11.6
Average		2.3	2.3	2.3	2.4	9.3	2.3
4.5 ppm	1	2.4	2.2	2.1	2.2	8.9	2.2
	2	2.1	2.3	2.4	2.4	9.2	2.3
	3	2.3	2.1	2.4	2.4	9.2	2.3
	4	2.2	2.3	2.3	2.2	8.9	2.2
	5	2.4	2.2	2.2	2.2	9.1	2.3
Amount		11.4	11.1	11.4	11.3	45.3	11.3
Average		2.3	2.2	2.3	2.3	9.1	2.2
Amount		66.0	64.1	62.4	67.5	191.4	
Average		2.5	2.35	2.3	2.4	2.4	

Attachment 6. (Advanced)

BAP	Extract Banana				Average
	0 g/L	10 g/L	20 g/L	30 g/L	
0 ppm	3.2	2.5	2.4	2.3	2.5
1.5 ppm	2.3	2.4	2.3	2.6	2.4
3.0 ppm	2.3	2.3	2.3	2.4	2.3
4.5 ppm	2.3	2.2	2.3	2.3	2.2
Average	2.5	2.35	2.3	2.4	2.4

Calculation :

1. Factor Correct (FK)

$$FK = \frac{(191.37)^2}{5\times4\times4}$$

$$= 457.77$$

2. Amount Square Total

$$\text{Jakarta} = 3.3^{\,2} + 3.5^{\,2} + \ldots, + 2.2^{\,2} - 457.77$$

$$= 5.33$$

3. Amount Square Treatment

$$JKP = \frac{15.8^{\,2} + 11.6^{\,2} + \ldots, + 11.3^{\,2}}{5} - 457.77$$

$$= 3.6$$

4. Amount Square Treatment B

$$JK\,(B) = \frac{51.6^{\,2} + 48.2^{\,2} + 46.2^2 + 45.3^{\,2}}{5\times 4} - 457.77$$

$$= 1.1$$

5. Amount Square Treatment P

$$JK\,(P) = \frac{50.3^{\,2} + 47.1^{\,2} + 46.4^2 + 47.6^{\,2}}{5\times 4} - 457.77$$

$$= 0.5$$

Attachment 6. (Advanced)

6. Amount Square Treatment Interaction

$$JK\ (BP) = \frac{15.8^{2} + 12.4^{2} + \ldots, + 11.3^{2}}{5} - 457.77 - 1.1 - 0.5$$

$$= 2.1$$

7. Amount Square Error

$$JKG = 5.3 - 1.1 - 0.5 - 2.1$$

$$= 1.7$$

8. ID card $= \frac{\text{JK Treatment}}{\text{db Treatment}} \frac{3.65}{15}$

$$= 0.24$$

9. $KT\ (B) = \frac{JK\ (B)}{db\ (B)} = \frac{1.15}{3}$

$$= 0.38$$

10. $KT\ (P) = \frac{JK\ (P)}{db\ (P)} = \frac{0.45}{3}$

$$= 0.15$$

11. $KT\ (BP) = \frac{JK\ (BP)}{db\ (BP)} = \frac{2.05}{9}$

$$= 0.23$$

12. $KT\ Error = \frac{JKG}{db\ (G)} = \frac{1.68}{64}$

$$= 0.03$$

Attachment 6. (Advanced)

13. F Calculate P $= \frac{\text{KT Treatment}}{\text{KT Error}} = \frac{0.24}{0.03}$

$= 9.27$

14. F Count (B) $= \frac{\text{KT (B)}}{\text{KT Error}} = \frac{0.38}{0.03}$

$= 14.56$

15. F Count (P) $= \frac{\text{KT (P)}}{\text{KT Error}} = \frac{0.15}{0.03}$

$= 5.73$

16. F Count (BP) $= \frac{\text{KT (BP)}}{\text{KT Error}} = \frac{0.23}{0.03}$

$= 8.69$

17. Table ANOVA

Sources of Diversity	DB	JK	KT	F count	F table 0.05	Sig
Treatment	15	3.65	0.24	9.27	1.83	*
BAP (B)	3	1.15	0.38	14.56	2.75	*
Extract Banana (P)	3	0.45	0.15	5.73	2.75	*
Interaction (BP)	9	2.05	0.23	8.69	2.03	*
Error	64	1.68	0.03			
Total	79	5.33				

Information : Significant (F count > F table), Mr. : No significant (F count < F table)

18. Coefficient of Diversity

$KK = \frac{\sqrt{0.03}}{2.4} \times 100\% = 10.4\%$

Attachment 6. (Advanced)

19. Test Carry on (BNJ) Factor Concentration BAP on level

$$5\%\ SD\ (Standard\ Error) = \frac{\sqrt{KTG}}{rP} = \frac{\sqrt{0.03}}{5.4} = 0.03621$$

Table BNJ 5% = (Amount Treatment, db Error)

= 3.40

BNJ Calculate = Sd × table values BNJ 5%

= 0.03621 × 3.40

= 0.1231

Table Matrix Difference Mark Middle Factor Concentration BAP

BAP	Mark Middle	B0	B1	B2	B3	Notation
		2.5	2.4	2.3	2.2	
B0	2.5	0.0 ns				a
B1	2.4	0.1 ns	0.0 ns			ab
B2	2.3	0.2 *	0.1 ns	0.0 ns		bc
B3	2.2	0.3 *	0.2 *	0.1 ns	0.0 ns	c

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count)

20. Test Carry on (BNJ) Factor Concentration Extract Banana on level

$$5\%\ SD\ (Standard\ Error) = \frac{\sqrt{KTG}}{rP} = \frac{\sqrt{0.03}}{5.4} = 0.03621$$

Table BNJ 5% = (Amount Treatment, db Error)

= 3.40

BNJ Calculate = Sd × table values BNJ 5%

= 0.03621 × 3.40

= 0.1231

Attachment 6. (Advanced)

Table Matrix Difference Mark Middle Factor Concentration Extract Banana

Banana Extract	Mark Middle	P0	P3	P1	P2	Notation
		2.5	2.4	2.35	2.3	
P0	2.5	0.00 ns				a
P3	2.4	0.10 ns	0.00 ns			ab
P1	2.35	0.15 *	0.05 ns	0.00 ns		b
P2	2.3	0.20 *	0.10 ns	0.05 ns	0.00 ns	b

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count)

21. Test Carry on (BNJ) Interaction Concentration BAP And Extract Banana on level 5%

$$\text{Sd (Error (Baku)} = \frac{\sqrt{KTG}}{rP} = \frac{\sqrt{0.03}}{5} = 0.07243$$

Table BNJ 5% = (Amount Treatment, db Error)

= 4.55

BNJ Calculate = Sd × table values BNJ 5%

= 0.07243 × 4.55

= 0.3296

Attachment 6. (Continued)

Table Matrix Difference Mark Middle of Interaction Factors Concentration BAP And Extract Banana

Treatment	NT	B0P0	B1P3	B0P1	B1P1	B2P3	B0P2	B1P2	B1P0	B2P1	B0P3	B2P0	B3P0	B3P2	B3P3	B2P2	B3P1	Notation
		3.2	2.6	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	
B0P0	3.2	0.0 ns																a
B1P3	2.6	0.6 *	0.0 ns															b
B0P1	2.5	0.7 *	0.1 ns	0.0 ns														bc
B1P1	2.4	0.8 *	0.2 ns	0.1 ns	0.0 ns													bc
B2P3	2.4	0.8 *	0.2 ns	0.1 ns	0.0 ns	0.0 ns												bc
B0P2	2.4	0.8 *	0.2 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns											bc
B1P2	2.4	0.8 *	0.2 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns										bc
B1P0	2.3	0.9 *	0.2 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns									bc
B2P1	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns								bc
B0P3	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns							bc
B2P0	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns						bc
B3P0	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns					bc
B3P2	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns				bc
B3P3	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns			bc
B2P2	2.3	0.9 *	0.3 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns	0.0 ns		bc
B3P1	2.2	1.0 *	0.4 *	0.3 ns	0.2 ns	0.2 ns	0.2 ns	0.2 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.1 ns	0.0 ns	c

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count).

Attachment 7. Data Amount Shoots Sunday 8th MST

BAP (B)	Test	Extract Banana (P)				Amount	Flat-flat
		0 g/L	10 g/L	20 g/L	30 g/L		
0 ppm	1	1.7	4.3	2.7	2.3	11.0	2.8
	2	0.0	2.0	0.0	3.0	5.0	1.3
	3	0.0	1.7	2.0	0.0	3.7	0.9
	4	1.3	3.3	2.3	5.0	11.9	3.0
	5	0.0	0.7	2.0	2.3	5.0	1.3
Amount		3.0	12.0	9.0	12.6	36.6	9.2
Average		0.6	2.4	1.8	2.5	7.3	1.8
1.5 ppm	1	1.0	0.0	3.0	3.0	7.0	1.8
	2	4.0	2.7	2.7	0.0	9.4	2.4
	3	1.0	0.0	5.0	0.0	6.0	1.5
	4	0.7	2.7	4.0	1.7	9.1	2.3
	5	2.7	3.0	2.3	3.3	11.3	2.8
Amount		9.4	8.4	17.0	8.0	42.8	10.7
Average		1.9	1.7	3.4	1.6	8.6	2.1
3.0 ppm	1	3.3	1.3	5.0	1.7	11.3	2.8
	2	1.0	1.0	1.3	0.3	3.6	0.9
	3	0.7	0.0	0.7	0.0	1.4	0.4
	4	0.7	3.0	1.3	2.0	7.0	1.8
	5	4.7	3.0	1.7	2.3	11.7	2.9
Amount		10.4	8.3	10.0	6.3	35.0	8.8
Average		2.1	1.7	2.0	1.3	7.0	1.8
4.5 ppm	1	1.0	1.3	8.0	3.3	13.6	3.4
	2	1.7	5.7	4.0	3.3	14.7	3.7
	3	2.0	3.0	1.3	5.0	11.3	2.8
	4	1.3	1.7	1.7	2.3	7.0	1.8
	5	0.0	1.7	4.7	1.7	8.1	2.0
Amount		6.0	13.4	19.7	15.6	54.7	13.7
Average		1.2	2.7	3.9	3.1	10.9	2.7
Amount		28.8	42.1	55.7	42.5	169.1	
Average		1.4	2.1	2.7	2.2	2.1	

Appendix 7. (Continued)

BAP	Extract Banana				Average
	0 g/L	10 g/L	20 g/L	30 g/L	
0 ppm	0.6	2.4	1.8	2.5	1.8
1.5 ppm	1.9	1.7	3.4	1.6	2.1
3.0 ppm	2.1	1.7	2.0	1.3	1.8
4.5 ppm	1.2	2.7	3.9	3.1	2.7
Average	1.4	2.1	2.7	2.2	2.1

Calculation :

1. Factor Correct (FK)

$$FK = \frac{(169.1)^2}{5\times4\times4}$$

$$= 357.4$$

2. Amount Square Total

$$\text{Jakarta} = 1.7^{2} + 0^{2} + \ldots, + 1.7^{2} - 357.4$$

$$= 203.6$$

3. Amount Square Treatment

$$JKP = \frac{3.0^{2} + 9.4^{2} + \ldots, + 15.6^{2}}{5} - 357.4$$

$$= 56.25$$

4. Amount Square Treatment B

$$JK\,(B) = \frac{36.6^{2} + 42.8^{2} + 35.0^{2} + 54.7^{2}}{5\times 4} - 357.4$$

$$= 11.99$$

5. Amount Square Treatment P

$$JK\,(P) = \frac{28.8^{2} + 42.1^{2} + 55.7^{2} + 42.5^{2}}{5\times 4} - 357.4$$

$$= 18.09$$

Appendix 7. (Continued)

6. Amount Square Treatment Interaction

$$JK\,(BP) = \frac{3.0^{2} + 12.0^{2} + \ldots, + 15.6^{2}}{5} - 357.4 - 11.99 - 18.09$$

$$= 26.17$$

7. Amount Square Error

$$JKG = 203.63 - 11.99 - 18.09 - 26.17$$

$$= 147.38$$

8. ID card $= \frac{\text{JK Treatment}}{\text{db Treatment}} \frac{5}{\frac{6.25}{15}}$

$$= 3.75$$

9. $KT\,(B) = \frac{JK\,(B)}{db\,(B)} = \frac{11.99}{3}$

$$= 4.00$$

10. $KT\,(P) = \frac{JK\,(P)}{db\,(P)} = \frac{18,09}{3}$

$$= 6.03$$

11. $KT\,(BP) = \frac{JK\,(BP)}{db\,(BP)} = \frac{26.17}{9}$

$$= 2.91$$

12. $KT\ Error = \frac{JKG}{db\,(G)} = \frac{147.38}{64}$

$$= 2.30$$

Appendix 7. (Continued)

13. F Calculate P = $\frac{\text{KT Treatment}}{\text{KT Error}} = \frac{3.75}{2.30}$

$= 1.63$

14. F Count (B) = $\frac{\text{KT (B)}}{\text{KT Error}} = \frac{4.00}{2.30}$

$= 1.74$

15. F Count (P) = $\frac{\text{KT (P)}}{\text{KT Error}} = \frac{6.03}{2,30}$

$= 2.62$

16. F Count (BP) = $\frac{\text{KT (BP)}}{\text{KT Error}} = \frac{2.91}{2,30}$

$= 1.26$

17. Table ANOVA

Sources of Diversity	DB	JK	KT	F count	F table 0.05	Sig
Treatment	15	56.25	3.75	1.63	1.83	Mr.
BAP (B)	3	11.99	4.00	1.74	2.75	Mr.
Extract Banana (P)	3	18.09	6.03	2.62	2.75	Mr.
Interaction (BP)	9	26.17	2.91	1.26	2.03	Mr.
Error	64	147.38	2.30			
Total	79	203.63				

Information : Significant (F count > F table), Mr. : No significant (F count < F table)

18. Coefficient of Diversity

$KK = \frac{\sqrt{2.30}}{2.1} \times 100\% = 104\%$

Because KK >50% so data transformed use log (x + 10)

Attachment 7. (Advanced)

Transformation Data Number of Shoots Sunday 8th MST

BAP (B)	Test	Extract Banana (P)				Amount	Average
		0 g/L	10 g/L	20 g/L	30 g/L		
0 ppm	1	1.1	1.2	1.1	1.1	4.5	1.1
	2	1.0	1.1	1.0	1.1	4.2	1.1
	3	1.0	1.1	1.1	1.0	4.2	1.1
	4	1.1	1.1	1.1	1.2	4.5	1.1
	5	1.0	1.0	1.1	1.1	4.5	1.1
Amount		5.2	5.5	5.4	5.5	21.6	5.4
Average		1.0	1.1	1.1	1.1	4.3	1.0
1.5 ppm	1	1.0	1.0	1.1	1.1	4.2	1.1
	2	1.1	1.1	1.1	1.0	4.3	1.1
	3	1.0	1.0	1.2	1.0	4.2	1.1
	4	1.0	1.1	1.1	1.1	4.3	1.1
	5	1.1	1.1	1.1	1.1	4.4	1.1
Amount		5.2	5.3	5.6	5.3	21.4	5.4
Average		1.0	1.1	1.1	1.1	4.3	1.0
3.0 ppm	1	1.1	1.1	1.2	1.1	4.5	1.1
	2	1.0	1.0	1.1	1.0	4.1	1.0
	3	1.0	1.0	1.0	1.0	4.0	1.0
	4	1.0	1.1	1.1	1.1	4.3	1.1
	5	1.2	1.1	1.1	1.1	4.5	1.1
Amount		5.3	5.3	5.5	5.3	21.4	5.4
Average		1.1	1.1	1.1	1.1	4.4	1.1
4.5 ppm	1	1.0	1.1	1.3	1.1	4.5	2.2
	2	1.1	1.2	1.1	1.1	4.5	2.3
	3	1.1	1.1	1.1	1.2	4.5	2.3
	4	1.1	1.1	1.1	1.1	4.4	2.2
	5	1.0	1.1	1.1	1.1	4.4	2.3
Amount		5.3	5.6	5.8	5.6	22.3	5.6
Average		1.1	1.1	1.2	1.1	4.5	1.2
Amount		21.0	21.7	22.3	21.7	86.7	21.6
Average		1.0	1.1	1.2	1.1	1.1	

Appendix 7. (Continued)

BAP	Extract Banana				Average
	0 g/L	10 g/L	20 g/L	30 g/L	
0 ppm	1.0	1.1	1.1	1.1	1.0
1.5 ppm	1.0	1.1	1.1	1.1	1.0
3.0 ppm	1.1	1.1	1.1	1.1	1.1
4.5 ppm	1.1	1.1	1.2	1.1	1.2
Average	1.0	1.1	1.2	1.1	1.1

Calculation :

1. Factor Correct (FK)

$$FK = \frac{(86.7)^2}{5\times4\times4}$$

$$= 93.96$$

2. Amount Square Total

$$\text{Jakarta} = 1.1^{\,2} + 1.0^{\,2} + \ldots, + 1.1^{\,2} - 93.96$$

$$= 0.32$$

3. Amount Square Treatment

$$JKP = \frac{5.2^{\,2} + 5.2^{\,2} + \ldots, + 5.6^{\,2}}{5} - 93.96$$

$$= 0.089$$

4. Amount Square Treatment B

$$JK\,(B) = \frac{21.6^{\,2} + 21.4^{\,2} + 21.4^2 + 22.3^{\,2}}{5\times 4} - 93.96$$

$$= 0.027$$

5. Amount Square Treatment P

$$JK\,(P) = \frac{21.0^{\,2} + 21.7^{\,2} + 22.3^2 + 21.7^{\,2}}{5\times 4} - 93.96$$

$$= 0.042$$

Appendix 7. (Attachment)

6. Amount Square Treatment Interaction

$$JK\ (BP) = \frac{5.2^{2} + 5.5^{2} + \ldots, + 5.6^{2}}{5} - 93.96 - 0.027 - 0.042$$

$$= 0.019$$

7. Amount Square Error

$$JKG = 0.329 - 0.027 - 0.042 - 0.019$$

$$= 0.240$$

8. ID card $= \frac{\text{JK Treatment}}{\text{db Treatment}} \quad \frac{0.089}{15}$

$$= 0.006$$

9. $KT\ (B) = \frac{JK\ (B)}{db\ (B)} = \frac{0.027}{3}$

$$= 0.009$$

10. $KT\ (P) = \frac{JK\ (P)}{db\ (P)} = \frac{0.042}{3}$

$$= 0.014$$

11. $KT\ (BP) = \frac{JK\ (BP)}{db\ (BP)} = \frac{0,0\ 19}{9}$

$$= 0.002$$

12. $KT\ Error = \frac{JKG}{db\ (G)} = \frac{0.240}{64}$

$$= 0.004$$

Appendix 7. (Continued)

13. F Calculate P $= \frac{\text{KT Treatment}}{\text{KT Error}} = \frac{0.006}{0.004}$

$= 1,580$

14. F Count (B) $= \frac{\text{KT (B)}}{\text{KT Error}} = \frac{0.009}{0.004}$

$= 2,433$

15. F Count (P) $= \frac{\text{KT (P)}}{\text{KT Error}} = \frac{0.014}{0.004}$

$= 3,767$

16. F Count (BP) $= \frac{\text{KT (BP)}}{\text{KT Error}} = \frac{0.002}{0.004}$

$= 0.567$

17. Table ANOVA

Sources of Diversity	DB	JK	KT	F count	F table 0.05	Sig
Treatment	15	0.089	0.006	1,580	1,826	Mr.
BAP (B)	3	0.027	0.009	2,433	2,748	Mr.
Extract Banana (P)	3	0.042	0.014	3,767	2,748	*
Interaction (BP)	9	0.019	0.002	0.567	2,030	Mr.
Error	64	0.240	0.004			
Total	79	0.329				

Information : Significant (F count > F table), Mr. : No significant (F count < F table).

18. Coefficient of Diversity

$$KK = \frac{\sqrt{0.004}}{1.1} \times 100\% = 5.8\%$$

Appendix 7. (Continued)

19. Test Carry on (BNJ) Factor Concentration Extract Banana on level

$$5\%\ SD\ (Standard\ Error) = \frac{\sqrt{KTG}}{rP} = \frac{\sqrt{0.004}}{5.4} = 0.0137$$

Table BNJ 5% = (Amount Treatment, db Error)

= 3.40

BNJ Calculate = Sd × table values BNJ 5%

= 0.0137 × 3.40

= 0.0466

Table Matrix Difference Mark Middle Factor Concentration Extract Banana

Banana Extract	Mark Middle	P2	P3	P1	P0	Notation
		1.2	1.1	1.1	1.0	
P2	1.2	0.0 ns				a
P3	1.1	0.1*	0.0 ns			b
P1	1.1	0.1*	0.0 ns	0.0 ns		b
P0	1.0	0.2*	0.1*	0.1*	0.0 ns	c

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count).

Attachment 8. Data Amount Leaf (Strand)

BAP (B)	Test	Extract Banana (P)				Amount	Flat-flat
		0 g/L	10 g/L	20 g/L	30 g/L		
0 ppm	1	1.7	2.0	2.0	2.0	7.7	1.9
	2	0.0	1.3	0.0	4.5	5.8	1.5
	3	0.0	1.7	2.0	0.0	3.7	0.9
	4	1.3	3.0	1.3	7.5	13.1	3.3
	5	0.0	0.3	1.7	3.5	5.5	1.4
Amount		3.0	8.3	7.0	17.5	35.8	9.0
Average		0.6	1.7	1.4	3.5	7.2	1.8
1.5 ppm	1	1.7	0.0	1.7	2.0	5.4	1.4
	2	2.3	2.7	1.3	0.0	6.3	1.6
	3	0.7	0.0	4.0	0.0	4.7	1.2
	4	1.0	2.0	2.3	1.0	6.3	1.6
	5	2.0	1.7	1.0	2.0	6.7	1.7
Amount		7.7	6.4	10.3	5.0	29.4	7.4
Average		1.5	1.3	2.1	1.0	5.9	1.5
3.0 ppm	1	0.7	0.7	1.7	0.0	3.1	0.8
	2	0.0	1.0	1.3	0.3	2.6	0.7
	3	0.3	0.0	0.3	0.0	0.6	0.2
	4	0.3	1.7	0.3	1.3	3.6	0.9
	5	1.3	2.0	1.0	1.3	5.6	1.4
Amount		2.6	5.4	4.6	2.9	15.5	3.9
Average		0.5	1.1	0.9	0.6	3.1	0.8
4.5 ppm	1	0.7	0.7	2.0	2.3	5.7	1.4
	2	1.0	2.3	0.0	0.3	3.6	0.9
	3	1.7	1.0	1.7	0.0	4.4	1.1
	4	1.3	0.0	1.3	2.3	4.9	1.2
	5	0.0	0.3	2.3	0.3	2.9	0.7
Amount		4.7	4.3	7.3	5.2	21.5	5.4
Average		0.9	0.8	1.5	1.0	4.3	1.1
Amount		18.0	24.4	29.2	30.9	102.2	
Average		0.9	1.3	1.4	1.5	1.3	

Appendix 8. (Continued)

BAP	Extract Banana				Average
	0 g/L	10 g/L	20 g/L	30 g/L	
0 ppm	0.6	1.7	1.4	3.5	1.8
1.5 ppm	1.5	1.3	2.1	1.0	1.5
3.0 ppm	0.5	1.1	0.9	0.6	0.8
4.5 ppm	0.9	0.8	1.5	1.0	1.1
Average	0.9	1.3	1.4	1.5	1.3

Calculation :

1. Factor Correct (FK)

$$FK = \frac{(102.2)^2}{5\times4\times4}$$

$$= 130.56$$

2. Amount Square Total

$$\text{Jakarta} = 1.7^{\,2} + 0.0^{\,2} + \ldots, + 0.3^{\,2} - 130.56$$

$$= 118.28$$

3. Amount Square Treatment

$$JKP = \frac{3.0^{\,2} + 7.7^{\,2} + \ldots, + 5.2^{\,2}}{5} - 130.56$$

$$= 39.62$$

4. Amount Square Treatment B

$$JK\,(B) = \frac{35.8^{\,2} + 29.4^{\,2} + 15.5^2 + 21.5^{\,2}}{5\times4} - 130.56$$

$$= 11.86$$

5. Amount Square Treatment P

$$JK\,(P) = \frac{18.0^{\,2} + 24.4^{\,2} + 29.2^2 + 30.6^{\,2}}{5\times4} - 130.56$$

$$= 4.86$$

Appendix 8. (Continued)

6. Amount Square Treatment Interaction

$$JK\,(BP) = \frac{3.0^{2} + 8.3^{2} + \ldots, + 5.2^{2}}{5} - 130.56 - 11.86 - 4.86$$

$$= 22.89$$

7. Amount Square Error

$$JKG = 118.28 - 11.86 - 4.86 - 22.89$$

$$= 78.66$$

8. ID card $= \frac{\text{JK Treatment}}{\text{db Treatment}} \frac{39.62}{15}$

$$= 2.64$$

9. $KT\,(B) = \frac{JK\,(B)}{db\,(B)} = \frac{11.86}{3}$

$$= 3.95$$

10. $KT\,(P) = \frac{JK\,(P)}{db\,(P)} = \frac{4.86}{3}$

$$= 1.62$$

11. $KT\,(BP) = \frac{JK\,(BP)}{db\,(BP)} = \frac{22.89}{9}$

$$= 2.54$$

12. $KT\ Error = \frac{JKG}{db\,(G)} = \frac{78.66}{64}$

$$= 1.23$$

Appendix 8. (Continued)

13. F Calculate P = $\frac{\text{KT Treatment}}{\text{KT Error}} = \frac{2.64}{1.23}$

$= 2.15$

14. F Count (B) = $\frac{\text{KT (B)}}{\text{KT Error}} = \frac{3.95}{1.23}$

$= 3.22$

15. F Count (P) = $\frac{\text{KT (P)}}{\text{KT Error}} = \frac{1.62}{1.23}$

$= 1.32$

16. F Count (BP) = $\frac{\text{KT (BP)}}{\text{KT Error}} = \frac{2.54}{1.23}$

$= 2.07$

17. Table ANOVA

Sources of Diversity	DB	JK	KT	F count	F table 0.05	Sig
Treatment	15	39.62	2.64	2.15	1.83	*
BAP (B)	3	11.86	3.95	3.22	2.75	*
Extract Banana (P)	3	4.86	1.62	1.32	2.75	Mr.
Interaction (BP)	9	22.89	2.54	2.07	2.03	*
Error	64	78.66	1.23			
Total	79	118.28				

Information : Significant (F count > F table), Mr. : No significant (F count < F table)

18. Coefficient of Diversity

$KK = \frac{\sqrt{1.23}}{1.3} \times 100\% = 98\%$

Because KK >50% then the data transformed use log (x + 10)

Attachment 8. (Advanced)

19. Test Carry on (BNJ) Factor Concentration BAP on level

5% SD (Standard Error) = $\frac{\sqrt{KTG}}{rP} = \frac{\sqrt{1.23}}{5.4} = 0.25$

Table BNJ 5% = (Amount Treatment, db Error)

= 3.40

BNJ Calculate = Sd × table values BNJ 5%

= 0.25× 3.40

= 0.84

Table Matrix Difference Mark Middle Factor Concentration BAP

BAP	Mark Middle	B0	B1	B3	B2	Notation
		1.8	1.5	1.1	0.8	
B0	1.8	0.0 ns				a
B1	1.5	0.3 ns	0.0 ns			ab
B3	1.1	0.7 ns	0.4 ns	0.0 ns		ab
B2	0.8	1.0 *	0.7 ns	0.3 ns	0.0 ns	b

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count)

20. Test Carry on (BNJ) Interaction Concentration BAP And Extract Banana on level 5%

Sd (Error (Baku) = $\frac{\sqrt{KTG}}{rP} = \frac{\sqrt{1.23}}{5} = 0.50$

Table BNJ 5% = (Total Treatment, db Error)

= 4.55

BNJ Calculate = Sd × table values BNJ 5%

= 0.50× 4.55

= 2.26

Attachment 8. (Continued)

Table Matrix Difference Mark Middle of Interaction Factors Concentration BAP And Extract Banana

Treatment	NT	B0P3	B1P2	B0P1	B1P0	B3P2	B0P2	B1P1	B2P1	B3P3	B1P3	B3P0	B2P2	B3P1	B0P0	B2P3	B2P0	Notation
		3.5	2.1	1.7	1.5	1.5	1.4	1.3	1.1	1.0	1.0	0.9	0.9	0.9	0.6	0.6	0.5	
B0P3	3.5	0.0 ns																a
B1P2	2.1	1.4 ns	0.0 ns															ab
B0P1	1.7	1.8 ns	0.4 ns	0.0 ns														ab
B1P0	1.5	2.0 ns	0.6 ns	0.2 ns	0.0 ns													ab
B3P2	1.5	2.0 ns	0.6 ns	0.2 ns	0.0 ns	0.0 ns												ab
B0P2	1.4	2.1 ns	0.7 ns	0.3 ns	0.1 ns	0.1 ns	0.0 ns											ab
B1P1	1.3	2.2 ns	0.8 ns	0.4 ns	0.2 ns	0.2 ns	0.1 ns	0.0 ns										ab
B2P1	1.1	2.4 *	1.0 ns	0.6 ns	0.4 ns	0.4 ns	0.3 ns	0.2 ns	0.0 ns									b
B3P3	1.0	2.5 *	1.1 ns	0.7 ns	0.5 ns	0.5 ns	0.4 ns	0.3 ns	0.1 ns	0.0 ns								b
B1P3	1.0	2.5 *	1.1 ns	0.7 ns	0.5 ns	0.5 ns	0.4 ns	0.3 ns	0.1 ns	0.0 ns	0.0 ns							b
B3P0	0.9	2.6 *	1.2 ns	0.8 ns	0.6 ns	0.6 ns	0.5 ns	0.4 ns	0.2 ns	0.1 ns	0.1 ns	0.0 ns						b
B2P2	0.9	2.6 *	1.2 ns	0.8 ns	0.6 ns	0.6 ns	0.5 ns	0.4 ns	0.2 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns					b
B3P1	0.9	2.6 *	1.2 ns	0.8 ns	0.6 ns	0.6 ns	0.5 ns	0.4 ns	0.2 ns	0.1 ns	0.1 ns	0.0 ns	0.0 ns	0.0 ns				b
B0P0	0.6	2.9 *	1.5 ns	1.1 ns	0.9 ns	0.9 ns	0.8 ns	0.7 ns	0.5 ns	0.4 ns	0.4 ns	0.3 ns	0.3 ns	0.3 ns	0.0 ns			b
B2P3	0.6	2.9 *	1.5 ns	1.1 ns	0.9 ns	0.9 ns	0.8 ns	0.7 ns	0.5 ns	0.4 ns	0.4 ns	0.3 ns	0.3 ns	0.3 ns	0.0 ns	0.0 ns		b
B2P0	0.5	3.0 *	1.6 ns	1.2 ns	1.0 ns	1.0 ns	0.9 ns	0.8 ns	0.6 ns	0.5 ns	0.5 ns	0.4 ns	0.4 ns	0.4 ns	0.1 ns	0.1 ns	0.0 ns	b

Note : * = significant (difference > BNJ Count), ns = No significant (difference < BNJ Count).

Attachment 9. Data Media Explanation Browning (bottle)

Treatment	Test	Number of Browning Explants	Browning Percentage (%)
B0P0	5	2	40
B0P1	5	0	0
B0P2	5	0	0
B0P3	5	0	0
B1P0	5	1	20
B1P1	5	2	40
B1P2	5	0	0
B1P3	5	0	0
B2P0	5	0	0
B2P1	5	0	0
B2P2	5	0	0
B2P3	5	0	0
B3P0	5	1	20
B3P1	5	0	0
B3P2	5	1	20
B3P3	5	0	0
Amount	80	7	

Information :

B0P0 : BAP 0 ppm + Banana Extract 0 g/L
B0P1 : BAP 0 ppm + Banana Extract 10 g/L
B0P2 : BAP 0 ppm + Banana Extract 20 g/L
B0P3 : BAP 0 ppm + Banana Extract 30 g/L
B1P0 : BAP 1.5 ppm + Banana Extract 0 g/L
B1P1 : BAP 1.5 ppm + Extract Banana 10 g/L
B1P2 : BAP 1.5 ppm + Extract Banana 20 g/L
B1P3 : BAP 1.5 ppm + Extract Banana 30 g/L
B2P0 : BAP 3.0 ppm + Banana Extract 0 g/L
B2P1 : BAP 3.0 ppm + Extract Banana 10 g/L
B2P2 : BAP 3.0 ppm + Extract Banana 20 g/L
B2P3 : BAP 3.0 ppm + Extract Banana 30 g/L
B3P0 : BAP 4.5 ppm + Banana Extract 0 g/L
B3P1 : BAP 4.5 ppm + Extract Banana 10 g/L
B3P2 : BAP 4.5 ppm + Extract Banana 20 g/L
B3P3 : BAP 4.5 ppm + Banana Extract 30 g/L

Appendix 9. (Continued)

Calculation Percentage Media Browning explant

$$\text{B0P0} = \frac{\text{Amount explanation browning every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{2}{5} \times 100\% = 40\%$$

$$\text{B1P0} = \frac{\text{Amount explanation browning every Total}}{\text{explants per treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B1P1} = \frac{\text{Amount explanation browning every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{2}{5} \times 100\% = 40\%$$

$$\text{B3P0} = \frac{\text{Amount explanation browning every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B3P2} = \frac{\text{Amount explanation browning every Total}}{\text{explants per treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

Attachment 10. Data Media Explanation Contaminated (bottle)

Treatment	Test	Amount Contaminated Explants	Contamination Percentage (%)
B0P0	5	4	80
B0P1	5	2	40
B0P2	5	1	20
B0P3	5	1	20
B1P0	5	2	40
B1P1	5	3	60
B1P2	5	1	20
B1P3	5	1	20
B2P0	5	0	0
B2P1	5	1	20
B2P2	5	0	0
B2P3	5	0	0
B3P0	5	1	20
B3P1	5	0	0
B3P2	5	1	20
B3P3	5	0	0
Amount	80	18	

Information :

B0P0 : BAP 0 ppm + Banana Extract 0 g/L
B0P1 : BAP 0 ppm + Banana Extract 10 g/L
B0P2 : BAP 0 ppm + Banana Extract 20 g/L
B0P3 : BAP 0 ppm + Banana Extract 30 g/L
B1P0 : BAP 1.5 ppm + Banana Extract 0 g/L
B1P1 : BAP 1.5 ppm + Extract Banana 10 g/L
B1P2 : BAP 1.5 ppm + Extract Banana 20 g/L
B1P3 : BAP 1.5 ppm + Extract Banana 30 g/L
B2P0 : BAP 3.0 ppm + Banana Extract 0 g/L
B2P1 : BAP 3.0 ppm + Extract Banana 10 g/L
B2P2 : BAP 3.0 ppm + Extract Banana 20 g/L
B2P3 : BAP 3.0 ppm + Extract Banana 30 g/L
B3P0 : BAP 4.5 ppm + Banana Extract 0 g/L
B3P1 : BAP 4.5 ppm + Extract Banana 10 g/L
B3P2 : BAP 4.5 ppm + Extract Banana 20 g/L
B3P3 : BAP 4.5 ppm + Banana Extract 30 g/L

Appendix 10. (Continued)

Calculation Percentage Explanation Contaminated

$$\text{B0P0} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{4}{5} \times 100\% = 80\%$$

$$\text{B0P1} = \frac{\text{Amount explanation contaminated every Total}}{\text{explants per treatment}} \times 100\%$$

$$= \frac{2}{5} \times 100\% = 40\%$$

$$\text{B0P2} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B0P3} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B1P0} = \frac{\text{Amount explanation contaminated every Total}}{\text{explants per treatment}} \times 100\%$$

$$= \frac{2}{5} \times 100\% = 40\%$$

$$\text{B1P1} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{3}{5} \times 100\% = 60\%$$

Appendix 10. (Continued)

$$\text{B1P2} = \frac{\text{Amount explanation contaminated every Total}}{\text{explants per treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B1P3} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B2P1} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B3P0} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

$$\text{B3P2} = \frac{\text{Amount explanation contaminated every treatment}}{\text{Total explanation every treatment}} \times 100\%$$

$$= \frac{1}{5} \times 100\% = 20\%$$

Attachment 11. Results Test Correlation Pearson between Parameter

Parameter	Appearance Time Shoots	Amount Shoots	Amount leaf
Time Shoots Appear	1.0	0.82	0.5
Amount shoots	0.82	1.0	0.71
Amount leaf	0.50	0.71	1.0

1. Time of Emergence of Shoots

$X^2 = 2.4^2$

$= 5.76$

2. Amount Shoots

$X^2 = 1.1^2$

$= 1.21$

3. Amount Leaf

$X^2 = 2.1^2$

$= 4.41$

4. Coefficient Time Correlation Appear Shoots And Amount Leaf

$$r_{xy} = \frac{N\sum XY - (\sum X).(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

information :

r_{xy} : correlation between variable X And variable Y

N : amount observation data

X : independent variable

Y : dependent variable

Attachment 11. (Advanced)

$$r_{xy} = \frac{6.97 - 2.64}{\sqrt{[11.52 - 2.42]}}$$

$$r_{xy} = \frac{4.33}{5.28}$$

$$r_{xy} = 0.8208$$

5. Coefficient Correlation Time Appear Shoots And Amount Leaf

$$r_{xy} = \frac{10.17 - 5.04}{\sqrt{[11.52 - 8.82]}}$$

$$r_{xy} = \frac{5.13}{10.08}$$

$$r_{xy} = 0.50893$$

6. Coefficient Correlation Time Appear Shoots And Amount Leaf

$$r_{xy} = \frac{5.62 - 2.31}{\sqrt{[2.42 - 8.82]}}$$

$$r_{xy} = \frac{3.31}{4.62}$$

$$r_{xy} = 0.71645$$

BIOGRAPHY

The author's full name is Putri Tayuvani Girsang, born on November 5, 2003 in Simalungun Regency. Writer is child First from The couple Mr. Jose Rizal Adi Putra Girsang, A.Md. Kom, and Mrs. Sri Rohdearni Sitepu, SE. The author completed his education base in Elementary School Country Pilot Sondi Raya, North Sumatra in 2015, SMP Negeri 1 Raya and graduated in 2018 and SMA Swasta RK Bintang Timur, Pematangsiantar City and graduated in 2021. In 2021 the author continued his education in the S - 1 Agroecotechnology Study Program, Diponegoro University, Semarang.

The author successfully completed the Field Work Practice Report with the title " *In Vitro Orchid Plant Propagation Techniques (Grammatophyllum scriptum*) at GS. Biotech Lembang, Bandung" in 2024. Active writer become assistant practical work in a number of eye studying like Climatology academic year 2022/2023 and 2023/2024, Soil Science academic year 2022/2023 and 2023/2024, Ecology Plant year teachings 2022/2023, Technique Conservation Land Resources for the 2023/2024 academic year, Plant Tissue Culture for the 2024/2025 academic year.

The author actively participates in campus organization management, such as the Christian Student Fellowship (PMK) FPP, as Treasurer for the 2023-2024 period. He also actively participates in committee activities at the Faculty and University levels. like GORe year 2022/2023 as mentor, GOM And PAB PMK FPP 2022/2023 as Treasurer, Christmas PMK UNDIP 2022/2023 as *Fundraising* , Diponegoro University Choir 2022-2023 as participant. Writer Once Work as Barista And Cashier in Mixue Undip Semarang in 2024. Until now the author is still actively registered as a student of the Agroecotechnology Undergraduate Study Program , Department of Agriculture, Faculty of Animal Husbandry and Agriculture, Diponegoro University, Semarang.