

## In Vitro Effects of Young Corn Extract on Propagules Stage of *Musa acuminata* Colla.

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**Abstract:** This study was aimed to evaluate the growth respond of *Musa acuminata* Colla in Murashige and Skoog (MS) medium supplemented with young corn extract, to determine optimum concentration of young corn extract to induce shoot of *Musa acuminata* Colla. This study using variation of young corn extracts which were 0 (control), 2, 4, 6, 8 ppm, and medium with plant growth regulator 4 ppm BAP (*Benzylaminopurine*) + 2 ppm IAA (*Indole acetic acid*). Explants used are propagule of *Musa acuminata* Colla. The results showed that the young corn extract had significant effect on growth of increasing the number and wet weight of *Musa acuminata* Colla propagule. Concentration of 8 ppm is the most effective to induced shoot of *Musa acuminata* Colla.

**Key words:** Propagule, *In vitro* culture, *Musa acuminata* Colla, Young corn extract

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### 1. Introduction

Banana is a fruit that is favored in the world, because bananas have a high nutrient content, and cheap price. Compared with the other fruits, bananas have a creamy texture with a delicious flavor. Because banana is not depend on the climate, bananas are available throughout the year. Today bananas have become a commodity industry (Maslukhah, 2008). According data from Central Bureau of Statistics (2005) Indonesia produce more than 5 million tons of bananas. Based on production data of banana in the world, banana ranks fourth global food after rice, wheat, and corn. Of many types bananas in Indonesia, banana is a fruit that is consumed by many people because it contains of compound called short chain fatty acids, which maintains the layer of the small intestine tissue and increases the body's ability to absorb nutrients.

Increased production of bananas in Indonesia requires the expansion of planting. One way is by banana plantations. Banana plantations require quality seeds in large quantities. There are two ways to provide seeds, namely conventional and tissue culture (*in vitro*). Propagation conventionally via sucker, hump and hump cleavage takes a long time, seedlings produced little, not uniform, the seed healthy is not guaranteed. While the technique of tissue culture (*in vitro*) can produce healthy banana seedlings and uniforms in large quantities in a relatively short period and does not depend on climate, so the availability of seeds is assured (Maslukhah, 2008).

Multiplication is propagation phase in plant tissue culture by doing subculture a few times that will be obtained a number of new plantlets (Yusnita, 2003). Tissue culture techniques are influenced by media, explants and growth regulators. Medium used in propagation of bananas is Murashige and Skoog as the basic medium (Razdan, 2004). According Sitohang (2006), the basic media still require addition of growth regulators or organic extracts to enhance development of explants. Synthetic growth regulators are commonly used but it is relatively expensive and sometimes availability is limited. Growth regulator which can be obtained easily and cheap can be extracted from the plant bioactive compounds. According Ulfa (2014) variegated plants contain bioactive compounds that can be extracted as plant growth regulators (auxin, gibberellins and sitokinin) compounds which are extracts from corn seed. Corn seed extract has a concentration of compound growth regulator such as auxin 1.67 ppm, 41.23 ppm gibberellin and cytokinin /zeatin 53.94 ppm. The results of NurAfni (2013) showed that 50 mg of young corn extract is the best concentration for potato meristem growth on MS medium. According Karjadi (2002), young corn extract can stimulate of cell division, morphogenesis, also enhance the growth of shoots.

### 2. Materials and Methods

#### 2.1 Plant Materials

The explants used were propagules of *Musa acuminata* Colla that is available in Tissue Culture Laboratory, Center for Biotechnology, University of Hasanuddin

## 2. 2 Extraction Process

Extraction using corn pale yellow *Zea mays* L. with criteria seeds easy to push the nails. Part used is the seed corn. The extraction process is done from modification of the way conducted by Ulfa, 2014. Corn seed grain from corncob. Seed corn is mixed with distilled water in the ratio 1: 1, little by little and blend (100 grams of corn: 100 ml of water). Filter the corn seed that have been blended by using a filter cloth. Then put into a bottle and store in refrigerator

## 2.3 Extract Treatment

Propagules were planted in media treatment of young corn extract concentrations of 2, 4, 6, 8 ppm; 0 ppm as a control and media with growth regulators BAP 4 ppm and IAA 2 ppm as a comparison. The culture is maintained under continuous white light at a temperature of 25°C. Observations done every week for 2 months.

## 2. 4 Data Analysis

Analysis of quantitative data were analyzed using the F test if there is a significant effect of treatment which will be carried out further tests using DMRT (Duncan Multiple Range Test) at 5%.

## 3. Result and Discussion

### 3. 1 Number of Propagules

The addition of young corn extract in medium increased the number of propagules *Musa acuminata* Colla per week. 0 ppm as a control treatment resulted in the number of shoots as much as 13.77 (Figure 1). This is presumably because the MS media without extract more leads to the forming of shoots and roots. According to Nurdin (2004) states that the MS is media consists of macro and micro nutrients and vitamins for the growth of explants. MS medium containing 40 mM of Nitrogen in the form of NO<sub>3</sub> and 29 mM in the form of NH<sub>4</sub><sup>+</sup>.

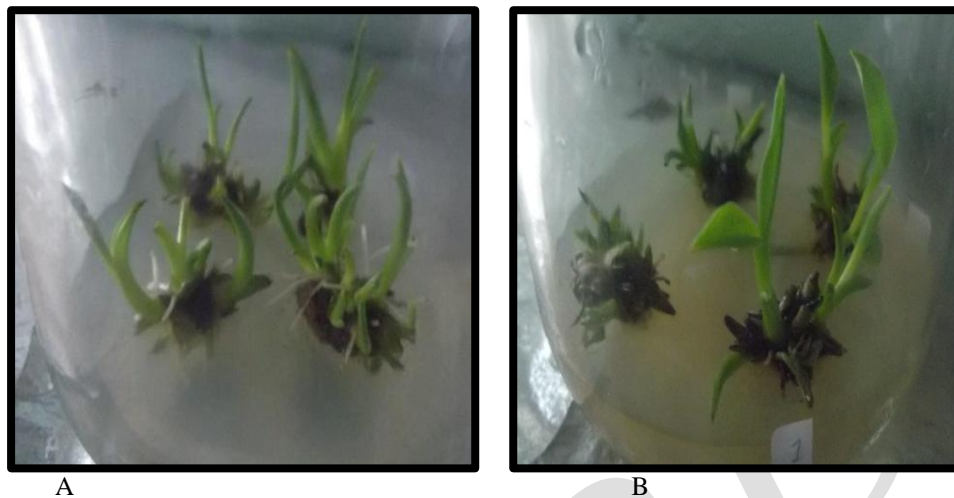
**Table 1:** Number of *Musa acuminata* Colla propagule

Treatment	Average Number of Propagule						
	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week	6 <sup>th</sup> week	7 <sup>th</sup> week	8 <sup>th</sup> week
Control 0 ppm	2,33 <sup>ab</sup>	3,88 <sup>b</sup>	6,55 <sup>cd</sup>	8,55 <sup>bc</sup>	10,22 <sup>bc</sup>	11,66 <sup>bc</sup>	13,77 <sup>a</sup>
MS + 2 ppm Young Corn Extrakt	1,55 <sup>a</sup>	2,33 <sup>a</sup>	3,55 <sup>a</sup>	4,44 <sup>a</sup>	5,66 <sup>a</sup>	6,10 <sup>a</sup>	6,88 <sup>b</sup>
MS + 4 ppm Young Corn Extrakt	1,99 <sup>a</sup>	3,22 <sup>ab</sup>	4,55 <sup>ab</sup>	6,33 <sup>ab</sup>	7,66 <sup>ab</sup>	8,88 <sup>b</sup>	10,33 <sup>b</sup>
MS + 6 ppm Young Corn Extrakt	1,88 <sup>a</sup>	3,66 <sup>ab</sup>	5,21 <sup>bc</sup>	6,55 <sup>ab</sup>	7,88 <sup>ab</sup>	9,10 <sup>b</sup>	10,55 <sup>c</sup>
MS + 8 ppm Young Corn Extrakt	2,21 <sup>a</sup>	4,66 <sup>bc</sup>	7,55 <sup>de</sup>	9,66 <sup>c</sup>	11,33 <sup>c</sup>	13,10 <sup>c</sup>	14,66 <sup>c</sup>
4 ppm BAP + 2 ppm IAA (Comparison)	3,33 <sup>b</sup>	5,77 <sup>c</sup>	7,99 <sup>e</sup>	10,88 <sup>c</sup>	12,66 <sup>c</sup>	13,55 <sup>c</sup>	14,44 <sup>c</sup>

Values in the same column followed by the same small letter not significantly according DMRT (Duncan Multiple Range Test) at 5%.

Concentration of 8 ppm produces the highest number of propagules 14.66 (Figure 1). This is presumably because of the high starch content is 72-73%, vitamin A or carotenoids and vitamin E. Corn also contains a variety of essential minerals, such as K, Na, P, Ca, and Fe (Suarni and Widowati, 2005). Many natural auxin contained in the liquid corn seeds that are still whitish yellow and soft watery contents also called milk ripe stage. Hartati (2009) states that natural auxin derived from corn extract already provide optimal results to emergence of roots. Each plant has a different ability to absorb the Plant Growth Regulator to stimulate

growth. According Ulfa (2014) corn contains natural auxin is 1.67 ppm and cytokinin 53.94 ppm that able to give a great influence on the growth of shoots and roots of *Musa acuminata* Collapropagules.



**Figure 1:** Shoots are grown in MS media. A. Control (0 ppm); B. Young corn extract (8 ppm)

As comparison medium with plant growth regulators BAP4 ppm + IAA 2 ppm also produce a number of propagules that are not much different with 8 ppm is 14.44, it is presumably cause cytokinin encourage shoot formation. According to Gunawan (1995), shoot will be formed in the concentration of cytokines 3-5 mg/l and concentration of auxin 2-0 mg/l. In some replicates the average number of propagules growing at BAP 4 ppm + IAA 2 ppm higher than 8 ppm young corn extract. This is presumably cause young corn extract used is crude extracts of unknown concentrations of auxin and cytokinin hormones contained therein.

### 3. 2 Wet Weight Propagule

Number of propagules are grown in each treatment greatly affects of the wet weight propagules. Rahayu(2003) states that wet weight is depend on the speed of the cells divide and continued with the formation of callus, shoots and roots. Wet weight of explants correlated with increasing volume and cell number. If the explants large volume, the higher wet weight of explants.

**Table 2:** Wet Weight of *Musa acuminata* Cola Propagule in Some concentration of Young Corn Extract Concentrations 8 Weeks After Planting

Concentration (ppm)	Average of wet weight of propagule (gr)
Control 0 ppm	0,802 <sup>b</sup>
2 ppm young corn extract	0,261 <sup>a</sup>
4 ppm young corn extract	0,429 <sup>a</sup>
6 ppm young corn extract	0,486 <sup>a</sup>
8 ppm young corn extract	0,865 <sup>b</sup>
4 ppm BAP + 2 ppm IAA	1,323 <sup>c</sup>

Values in the same column followed by the same small letter not significantly according DMRT (Duncan Multiple Range Test) at 5%.

Increased of wet weight propagules presumably cause the organic material contained in extract of young corn can enhance the process of growth and enlargement of the explants so that the volume becomes larger. The same is stated Hartati (2009) that in cultured plantain with addition of corn and tomato extract at a concentration of 100 g/l given significant effect on the growth of plantain explants. Treatment BAP4 ppm + IAA 2 ppm propagules produced the highest wet weight 1,323 g at eight week because of size and number of propagule large lot by the average number is 14.44. Control treatment resulted in an average wet weight is 0.802

g propagules, this result is not much different in treatment of 8 ppm with an average weight of 0.865 g. This is presumably because propagules that grow at a concentration of 0 ppm is shoot. While the concentration of 8 ppm propagules are grown is shoot and small propagules. Wet weight in treatment produced the lowest propagules 2 ppm with an average weight is 0.261 grams. This is caused by propagules growing form is candidate shoots.

#### 4. Conclusion

From these study it can be concluded that young corn extract *Zea mays* L. had significant effect on the growth in number and weight of wet propagules *Musa acuminata* Colla, with the highest number of propagules in treatment of 8 ppm young corn extract is 14.66 and highest of wet weight of propagules is 0.865 g. Optimal concentration of young corn extract for propagation of *Musa acuminata* Colla is 8 ppm.

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