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# The Effect Hormone Cytokynin and Giberelin On Maize Growth (Zea mays L.)

*Pengaruh Aplikasi Hormon Giberelin dan Sitokinin pada Jagung (Zea mays L.)*

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***ABSTRACT***

*Maize is important food comodity in indonesia beside rice. In its devolepment,maize does not only function as food for human, but also asa staple in animal feed industry and other needs, to meet market demand for increased maize production,it is in necessary to improve cultivation methods with the application of growth regulators,namely by used giberellin and cytokinins.Giberellin is hormone that affects plant growth in the germination and flowering phases while cytokinins play arole in cell elongation. The aim of this study was to evaluate the effect of gibberelin and cytokinins on stem height, leaf lenght panicle land.This study used a completely randomized design with two factors, the concentration of giberellin and cytokinin 0, 10,20,50 ppm.Based on the data analysis below combiation had a significant effect on the stem height(P2C1).Cytokinin at concentration of 25 and giberelin 10 ppm increase the stem height(. The combination cytokynin 50 ppm and giberellin 50 ppm (P3C3) affect leaf lenght and lengt of panicle maize.*

*Keywords : Giberella, Cytokinin, Zea mays*

**ABSTRAK**

Jagung (Zea mays L) merupakan komoditi pangan yang penting di Indonesia selain padi. Dalam perkembangannya jagung tidak hanya berfungsi sebagai bahan pangan bagimanusia, namun juga sebagai bahan pokok dalam industri pakan ternak dan kebutuhan lainnya, untuk memenuhi permintaan pasar terhadap peningkatan produksi jagung maka perlu peningkatan cara budidaya dengan aplikasi zat pengatur tumbuh yaitu dengan menggunakan giberelin dan sitokinin. Giberelin merupakan hormon yang mempengaruhi pertumbuhan tanaman pada fase perkecambahan dan pembungaan sedangkan sitokinin berperan dalam pemanjangan sel, pembentukan, akar,tunas dan pembentukan organ pada tanaman lainnya. Tujuan penelitian ini untuk mengevaluasi pengaruh giberelin dan sitokinin terhadap tinggi batang dan panjang daun tanaman jagung. Penelitian ini menggunakan Rancangan Acak lengkap dengan dua faktor yaitu konsentrasi giberelin 0, 10, 25,50 ppm dan sitokinin 0, 10,25, 50 ppm. Berdasarkan analisis data ddibawah bahwa kombinasi $P_2C_1$ memberikan pengaruh nyata terhadap tinggi tanaman yaitu konsentrasi . Panjang daun dan panjang malai pada jagung yang paling berpengaruh kombinasi $P_3C_3$ yaitu kombinasi sitokinin50 ppm dan giberelin 50 ppm.

*Keywords : Giberelin, Sitokinin, Zea mays*

## INTRODUCTION

Maize (Zea mays L) is an important food commodity in Indonesia besides rice. In a development, maize not only usefor humans, but also as a basic food idustry for poultry. In the last five years, the need of maize as a food industry increases 10-15% per year and it will 2 million tonof per year. There are some eefforts that can be done to increase maize production is to expand planting area and cultivation technique. The increase of production by expand the planting area is more difficult, because the land production decrease and cultivation techniques. Increasing production by expanding the planting area is more difficult, because the land convertion and degradation (Badan Litbang Pertanian,2012).

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There fore, anincrease ofnational maize production is often usecultivation improvement system the grow regulators is administered ofgiberelin hormon in a process of growth and development. The addition of the hormone gibberellins to the maize can be able to stimulate cambium cell division, stimulatede flowering pramaturely (Agus et al., 2009).

Cytokinins is a substitute for aadenine to increase cell division and growth regulatory fuctions. How it works the same as kinetin (6- furfurylaminopurine). The first natural cytokines isolated is zeatin in young seed maize. Zeatin is a cytokinin that is often found in almost high plants, mos, pathogenic and non-pathogenic fungi, bacteria, and tRNA in microorganism cells and animal cells. Cytokinins are a class of hormones that are important in growth because it is essential in cell division (Roitch, 2000). Beside its fuction cell division, cytokines is also involve delaying the shedding of leaves, flowers, fruit and the growth of shoots, roots and increasing resistance to pathogens. Because of cytokinin has an important role to the plant growth, so th ewriter interested to evaluate the optimal to ward concentration of gibberellin and cytokinins hormone toward of maize on the growth of maize plants,especially on the stem height leaf length, and the lenght panicle of the plant.

## MATERIALS AND METHODS

This research is done in Batang Angkola sub-district from July until October 2020. The material of Materials in the research of maize seeds, soil, cytokinin gibberellin and other supporting materials. The tools used are polybags, sprayers, hoes, rulers, scales, plantlets, plastic strap. This study used a factorial completely randomized design. The first factor was cytokinin P0(0), P1(10),P2(25) and P3(50) and the second was giberelin with a Concentration of C0(0), C1(10), C2(25), C3(50) ppm. Statistic analysis two way Anavo (Gomez,1976) .

Observation parameters

The parameters measured are:

1. The height of the maize plant is measured from the point of growth to the end of each week.
2. The length of the third leaf is measured every week until reaching the maize plant post harvest,
3. The panicle lenght of maize plants was measured at the time the panicle exits The measurement was carried out once a week.

## RESULTS AND DISCUSSIONS

Table 1. Stem height ofmaize (cm)

| Giberelin | | Cytokinin (ppm) | | | |
|---|---|---|---|---|---|
| | | **0** | **10** | **25** | **50** |
| | | **Stem height (cm)** | | | |
| **Week - 5** | **0** | 60 | 72 | 69 | 71 |
| | **10** | 67 | 70 | 73 | 71 |
| | **25** | 82 | 67 | 62 | 67 |
| | **50** | 80 | 73 | 69 | 63 |
| **Week-9** | **0** | 67 | 81 | 83 | 83 |
| | **10** | 72 | 83 | 93 | 90 |
| | **25** | 93 | 90 | 89 | 89 |
| | **50** | 90 | 82 | 85 | 92 |
| **Week - 13** | **0** | 106 | 117 | 120 | 111 |
| | **10** | 108 | 109 | 107 | 116 |
| | **25** | 134 | 113 | 97 | 117 |
| | **50** | 110 | 119 | 106 | 120 |

Based on Table 1, the height of the stalks in maize at the fifth week was most visible at the P2C2 concentration and the most significant at week 13. It was concluded that gibberellins and cytokinins had a significant effect on maize plant height. Gibberellin is proven to increase plant height (Pavlista et al.,2013).

Cytokinins functions to increase stem height by increasie cell elongation (Wicaksono, et al. 2016). The concentrations of gibberellin depend on each other at the stage of cytokinin concentrations as seen in Table 1, so it is suspected that

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cytokininconcentrations can decrease the performance of gibberellins and vice versa.

Table 2. Length leaves of maize (cm)

| Treatmean | $C_0$ | $C_1$ | $C_2$ | $C_3$ | Average |
|---|---|---|---|---|---|
| $P_0$ | 22.1 | 24.2 | 23.7 | 23.5 | $23.4^{x}$ |
| $P_1$ | 24.2 | 26.8 | 25.6 | 26.6 | $25.8^{x}$ |
| $P_2$ | 23.8 | 29.2 | 27.6 | 24.7 | $26.3^{xy}$ |
| $P_3$ | 26.2 | 27.3 | 26.1 | 27.8 | $27^{y}$ |
| Average | 24.x | 27.y | 25.x | $25^{x}$ y | |

Based on Table 2 above, the optimal leaf length of the P3C3 combination compared to other concentrations. This proves that gibberellin has a significant effect on cell enlargement so that leaf length increases (Taiz&Zeiger,2002) while cytokinins function in cell division, there by affecting leaf length of maize.

Table 3. Length Panicle of maize cm

| Treatmean | $C_0$ | $C_1$ | $C_2$ | $C_3$ | Average |
|---|---|---|---|---|---|
| $P_0$ | 24.7 | 27 | 24 | 23.5 | $26.3^{x}$ |
| $P_1$ | 24.2 | 26.8 | 26 | 28 | $26.3.8^{x}$ |
| $P_2$ | 25 | 27 | 27.8 | 27 | $26.^{y}$ |
| $P_3$ | 26.2 | 27.8 | 28 | 29 | $27,8^{xy}$ |
| Average | $25^{x}$ | 27 y | 26.5 x | $26,8^{x}$ y | |

Based onthe result above, cytokinin and giberelin give some effecttoward the plants growth and production. Cytokinin has fuction in cell division so that the lenght of panicle is addad. Cytokinin can affect growth such as long panicle formation.Cytokinin treatment that give in 2 weeks after it has flower twice,will increse the panicle growth. Cytokinin can increase le strengt. Which is a of hole size and the activities of lubuk the consequence will stimulate the panicles growth.and twice the
frequency would increase panicle growth (Pavlista *et al*,2013)

Cytokinin has function in cell division so that the lenght of panicle is added. Cytokinin can affect growth such as along panicle formation. Cytokinin treatman that give in 2 weeks often it has flower will increase the panicle growth (Davis,2005). Cytokinin can increase hole strenght which is acombination of hole size an the activities of hole an the activities of the consequence will stimulate applied ti plant can affect the balance of endogenous hormone in plants especially giberlilin, auxin and cytokines which have a role in cell alongation (Damagaska,2011). The combination cytokynin and giberellin P3C3 affect the lengt of panicle maize. The plant growrh and development not only affects external factor but also internal factor, but the enviroment factor can also affect the plnt growth. It doesnt give maximum rsult, in this case the plant still give a quick respond against nutrient absorption that comes from outside plants, because the age of plant really affects nutrien absoptin of the plant (Wang, 2011)

## CONCLUSION

Based on the statements above, the application of gibberellin and cytokinins can increase height of stem and and leaf length in maize plants in combination P2C1.The combination P3C3 leaf lenght and panicle lenght in maize plant.

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