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Effect of Soaking Time with Gibberellins on Germination of Sugar Palm Plant Seeds

Pengaruh Lama Perendaman Dengan Giberelin Terhadap Perkecambahan Benih Tanaman Aren

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ABSTRACT

Sugar palm or palm tree (*Sugar palm ga pinnata*) is a tree that produces industrial materials, almost all parts or products of this plant can be utilized and have economic value. Gibberellin has the advantage of stimulating plant growth, accelerating and stimulating flowering, increasing seedbed yields, accelerating flower ripening, increasing production, accelerating seedling growth, breaking seed dormancy and producing seedless fruit. This study aims to determine the effect of soaking time with gibberellin on the germination of sugar palm plants. The research was conducted on Jl Wonogiri, West Medan District, Medan, starting from January to May 2018. The plant material used is palm plant seeds taken from a natural palm garden in Sipirok This experiment used a factorial randomized block design (RBD) with two treatments, namely immersion time (L0, L1, L2, and L3) and gibberellin (G0, G1, G2, and G3). Data were analyzed using analysis of variance (ANOVA). If the treatment (immersion time, gibberellin concentration and interaction) is significant, then proceed with DMRT (Duncan Multiple Range Test) at α = 5%. The observed parameters included: maximum growth potential, germination capacity and apical length. The results showed that the long immersion treatment with gibberellin had no significant effect on all the parameters of the observation.

Keywords : Soaking Time, Gibberellin, Germination, Seed, Sugar palm

ABSTRAK

Pohon aren atau enau (*Sugar palm ga pinnata*) merupakan pohon yang menghasilkan bahan-bahan industri yang hampir semua bagian atau produk tanaman ini dapat dimanfaatkan dan memiliki nilai ekonomi. Giberelin memiliki kelebihan untuk merangsang pertumbuhan tanaman, mempercepat dan merangsang pembungaan, meningkatkan hasil persemaian benih, mempercepat pematangan bunga, meningkatkan produksi, mempercepat pertumbuhan semai, memecahkan dormansi benih dan dapat menghasilkan buah tanpa biji. Penelitian ini bertujuan untuk mengetahui pengaruh lama perendaman dengan giberelin terhadap perkecambahan tanaman Sugar palm . Penelitian dilaksanakan di Jl Wonogiri Kecamatan Medan Barat, Medan yang dimulai pada bulan Januari sampai dengan Mei 2018. Bahan tanaman yang digunakan adalah benih tanaman Sugar palm yang diambil dari kebun Sugar palm alami di Sipirok Tapanuli Selatan. Percobaan ini menggunakan Rancangan Acak Kelompok (RAK) Faktorial dengan dua perlakuan yaitu lama perendaman (L0, L1, L2, dan L3) dan Giberelin (G0, G1, G2, dan G3). Data dianalisis menggunakan analisis varian (ANOVA). Jika perlakuan (lama perendaman, konsentrasi Giberelin dan interaksi) nyata maka dilanjutkan dengan DMRT (Duncan Multiple Range Test) pada α = 5%. Parameter pengamatan yang diamati antara lain : potensi tumbuh maksimum, daya kecambah dan panjang apokol. Hasil penelitian menunjukkan bahwa perlakuan lama perendaman dengan giberelin berpengaruh tidak nyata terhadap semua parameter pengamatan.

Kata Kunci: Lama Perendaman, Giberelin, Perkecambahan, Benih, Sugar palm

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INTRODUCTION.

Plants Sugar palm (Sugar palm ga pinnata Merr) is a plant that has a lot of potentials. The magnitude of the potential that exists in plants isn't offset by an increase in land area of the palm, precisely from the year to year decline of plantation Sugar palm caused by the export functions of the land and palm trees that are no longer productive. The regeneration of the land to palm plants derived from seedling's quality. Plant propagation palm can only be done by using the propagation of generative with the use of seeds (Farida, 2017).

Sugar Plant (A. pinnata) has many benefits, including as a producer nira (the main ingredient brown sugar, beverage, vinegar, and alcohol), a source of renewable energy (bioethanol), a source of carbohydrates (flour), mixed drink (kolang-kaling), building materials (stem) and as the plant conservation and reclamation to land a critical. In the present society only utilize plants Sugar palm derived from nature, so in a moment the plant may be the sum will be reduced (Naemah et al., 2013).

Various attempts have been made to support the development of plants palm. Some of which is to do with rejuvenation through the process of cultivation of the plant palm, the promotion of cultivation of the plant palm with how to remove the seeds palm that grows wild, and the utilization of degraded lands and the area of the outskirts of the forest, so that the population of plants palm can be increased back (Rozen et al., 2016).

The seeds of palm have a period of dormancy for quite a long time. The dormancy of the seeds isn't achieved in 12 months. Dormancy in seeds of sugar palm (Sugar palm ga pinnata) is caused by the structure of the skin the seeds are hard, so it is difficult to absorb water to germinate (Ancient, et al., 2014). One way to break the dormancy of seeds is to do scarification of the seed. According to Dharma, et al., (2015) seed Scarification is one of the efforts of pretreatment or treatment beginning on the seeds that are intended to break dormancy and accelerate the germination of seeds. Attempt to pematahan seeds palm can be done chemically, which uses a chemical solution. One of them is to use a solution of gibberellin.

Gibberellin is a plant growth regulating substance that has a role in accelerating the germination of seeds. Gibberellins as organic compounds are very important in the process of seed germination due to the nature of the control of germination. The plant can produce GA3 own, but the amount produced is not enough to stimulate germination, especially for seed-skinned hard. Soaking with GA3 on seed crusted loud needs to be done to accelerate the process of germination. The granting of gibberellins exogenous by soaking the seeds is expected to increase the growth-regulating substances that are absorbed so that the seed can speed up the germination, increase germination percentage as well as improve the growth of (Kartikasari, et al., 2019).

The purpose of this study aims to determine the influence of immersion with gibberellin on germination palm plants and the interaction of both.

MATERIALS AND METHODS

The research was conducted in Jl. Wonogiri, village Karang Choppy, districts Medan Barat, Medan, which began in January up to May 2018. The plant material used is the seed of the sugar plant taken from the gardens Sugar palm naturally in Sipirok Tapanuli Selatan. The materials used in this research is the seed of the sugar plant taken from the gardens Sugar palm naturally in Sipirok Tapanuli Selatan, sand, gibberellins, distilled water, furadhan, dhitane and water. The tools used are non germination measuring 38 cm x 30 cm x 15 cm, hand sprayer, plastic bag, jute bag, label, knife, tape measure,

gloves, camera, fanfare, pacak samples, stationery and other tools that support this research.

This experiment used a Randomized block Design (RAK) Factorial with two treatments, namely a long time of immersion (without soaking, soaked for 12 hours, soaked for 24 hours, and soaked for 36 hours) and Gibberellins (control, 10 ppm, 20 ppm and 30 ppm). In this research, there are 16 combinations of treatment and each treatment was repeated 3 times so that there are 48 units of the experiment. Each unit experiments using 20 grains of the seed so that the required 48 x 20 = 960 grains.

The parameters of the observation in this study is the potential for maximum growth, germination and length of apokol. Data were analyzed using analysis of variance (ANOVA). If treatment (long immersion, the concentration of Gibberellins and interaction) is real, then continued with DMRT (Duncan Multiple Range Test) at $\alpha = 5\%$.

The implementation of the research conducted, among others, the preparation of the land, the taking of seeds and seed selection, preparation of media germination, making a solution of gibberellin, immersion, planting, maintenance and observation. The growing Media used consisted of soil and sand in the ratio 1 : 1, and then mixed evenly and put in the tub sprouts measuring 38 cm x 30 cm x 15 cm. The seeds used are seeds that are around the planting area of crops Sugar palm ago collected and stored in burlap sacks. Seeds that qualify as a seed that is round-oblong with the size of 25-40 mm x 15-25 mm long, brownish-black color, shiny, and slippery surface. Gibberellins used has a content of 95% gibberellins. Making a solution of the pSugar palm t, making a solution of gibberellin with a concentration of 1,000 ppm by the way, 1 mg GA3 mixed with distilled water to a volume of 1 liter. Then do the dilution of the solution. The formula dilution as follows: M1V1=M2V2, namely : M1= concentration of the diluted solution, M2= concentration of the solution diluent, V1 = volume of the diluted solution, and V2 = volume of the solution diluent. To make a solution of gibberellin 10 ppm is required 10 ml of a solution of the pSugar palm t diluted with distilled water to a volume of 1000 ml. To make a solution of gibberellin 20 ppm required 20 ml of a solution of the pSugar palm t diluted with distilled water to a volume of 1000 ml. To make a solution of gibberellin 30 ppm required 30 ml of a solution of the pSugar palm t diluted with distilled water to a volume of 1000 ml.

Soaking is done in accordance with the treatment that has been determined, namely control (without soaking) (G0), soaked for 12 h (G1), soaked for 24 h (G2) and soaked for 36 h (G3). The seeds germinated in the tub nursery measuring 38 cm x 30 cm x 15 cm, the seed is planted with a distance of 5 x 5 cm, whirlpool is put in the plastic house. The seeds germinated with the way the position of the will of the embryo facing down and immersed up to the back of the seed flush with the surface of the growing medium. Maintenance of the plants is carried out with the watering is carried out every two times a day, weeding the weeds, and controlling pests and diseases.

RESULTS AND DISCUSSION

The potential to Grow to a Maximum of (PTM).

The observation Data of the potential of maximum growth (PTM) showed that the treatment of long immersion with the gibberellins and their interaction effect was not real on the potential of maximum growth (PTM). The Data of the average potential to grow to a maximum at the treatment of a variety of growing media can be seen in Table 1.

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Table 1. The potential to Grow to a Maximum of (PTM) sugar plant in the treatment of immersion with gibberellins

Long Immersion	Giberelin				Average
	G0 (kontrol)	G1 (10 ppm)	G2 (20 ppm)	G3 (30 ppm)	
L0 (Without Soaking)	25.00	21.67	21.67	33.33	25.42
L1 (Soaked for 12 jam)	28.33	33.33	31.67	35.00	32.08
L2 (Soaked for 24 jam)	33.33	46.67	31.67	40.00	37.92
L3 (Soaked for 36 jam)	38.33	36.67	40.00	23.33	34.58
Average	31.25	34.58	31.25	32.92	

From Table 1 it can be seen that the treatment of the long immersion effect is not real to the parameters of the potential maximum growth with the average highest in L2 (24-hour) is equal 37.92% and the average low in L0 (without soaking), namely by 25.42%. It is thought the process imbibes running less than optimal, the water and the substances that are contained in the gibberellin yet can stimulate the development of cells on the seed. The potential for maximum growth is the overall percentage of seeds that can germinate or break the dormancy and shows the symptoms of life, both produce the sprouts of both normal and abnormal (Kartikasari, et al., 2019). The increase in germination will run balanced with an increase in the potential maximum growth of the seeds are. The ability to appear and the development of the structure of the most important embryo of the seed showed the ability to develop into normal plants in optimum environmental conditions (Ayuningtyas et al., 2017).

The treatment of the gibberellin effect is not real to the parameters of the potential maximum growth with the average highest in G1 (10 ppm) of 34.58% and the average low in G0 (0 ppm) and G2 (20 ppm) is equal to 31. 25%. Gibberellin is one of the growth regulators of synthetic that play a role in increasing the potential for maximum growth. In this study, gibberellins have yet to reveal their influence in increasing the potential for maximum growth. In line with the Tikafebiati, et al. (2019) stated that gibberellin can increase the potential to grow from the embryo and can overcome mechanical barriers in the germination caused by the cover layer of seeds. Adnan et al. (2017) stated that the granting of PGR in crop with an optimal concentration then the seeds will be able to respond better if the concentration is too low will not show significant changes in the plant, while the provision at a concentration that is too high will have an impact on the decline.

Germination (DK).

Data observation of the germination (DK) showed that the treatment of long immersion with the gibberellins and their interaction effect is not real to the parameters of germination (DK). The Data of the average power sprouts (DK), in the treatment of immersion with gibberellins, can be seen in table 2.

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Table 2. Germination (DK) sugar plant in the treatment of immersion with gibberellins

Long Immersion	Giberelin				Average
	G0 (kontrol)	G1 (10 ppm)	G2 (20 ppm)	G3 (30 ppm)	
L0 (Without Soaking)	10.00	13.33	18.33	16.67	14.58
L1 (Soaked for 12 jam)	18.33	20.00	10.00	26.67	18.75
L2 (Soaked for 24 jam)	26.67	15.00	40.00	16.67	24.58
L3 (Soaked for 36 jam)	28.33	33.33	33.33	20.00	28.75
Average	20.83	20.42	25.42	20.00	

From Table 2 it can be seen that the treatment of the long immersion effect is not real to the parameters of germination (DK) with the average highest in L3 (36 hours) is equal 37.92% and the average low in L0 (without soaking), namely by 14.58%. This is caused by the seeds are received less supply sufficient water although got a treatment of immersion that inhibit the outbreak of the dormancy of the seeds Sugar palm . If the water supply is less then it will slow down the process of seed germination. . The ability of the seeds to grow and produce normally at the optimum conditions (Dharma, et al., 2015) is a parameter rather than the potential viability of the seed. In addition, the benchmarks of the viability of the seed of the germination and dry weight of sprouts normal. Seed treatment that has a hard skin with how immersion chemicals gibberellins can soften the skin of the seed to facilitate the ingress of water and O2 are needed for the process of germination.

The treatment of the gibberellin effect is not real to the parameters of germination (DK) with the average highest in G2 (20 ppm) is equal to 25.42% and the average of the lowest in G3 (30 ppm) is equal to 20.00%. It is thought to increase the germination of seeds required special treatment. Scarification of seeds with gibberellin can speed up germination and improves seed germination. In this study, the process of scarification has yet to reveal its influence on the seeds Sugar palm . According to Ancient, et al (2014), Seed dormancy requires testing procedures germination special. Germination of seeds provides information to the user seed Jan ability of the seeds to grow normally into plants that produce reasonable in the circumstances biophysical field-paced optimum (Bachtiar et al., 2017).

Long Apokol (cm)

Observation Data length apokol showed that the treatment of long immersion with the gibberellins and their interaction effect is not real to the parameters of the long apokol (cm). Data on the average length of apokol (cm), in the treatment of various growing media can be seen in Table 3.

Table 3. Long apokol (cm) sugar plant in the treatment of various growing media

Long Immersion	Giberelin				Average
	G0 (kontrol)	G1 (10 ppm)	G2 (20 ppm)	G3 (30 ppm)	
L0 (Without Soaking)	0.80	0.88	1.42	0.82	0.98
L1 (Soaked for 12 jam)	1.36	1.16	0.76	2.04	1.33
L2 (Soaked for 24 jam)	0.91	3.34	1.30	2.01	1.89
L3 (Soaked for 36 jam)	1.91	2.51	2.02	0.79	1.81
Average	1.24	1.97	1.37	1.41	

From Table 3 it can be seen that the treatment of the long immersion effect is not real to the parameters of the long apokol (cm) with the average highest in L2 (24-hour) that is equal to 1.89 cm and the average low in L0 (without soaking) that is equal to 0.98 cm. This is caused by the process of immersion yet can accelerate the absorption of water (imbibition) which then happened overhaul of carbohydrates, fats, and proteins that support the activities of the embryo and used for the formation of the major organs in the sprouts so that more rapid growth (Kartikasari, 2019). Alghofar et al. (2017) state that the substrate (carbohydrate, fat, and protein) will be recast enzymatically to support the activities of the embryo or the buds form will be the plant which then formed the main organs of the plant such as stems, leaves, and roots.

The treatment of gibberellins does not affect significantly the length parameter apokol with the average highest in G2 (20 ppm) is equal to 1.97 cm and the average low in G0 (0 ppm) is equal to 1.24 cm. It is suspected by gibberellins have not been able to spur the growth of apokol on the seeds Sugar palm . GA3 included in the group of gibberellins which serves to spur the growth of the stem, increasing the enlargement and multiplication of cells in plants (Putrasamedja and Anggoro, 2014). Sitanggang et al. (2015) stated that the factor of the plant will affect the absorption rate of growth-regulating substances by the plant. The effect is not real at the treatment concentration of gibberellins caused that ZPT just as it, namely the drive in the process-the process of plant physiology.

CONCLUSION

From the analysis of data on the treatment of immersion with gibberellins as well as the interaction of these two factors' influence is not real at all the parameters.

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