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Germination variety Test Two Plantcane *(Saccharum Officinarum L.)* The Use of Breeding Mule Shoots With Different Eyes Lay

Yeni Ika Pratiwi, Fauziatun Nisak, Bambang Wicaksono Hariyadi*, Nurul Huda

Faculty of Agriculture, Merdeka University, Surabaya

*Correspoding Author E-mail: wicaksonounmer@gmail.com

ABSTRACT

The number of clumps per hectare is influenced by the percentage of germination of kinds of seeds used (Tamelsilva, 2006). Increasing the production of sugar cane as a raw material for sugar is absolutely necessary. One of the causes of the decline in sugarcane productivity is the problem in the use of seeds, such as sugarcane seeds used by farmers who are less qualified (Iskandar, 2005). The study was conducted at the Experimental Garden of the Faculty of Agriculture, Merdeka University, Surabaya, in March-April 2017. Using a Randomized Block Design (RBD) consisting of six treatment combinations with three replications and two sample plants. As for the combination treatment, as follows: A (Variety LPS-864 and Buds Buds section 20); B (Variant LPS-864 and Mata Tunas Middle-segment-14); C (Variety of LPS-864 and Mata Tunas at the base of Section-08); D (Variety of LPS-891 and Buds section of Section-20); E (Variant LPS-891 and Mata Tunas Middle-segment-14); F (Variety of LPS-891 and Mata Tunas at the base of segment-08). The results showed that the treatment of the combination of the location of the buds and varieties significantly affected the observation of the number of leaves, but the effect was very significant on the variable of germination speed and length of the plant and the wet weight of the plant. Combination treatment of bud location on segment-20 (shoots) on the sugar cane varieties LPS-891 and cane varieties LPS-864 showed the best results on all observational variables, although the highest results always indicated the location of bud-section 20 buds (shoots) on sugarcane varieties LPS-891, but statistically not significantly different.

Keywords: Layout of Buds, Germination, Cane

1. INTRODUCTION

Sugarcane *(Saccharum officinarum* Linn.*) Is* one of the potential plantations and has a high economic value, because sugarcane has a high sugar content in the stem. National sugar production in 2013 decreased by 1.77% when compared to 2012 production with a yield of 7.2% and an increase in the area of sugar cane to 460,496 hectares. This is equivalent to the production of white crystal sugar of 2.39 million tons. Whereas the initial target of sugar self-sufficiency in 2014 was 5.7 million tons of white crystal sugar and adjustments had been made to 3.1 million tons to achieve a more realistic target. Therefore, the development and productivity improvement program is a priority (Ditjenbun, 2013).

Community demand for sugar continues to increase from time to time. This is due to population development and the increasingly widespread industry that uses raw materials for sugar.

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The average sugar production is 2.26 million tons per year, while consumption is around 5.10 million tons per year. This is what causes the sugar production and consumption figures show a high gap. Increasing sugarcane production is a raw material for sugar which is absolutely necessary. One of the causes of the decline in sugarcane productivity is the problem in the use of seeds, such as sugarcane seeds used by farmers who are less qualified (Iskandar, 2005). Furthermore according to Winarsih and Sugiyarta (2008), that sugarcane seedlings come from two sources, namely: conventional and tissue culture. The success of sugarcane cultivation is largely determined by the quality factor of sugarcane seeds. Good sugarcane seeds are pure, free from pests and diseases and weeds, so they have good germination and growth speed.

In 2002-2007, the increase in sugarcane productivity was carried out through an acceleration program for increasing national sugar productivity and as a result Indonesia was able to self-support sugar consumption directly in 2008. With the successful implementation of the aforementioned acceleration program, in 2010, a national sugar self-sufficiency program was launched in 2014 with a sugar production target of 5.7 million tons, so as to meet the national sugar needs of both white and refined crystal sugar. Strategies to achieve these targets include increasing the productivity of both sugar cane and sugar, expanding the area, revitalizing and developing the sugar-based sugar industry, strengthening institutions and financing as well as national policies. In the context of 2014 national sugar self-sufficiency, a strategic step which is mutually supportive is developed, namely the arrangement of varieties in order to optimize land and milling efficiency, so that sugar productivity increases (Ditjenbun, 2013).

Germination is the beginning of the growth of sugarcane. Germination consists of the development of sugarcane organs contained in sugarcane seedlings (Hariyadi, Ali, & Pratiwi, 2018). Buds are miniature stems with growth points and leaf and root primordia that form sugarcane shoots. After that, root primordia that have grown into seedling roots will function to absorb nutrients and water (Martin *et al*, 1961 *in* Andreas, 2013). The condition of the growth of sugar cane plants is very much required by buds whose growth is uniform. The buds that are located on the young and un-colored segments will germinate faster than the older ones. The more the ata or the more downward the longer the germination, because the more upward is too young and soft, while the lower is getting older, the possibility is damaged. The use of proper bud number is expected to be obtained by plants with good growth and production (Pujiarso, 2003).

Van Dellewijn (1952) writes that sugarcane buds equipped with a small amount of tissue and a small number of root candidates (*bud chips*) can germinate and are able to grow into seeds, whereas Ramaiah *et al.* (1977) reported that the possibility of using buds as a type of seed in

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sugarcane cultivation. Jain *et.al.* (2010) reported that the use of buds as a type of seedlings directly in the field led to the low growth of seedlings in the field, due to the limited food reserves in the variety of seeds.

Results of interim studies conducted in India by Jain *et al.* (2010) showed that a single eye sugar cane germinated individually in a polybag could produce an excellent percentage of germination (> 95%) with a normal initial growth of seedlings. At 16 weeks after planting, plant height can reach as low as one meter with a stem diameter of about one centimeter.

According to Saryadi (1997), the location of the buds on sugarcane stems affects germination. The buds located on the young cane stem sections (shoots) will germinate faster than the buds located on the very old stem segments (pengkal). Furthermore Soetopo (1988) states that the segments of the upper sugarcane stem (shoots or young stems) contain more glucose than the lower sugar cane segments, so that the highest germination rate is reached by the upper sugar cane segments . This is consistent with the opinion of Dillewijn (1952) *in* Clements (1980) which states, that the old sugarcane stems contain more saccharose than glucose. In sugarcane cuttings for germination, younger shoots will germinate faster than older buds.

Dwidjoseputro (1978) explains, that photosynthesis is a process of preparation (anabolism), where energy is needed from a light source stored as a chemical in the form of glucose (C6H12O6), then in the process of metabolism, glucose is disassembled (catabolism) or re-generated to administer glucose. life processes. Clements (1980) research results state that the buds on the sugar cane stem located on the 9th, 10th, 11th, 12th and 13th stem sections of the top of the stem section, produce the highest percentage of germination and germination rate. Sarjadi further (1997) argues, that the highest germination speed is shown by the buds at numbers 10, 12, 14 and the results decrease until the shoots are located at the base of the sugarcane stem.

According to Ahmad Dhiaul Khuluq and Ruly Hamida (2014), that the pattern of bud germination rate in the sugar cane squared is quadratic. The buds are located at the base of the stem, germinate slowly, then get faster and reach the optimum at the shoots that are close to the shoots, then decrease back to the lowest at the buds located on the shortest stem segments. This is due to the budding eyes still not fully formed. While the results of the research Yohan Tri Widarto (2012) concluded that there was a very significant effect on the location of the buds on the parameters of plant length, plant wet weight and germination speed, but had no significant effect on the number of leaves, root length of plants. The interaction between the treatment of bud location with the use of EM-4 significantly affected the parameters of plant length, root length and wet weight of sugarcane.

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One way to support the intensification program is to achieve the expected sugar productivity, including the use of superior seeds from superior varieties, so it is deemed necessary to carry out further testing of the location of the seedling buds on several varieties of sugar cane in order to obtain seeds with superior varieties.

2. RESEARCH METHODS

The study was conducted in the Experimental Garden of the Faculty of Agriculture, Merdeka University Surabaya, on Jalan Ketintang Madya VII-2 Surabaya, East Java with a height of ± 5 meters above sea level. The materials used in this study include: planting soil, seedling mule seeds of one bud shoot at segment-20 (shoots), section-14 (middle) and section-8 (base) , Varieties LPS-864 and LPS-891, while the tools used include: hoe, pocker, knife, polybag (medium size 5 kg), labels, ruler gauges, stationery, weight gauges (house scales and electric scales) and other laboratory equipment.

This study used a randomized block design (RBD) consisting of six treatment combinations with three replications and two sample plants. As for the combination treatment, as follows: A (Variety LPS-864 and Buds Buds section 20); B (Variant LPS-864 and Mata Tunas Middle-segment-14); C (Variety of LPS-864 and Mata Tunas at the base of Section-08); D (Variety of LPS-891 and Buds section of Section-20); E (Variant LPS-891 and Mata Tunas Middle-segment-14); F (Variety of LPS-891 and Mata Tunas at the base of segment-08). According to Adji Sastrosupadi (1999) and Bambang Wicaksono Hariyadi (2017) to find out the effect of the treatment of buds on mules on the germination of two varieties of sugarcane, the F Test with a level of 5% is used, namely the Variance Analysis Test (ASR). If the results of the F% Test have a significant influence, then proceed with the T Test (Test the Smallest Significant Difference) with a level of 5% to determine the difference between the location of the buds on the mule seedlings to two varieties of sugar cane, socombination can be known that the right. useful and beneficial.

3. RESULTS AND DISCUSSION

3.2 Research result

1. Plant Germination Speed and Wet Weight

The results of the analysis of the variance showed that the combination treatment of the location of the buds and varieties of sugarcane had a very significant effect on the observed variables of the germination speed and the wet weight of the sugarcane cuttings. The statement above is suspected,

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that the location of the bud is important as one of the requirements in the cultivation of sugarcane, as well as for the variety of varieties used, because each variety has its own advantages and has different germination abilities. This is in accordance with the results of the research Yohan Tri Widarto (2012) concluded that there was a very significant effect on the treatment of the location of the buds on parameters of plant length, plant wet weight and germination speed, but had no significant effect on the number of leaves, plant root length. The interaction between the treatment of bud location with the use of EM-4 significantly affected the parameters of plant length, root length and wet weight of sugarcane.

Table 1. Average Plant Germination Speed and Wet Weight of Effects Treatment Combination of the Layout of the Buds and the Varieties of Cane Plants differen

Treatment of Combination of the Layout of the Buds and the Varieties of Sugar Cane	Germination Speed (days)	Wet Weight of the Plant (grams)
A = (Var.LPS-864 x Section-20 Shoots)	5.00 ab	96.30 cd
B = (Var.LPS-864 x Middle Section-14)	7.00	cde 85.90 abc
C = (Var.LPS-864 x Section-08 Base)	7,67 e	76,90 a
D = (Var.LPS-891 x Section-20 Buds)	4,33 a	98.93 d
E = (Var.LPS-891 x Middle-Section 14)	6.00 bcd	92.67 bcd
F = (Var.LPS-891 x Section 08)	7.33 de	Base82.33 ab
BNT 5%	1.42	11.09

Note: The numbers are accompanied by the same letters in the column
the same was not significantly different in the 5% LSD Test

Table 1 shows that the fastest germination process resulted in a combination of treatment D = (Section-20 shoots x Var.LPS-891) in 4.33 days, although statistically not significantly different from combination treatment A = (Section-20 shoots x Var. LPS-864) within 5.00 days. The results of the germination process that took the longest time showed a combination treatment of C = (Section-08 Base x Var.LPS-864), which was for 7.67 days and was not statistically significantly different from B = (Middle Section-14 x Var.LPS- 864) the time is 7:00 days and E = (Middle Section-14 x Var. LPS-891) the time is 6.00 days.

When compared simply and separated from the combination treatment, the location of the buds that showed buds showed faster germination speed, when compared to the base, while the cuttings of the LPS-891 variety germinated faster when compared to the LPS-864 variety.

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According to Saryadi (1997), the location of the buds on sugarcane stems affects germination. The buds located on the young cane stem sections (shoots) will germinate faster than the buds located on the very old stem segments (pengkal). Furthermore Soetopo (1988) states that the segments of the upper sugarcane stem (shoots or young stems) contain more glucose than the lower sugar cane segments, so that the highest germination rate is reached by the upper sugar cane segments . This is consistent with the opinion of Dillewijn (1952) *in* Clements (1980) which states, that the old sugarcane stems contain more saccharose than glucose. In sugarcane cuttings for germination, younger shoots will germinate faster than older buds.

Table 1 also shows that the wet weight of sugarcane when harvested at 42 days after planting is highest, it is shown the combination treatment D = (Section-20 shoots x Var.LPS-891), which weighs 98.93 grams but is not statistically significantly different from combination treatment A = (Section-20 Shoot x Var. LPS-864) weighing 96.30 grams and combination treatment E = (Section 14 Middle x Var. LPS-891) weighing 92.67 grams. The lowest wet weight of sugarcane plant is shown by the combination treatment C = (Section-08 Base x Var.LPS-864) which is weighing 76.90 grams. Germination is influenced by many factors, both internal factors (seed quality) and external factors (growing environment). Maximum germination only occurs if internal and external factors are optimum. Both of these factors can be controlled to a certain extent by cultivation techniques so that normal germination.

According to Sutopo (1985), that in the process of germination there are five stages, namely: the first stage, germination begins with the process of absorption of water and hydropower of protoplasm. The second step is cell activity and enzymes and increased respiration. The third stage occurs decomposition of materials such as carbohydrates, fats and proteins into forms that are soluble and translocated to the point of growth. The fourth step is the assimilation of materials that have been dissolved to produce energy. The fifth stage is the growth of sprouts through the process of division, enlargement and division of cells at the point of growth.

Purnomo (2011), states that there is a substance of growing order for the buds contained in each cane stem section book, namely: a. Buds will not develop into new shoots if the point of growth on the shoots of the sugarcane stem is not cut, injured, attacked by pests, flowering of the fallen sugarcane stems, herbicide poisoning and others; b. Normally the buds will grow regularly and sequentially starting from the buds which are located in the segment of the tip of the eye. The substance of this growing order is called top*dominance*. The shoot domination is influenced by the addition of auxin growth regulating agent (ZPT) and to reduce the shoot domination effect so as to

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obtain a germination germination, it can be done, for example by rayugan system or cutting cuttings selection.

2. Number of Leaves and Length of Plants

The results of the analysis of the variance showed that the combination treatment of the location of the buds and varieties of sugarcane had a very significant effect on the observed variables of the germination speed and the wet weight of the sugarcane cuttings.

According to Ahmad Dhiaul Khuluq and Ruly Hamida (2014), that the pattern of bud germination rate in the sugar cane squared is quadratic. The buds are located at the base of the stem, germinate slowly, then get faster and reach the optimum at the shoots that are close to the shoots, then decrease back to the lowest at the buds located on the shortest stem segments. This is due to the budding eyes still not fully formed.

Dwidjoseputro (1978) explains that photosynthesis is a process of preparation (anabolism), where energy is needed from a light source that is stored as a chemical in the form of glucose (C6H12O6), then in the process of metabolism, glucose is disassembled (catabolism) or re-generated to carry out the chemical. life processes.

Table 2. Average Number of Leaves and Length of Plants Due toTreatment of the CombinationLayout of the Bud and Cane Varieties Different at 21 and 42 days

Treatment of Combination of the Layout of the Buds and Varieties of Cane Plants	Number of Leaves (strands)		Plant Length (cm)	
	21 Days	42 Days	21 Days	42 Days
A = (Var.LPS-864 x Section-20 Shoots)	7.00 bc	17.67 bc	72 , 67 bc	131,00 cd
B = (Var.LPS-864 x Middle-Section 14)	5.67 abc	15.33 ab	67.00 abc	117.33 ab
C = (Var.LPS-864 x Section-08 Base)	4.67 a	13.67 a	58.33 a	108.33 a
D = (Var.LPS-891 x Section-20 Section)	7.33 c	19.33 c	75.67 c	137.33 d
E = (Var.LPS-891 x Middle-Section 14)	6.00 abc	17.00 abc	69.00 bc	122.00 bc

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F = (Var.LPS-891 x Section-08 Base)	5,33 ab	15,33 ab	63 , 33	b1 111.67 a
BNT 5%	1.69	3.61	9.47	8.67

Note: The numbers are accompanied by the same letters in the column
the same was not significantly different in the 5% LSD Test

Table 2 shows that the highest number of leaves produced by the combination of treatment D = (Section-20 shoots x Var.LPS-891) is 19.33 strands at 42 days, although statistically it is not significantly different from the combination treatment A = (Section -20 shoots x Var.LPS-864) as many as 17.67 strands and the combination treatment E = (Middle Section-14 x Var.LPS-891) as many as 17.00 strands. The lowest number of leaves indicated by the combination treatment C = (Section-08 Base x Var.LPS-864), which is a number of 13.67 strands.

Table 2 also shows that the longest sugar cane plant at 42 days after planting shows the combination treatment D = (Section-20 shoots x Var.LPS-891), which is 137.33 cm long, but not statistically significantly different from the combination treatment A = (Section-20 Shoot x Var. LPS-864) 131.00 cm long. The shortest plants were shown the combination treatment C = (Section-08 Pkl x Var.LPS-864), which was 108.33 cm. It is suspected, that the buds located on the shoot joints contain more glycose than the buds located at the base of the cuttings, while the sucrose content of the juice is inversely proportional, where the shoots have less sucrose content compared to the base.

Clements (1980) research results state that the buds on the sugar cane stem located on the 9th, 10th, 11th, 12th and 13th stem sections of the top of the stem section, produce the highest percentage of germination and germination rate. Sarjadi further (1997) argues, that the highest germination speed is shown by the buds at numbers 10, 12, 14 and the results decrease until the shoots are located at the base of the sugarcane stem.

According to Purnomo (2011) and Dwi Hartoyo (2013), that one of the factors influencing germination is the variety factor, where each variety has a different character, there are varieties that grow roots first and then germinate and vice versa. Varieties with a wide root system will result in low production. The root system in ratoon plants is shorter or shallower than the first plant and usually the roots of ratoon plants are old, so it is slower in nutrient absorption. The roots that were first formed from cuttings were dark, thin adventitious roots. After the shoots grow, then this root function will be replaced by secondary roots that grow at the base of the shoot. In suitable soils, sugar cane roots can grow to 0.5 - 1.0 meters in length. Sugar cane plants are rooted in fibers,

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so only at the tips of young roots are hair roots involved in absorbing nutrients (Erliandi, Ratna Rosanty Lahay and Toga Simanungkalit, 2015).

According to Sutopo (1985), that seedlings are the basic capital in sugarcane cultivation, so that in an effort to increase sugarcane production and sugar productivity, the use of sugarcane seedlings is absolutely necessary. Sugarcane seeds are part of the sugarcane plant which is a plant material that can be developed for sugarcane planting. Sugar cane seedlings which are superior and of course must have high production potential, are free of disease land, have a purity level of more than 95%, age around 6-7 months. Superior seeds can be obtained in the nursery. Seedlings are plantations for nurseries, in order to obtain seeds that meet quality requirements and sufficient quantities. There are various kinds of sugarcane seeds that will be planted, which can be shoots, young stem seeds, rayungan seeds and siwilan seeds.

4. CONCLUSION

The treatment of the combination of the location of the buds and varieties significantly affected all observations of the number of leaves, but the effect was very significant on the variables of germination speed and plant length and plant wet weight.

Combination treatment of bud location on segment-20 (shoots) on the LPS-891 sugar cane varieties and LPS-864 cane varieties showed the best results on all observation variables, although the highest results indicated the location of bud-20 segment shoots (shoots) on the LPS cane varieties -891, but statistically not significantly different.

SUGGESTION

From the conclusion above, it is recommended to study further about the location of the buds and land conditions or planting media that are more varied in order to obtain variations in germination or further growth that varies or varied, even to the effect on the yield of sugarcane. If in sugarcane cultivation using the LPS-891 variety or the LPS-864 variety, it is recommended that the mule seedlings use the buds on the 20th section (shoot section).

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