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Effect of Spacing and Weeding Time on growth and production of Bawang Sabrang (Eleutherine Americana Merr.)

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ABSTRACT

The potential of sabrang onions as a medicinal plant for industrial scale is very large because these plants can grow and adapt in all climates and types of soil with a relatively short harvest time (3-4 months). This research aim was to determine the effect of spacing treatment and weeding time as well as their interaction with the growth and production of sabrang onions (Eleutherine americana Merr.). Penelitian ini dilakukan di Fakultas Pertanian, Universitas Sumatera Utara, Medan dengan ketinggian + 32 meter di atas permukaan laut, yang dimulai pada bulan September hingga Desember 2017. The research design used was Factorial Randomized Group Design with two factors. The first factor is the spacing with 3 types, namely: 10 cm x 20 cm; 15 cm x 20 cm; 20 cm x 20 cm and the second factor is the time of weeding with 4 types, namely: Weeds are weeded up to 28 days after planting, then weeds are left to harvest; Weeds are weeded up to 56 days after planting, then weeds are left to harvest; Weeds are weeded up to 84 days after planting, then weeds are left to harvest; Weeds are weeded up to 14 days after planting, then weeds are left until harvest. The observation parameters were plant height, number of leaves per clump, number of tubers per clump, tuber wet weight per clump, tuber dry weight per clump, tuber wet weight per plot, tuber dry weight per plot and weed wet weight. The research results showed that the treatment of spacing significantly affected the number of leaves at 6 & 7 weeks after planting and the number of tubers. The treatment of weeding time significantly affected the number of tubers and weed wet weight per plot. Interaction treatment between spacing and weeding time did not significantly affect all observed parameters. The best result obtained was at a spacing of 20 cm x 15 cm or weeding time up to 84 days after planting, then weeds are left until harvest.

Keywords: Sabrang Oniom, Spacing, Weeding Time.

INTRODUCTION

Sabrang onion or dayak onion is a typical plant of Kalimantan Tengah. In dayak onion tubers contained phytochemical compounds namely alkaloids, glycosides, flavonoids, phenolics, steroids and tannin substances. Empirically, Dayak onion has been used by local people as a medicine for various types of diseases such as breast cancer, reducing hypertension, diabetes mellitus, lowering cholesterol, boils, intestinal cancer, preventing strokes, smoothing breast milk and reducing stomach pain after childbirth (Galingging, 2009).

The potential of sabrang onions as a medicinal plant for industrial scale is very large because these plants can grow and adapt to all climates and soil types with relatively short harvest times (3-4 months), but the incomplete information regarding this plant cultivation technique inhibits its use as a modern medicine ingredient (Raga et al., 2012).

Spacing on onion plants is important to note because the spacing can affect the growth and production of the onion plant. This is also supported by Keddy (1991); Grace and Tilman (1990) who stated that the more closely spaced in planting the higher the plant population per unit of the land area resulting in increased of competition between plants.

The purpose of setting plant density or spacing basically is to give the possibility of plants to grow well without experiencing

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competition in terms of taking water, nutrients, sunlight, and facilitating plant maintenance. The use of improper spacing can stimulate weed growth, hence it can reduce yield. In general, the highest crop yield per unit area is obtained at high plant densities but the weight of each tuber individually decreases due to competition between plants (Sumarni and Hidayat, 2005).

Weed populations determine competition and the greater the decline in crop production. Weeds that appear or germinate first or together with managed plants have a major impact on growth and main crop yields. Weed competition at the beginning of growth will reduce the quantity of yield, while competition and disruption of weeds near harvest time have a major effect on the yield quality (Sukman and Yakup, 2002).

The selecting the right time for weeding is important because it relates to energy and costs efficiency when weeding the weeds carried out at any time during plant growth will not solve the problem due to weed competition to plants (Moenandir, 2005).

Based on the description above, the authors are interested in conducting research on the effect of spacing and weeding time on the growth and production of sabrang onion plants (Eleutherine americana Merr.).

MATERIALS AND METHODS

The research was carried out on the experimental field of the Faculty of Agriculture, University of Sumatera Utara, Medan, with an altitude of ± 32 m above sea level. This research was conducted from September to December 2017.

The materials used in this research were sabrang onion tubers taken from Tarutung, chicken manure as plant organic fertilizer and other materials that support this research.

The tools used in this research were hoes to process the soil, meters to measure the experimental area, analytical scales to weigh onion tubers, ruler to measure spacing, watering can for watering plants, data formats, stationery and cameras.

This research used Factorial Randomized Block Design (RBD) with 2 factors, namely factor 1: Spacing (J) consisting of 3 types, namely: J1 = 20 cm x 10 cm, J2 = 25 cm x 15 cm, J3 = 20 cm x 20 cm. Factor 2 was weeding time (P) which consists of 4 types, namely: P1 = weeding up to 28 days after planting, then weeds left until harvest, P2 = weeding up to 56 days after planting, then weeds left until harvest, P3 = weeding up to 84 days after planting, then weeds are left to harvest, P4 = weeding for up to 14 days after planting, then weeds are left to harvest.

The research results data on the treatment which have a significant effect were continued with Duncan's Multiple Range Test with a level of 5%. The implementation of the research was land preparation, fertilization, planting material preparation, planting and maintenance of plants.

RESULTS AND DISCUSSION

1. Number of Leaves Per Clump

The spacing and weeding time and their interaction have no significant effect at 12 weeks after planting.

Based on Table 1, it showed that the number of leaves of sabrang onions at the age of 12 weeks after planting was highest in the J2 treatment of 26.32 and the lowest was in J1 treatment of 18.90. While on the treatment of weeding time, the highest of sabrang onion height was found in P4 treatment (weeded up to 14 days after planting, then left until harvest) and the lowest was found in P1 treatment (weeded up to 28 days after planting, then left until harvest). This was in accordance with Raga's (2012) statement that the spacing of 15 cm x 20 cm has the highest number of leaves compared to other treatments with a spacing that is more tenuous.

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Table 1. The number of leaves of sabrang onions in 12 weeks after planting with spacing and weeding time treatment.

Ages (Weeks After Planting)	Spacing (cm)	Weeding Time (Days After Planting)				Average
		P1	P2	P3	P4	
12	J1 (20x10 cm)	20,33	17,00	19,07	19,20	18,90
	J2 (20x15 cm)	23,53	24,60	22,00	35,13	26,32
	J3 (20x20 cm)	20,73	23,87	21,47	22,73	22,20
Average		21,53	21,82	20,84	25,69	

Description: The number followed by the same letter in the column and the same time of observation shows that there is no significant difference in Duncan's Multiple Range Test at the level of α = 5%

The density of spacing is closely related to plant population per unit area, and competition between plants in the use of light, water, nutrients, and space, hence it can affect the growth and yield of shallots (Sumarni et al., 2012).

2. Number of Tubers per Clump

Spacing and weeding time have a significant effect on the number of tubers while the interactions of both have no significant effect. The results of Means Different Test on the number of tubers per clump in the treatment of spacing and weeding time can be seen in Table 2.

Based on Table 2, it can be seen that the highest number of tubers of sabrang onions per clump was found at a spacing of 20 cm x 15 cm while the lowest was at a spacing of 20 x 10 cm. The J3 treatment was not significantly different with J2 (20 cm x 15 cm) and J1 (20 cm x 10 cm) treatments. The highest weeding time at P3 treatment (weeded up to 84 days after planting later weeds were weeded until harvest) and the lowest in P2 (weeded up to 56 days after planting, then left until harvest). P3 treatment was not significantly different from P4 treatment and was significantly different from P1 and P2 treatment.

Based on the research data it can be seen that the spacing has a significant effect on the number of tubers parameter of sabrang onion plants per clump. This was because the purpose of regulating plant density or spacing is basically to allow plants to grow properly without experiencing competition in terms of taking water, nutrients, sunlight, and facilitating plant maintenance.

At a spacing of 20 cm x 15 cm the density of plants is smaller hence in competition over nutrients, water and sunlight is better for tuber formation when compared to the treatment of 20 cm x 10 cm. In accordance with the statement of Simamora (2006) which stated that plant density affects the appearance and production of plants, mainly because of the coefficient of use of light.

3. Weed Wet Weight per Plot

Weeding time significantly affected the weed wet weight while the spacing and the interaction of both of them had no significant effect. The results of the means difference test in the number of tubers per clump in the treatment of spacing and weeding time can be seen in Table 3.

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Table 3. Weed wet weight per plot with treatment of spacing and weeding time

Spacing (cm)	Weeding Time (days after planting)				Average
	P1	P2	P3	P4	
J1 (20x10 cm)	36,82	85,52	120,88	16,15	64,84
J2 (20x15 cm)	34,87	83,97	116,80	15,84	62,87
J3 (20x20 cm)	31,88	83,12	126,61	15,63	64,31
Average	34,53c	84,20b	121,43a	15,88c	

Description: The numbers followed by the same letters in the same column show no significant difference in Duncan's Multiple Range Test at the level of α = 5%

Table 4. Tuber dry weight of sabrang onion per plot with treatment of plant spacing and weeding time

Spacing (cm)	Weeding Time (days after planting)				Average
	P1	P2	P3	P4	
J1 (20x10 cm)	593,33	600,19	720,43	589,01	625,74
J2 (20x15 cm)	593,46	738,21	800,82	807,48	734,99
J3 (20x20 cm)	754,35	636,49	710,75	742,74	711,08
Average	647,05	658,30	744,00	713,07	

Based on Table 3. it can be seen that weed wet weight per plot in the highest treatment of spacing was found in J1 treatment (20 cm x 10 cm) and the lowest was in J2 (20 cm x 15 cm). The highest weeding time was in the P3 treatment (weeding up to 84 days after planting, then left until harvest) and the lowest was on P4 (weeding up to 14 days after planting, then left until harvest). In P1 treatment was not significantly different from P4 treatment and was significantly different from P2 and P3 treatment.

This is presumably due to the formation of the number of tubers and tuber dry weight per plot in the Sabrang onion plant located at the beginning of the age until flowering i.e. from 10 weeks after planting to 12 weeks after planting. Hence, weeding up to 84 days after planting is expected to support the formation of the number of tubers because sabrang onion plants do not compete with weeds in competition over nutrients both in the vegetative and reproductive growth phases.

This was in accordance with Sukman and Yakup (1995) suggesting that a perfect weeding will inhibit the presence of weeds as nutrient competitors for plants. The absence of competition between plants and weeds causes plants maximally utilize available nutrients hence growth runs well and spacing treatment of 20 cm x 15 showed high yield.

4. Tuber Dry Weight per Plot

The treatment of spacing and weeding time and the interaction of both had no significant effect on tuber dry weight of sabrang onion per plot. The results of means different test on the number of tubers per clump on the treatment of spacing and weeding time can be seen in Table 4.

Based on Table 4, it showed that the tuber dry weight per plot was highest in 20 x 15 cm (J2) treatment of 734.99 g and the lowest was in treatment 20 x 10 cm (J1) of 625.74 g. While the treatment of weeding time for tubers dry weight per plot was highest in P3 treatment (weeded up to 84 days after planting,

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then left until harvest) of 744.00 and the lowest was found in P1 treatment (weeded up to 28 days after planting, then left until harvest) amounting to 647.05.

CONCLUSION

Based on research conducted to obtain high production of sabrang onions it is recommended to use a spacing of 20 cm x 15 cm and continuous weeding of up to 84 Day After Planting.

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