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Performance of Several Sweet Potatoes Genotypes from Simalungun and Dairi Highlands

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ABSTRACT

Sweet potato (Ipomoea batatas L.) is one of the food crops that can be used to diversify menus to maintain rice self-sufficiency. This research aim was to analyze the morphological character and production of several sweet potato genotypes in the highlands. This research was carried out in the experimental garden area of Balitsa, Tongkoh village, Berastagi Subdistrict, Karo District - Sumatera Utara, at an altitude of ± 1440 masl. This research was conducted from May to October 2018. This research used a randomized block design (RBD) method with one factorial, namely sweet potato genotype, which consists of the Seribu Dolok Genotype, Kampung Kesemak Genotype, Batang Beruh Genotype, Tanah Seribu Genotype, and the Beta-1 Variety. The observation variables being observed were morphological characters, tendrils length, tuber number per sample, tuber weight per sample, tuber weight per plot, and organoleptic test. The results showed that there were significant differences in the morphological characteristics of sweet potato genotypes, namely the increasing parameters of tendrils length, number of tubers per sample, tuber weight per sample, and tuber weight per plot.

Keywords: highland, sweet potato genotype, morphological character, performance.

INTRODUCTION

Sweet potato (Ipomoea batatas Lamb.) is one of the food crops that can be used to diversify menus to maintain rice self-sufficiency. This plant is an important source of carbohydrates other than rice, corn, sago, and other tubers (Sarwono, 2005). Even in certain regions, especially the eastern part of Indonesia, it is used as the staple food of the people. This plant ± in the 16th century was thought to have originated from the Americas and spread throughout the world, especially tropical countries.

According to the Ministry of Agriculture (2016) national sweet potato production from 2014 to 2016 decreased by 2,382,658 tons (2014) to 2,169,386 tons (2016). Sweet potato harvested area in 2014-2016 also decreased by 156,758 ha (2014) to 123,574 ha (2016). But the productivity of sweet potatoes per ha has increased from 2014-2016, which is 152.00 quintals/ha to 175.55 quintals/ha (BPS, 2017).

Sweet potato production in Indonesia is still relatively low, while efforts to increase sweet potato production are influenced by external factors, namely water, soil, air humidity, air temperature, light and internal factors, namely genetics and hormones. One internal factor that needs special attention is genetic factors

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that are used as a basis for selecting superior seeds from a particular variety. According to Djufry (2011), if the seeds used for planting are of high quality, sufficient quantities, and prices that are affordable to farmers, the production will be maximized. Besides being determined by environmental factors, sweet potato production is also influenced by the adaptability of a variety to the environment. To get a variety with good production capability, it is best to do an adaptation test on the varieties to be planted.

The location of planting is a very influential factor in the growth and production of sweet potatoes, the declining planting area is caused by the change in agricultural land into industrial land which triggers the reduction of genetic matters to produce new varieties. Adaptability of sweet potatoes is very broad hence it is able to grow and produce in various environments (Widodo and Rahayuningsih, 2009).

Efforts that can be made to increase sweet potato production include using superior seeds and local seeds that are able to overcome problems in the drought area. By using superior and local seeds, it is expected to find out the sweet potato clones that are resistant to drought (Sasongko, 2009).

The sweet potatoes genotypes of Simalungun and Dairi which are used as planting material are sweet potatoes originating from the cultivation in the highlands, then cultivated in the lowlands by observing at the adaptation test of these two sweet potato genotypes. Then the Simalungun and Dairi sweet potato genotypes are planted back into the highlands in different origin areas, this is to see the growth rate and productivity of the sweet potato plants. According to Yusuf (2008) the local genotype of sweet potatoes generally has location-specific properties, if planted in other areas the results are not optimal. Broad-adapted genotypes have the advantage of being able to provide high yields on diverse agroecosystems, while the disadvantages are that the tubers produced are not in accordance with the tastes of consumers in the area.

Based on the description above, it is necessary to have a more detailed taxonomic identification to determine the name of the sweet potato type that is right both visually and molecularly and it is necessary to study further on multi-location tests with the altitude of different places together.

MATERIALS AND METHODS

This research was carried out in the experimental garden area of Balitsa, Tongkoh village, Berastagi Subdistrict, Karo District - Sumatera Utara, at an altitude of ± 1440 masl. This research was conducted from May to October 2018. The materials used in this research were Beta 1 sweet potato, Japanese sweet potato from Tanah Seribu Binjai, A10 genotype from Simalungun, A6 genotype from Simalungun, A5 genotype from Dairi which was used as observed plant indicators, urea, tsp and kcl as basic fertilizer.

The tools used in this research were hoes to prepare land, knives for cutting, scales for weighing tubers, meters for measuring plants and land area, watering can for watering plants, calipers to measure the diameter of tubers, digital cameras to document the research activities, stationery for writing data, data books for recording the results of crop data every week, as well as other tools that support the research.

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This research used a randomized block design (RBD) method with one factorial. The first factor was 5 planting material (G), namely A10 Genotype from Dairi Regency Batang Beruh village (G1), A6 Genotype from Simalungun - Kampung Kesemak village (G2), A5 Genotip from Simalungun - Seribu Dolok village (G3), Japanese Yam originated from Tanah Seribu Binjai (G4), Beta 1 variety (National Superior) (G5).

Data were analyzed by variance analysis, the significant variance was continued using Duncan's Multiple Range Test with a level of α = 5% (Steel and Torrie, 1995).

RESULTS AND DISCUSSION

Tuber Weight per sample

Based on the results of observations of tuber weight parameters per sample in Table 1, the differences in genotype have a significant effect on tuber weight per sample (g). Tanah Seribu genotypes had the highest mean value (2,253.30 g) which was significantly different from other genotypes. This was because Tanah Seribu genotypes can adapt better than other genotypes. This was in accordance with the literature of Prabawardani et al. (2008) which stated that a high harvest index value describes the distribution of larger assimilation yields to the enlargement section of the tuber. While the low harvest index value indicating the high yield of biomass and the lack of assimilating stockpiling into the tuber.

Number of Tubers per sample

Based on the results of observations of tuber weight parameters per sample in Table 2 showed that the differences in genotype have a significant effect on the weight of the number of tubers per sample (g). The Batang Beruh genotype showed the highest mean value (3.30 g) that was significantly different from the other genotypes. This was because Batang Beruh genotype was able to adapt to highland agrosystems and produce high yield compared to other genotypes. This was in accordance with Amalia's literature (2010) which stated that sweet potatoes have extensive adaptability to the surrounding environment hence they can be cultivated in various types of land, altitude and different soil fertility.

Table 1. tuber weight per sample (g)

Genotype	Mean
Tanah Seribu	2.253,30 a
Varietas Beta-1	1.077,25 bc
Batang Beruh	1.061,5 bc
Kampung Kesemak	718.30 c
Seribu Dolok	542.25 c

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

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Table 2. Number of tubers per sample (tuber)

Genotype	Mean
Batang Beruh	3.30 a
Seribu Dolok	2.95 b
Tanah Seribu	2.90 b
Kampung Kesemak	2.85 b
Varietas Beta-1	2.70 b

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

Table 3. Total tuber weight per plot (g)

Genotype	Mean
Tanah Seribu	27.865,06 a
Batang Beruh	18.008,20 b
Varietas Beta-1	15.536,58 bc
Kampung Kesemak	14.067,01 cd
Seribu Dolok	9.874,23 d

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

Total tuber weight per plot (g)

Based on the results of observations of tuber weight parameters per sample in Table 3 showed that the differences in genotype had a significant effect on tuber weight per plot (g). Tanah Seribu genotypes had the highest mean value (27,865.06 g) which was significantly different from other genotypes. This was due to Tanah Seribu genotypes' potential asymylate were translocated to tuber formation more optimally than other genotypes which were partially translocated to stem formation. This was in accordance with Amalia's literature (2010) which stated that reversal of plant stems is also recommended because it can assist the increasing of tuber yields including tuber diameter.

CONCLUSION

There were significant differences in the morphological characteristics of sweet potato genotypes, namely the parameters of tendrils length increase, number of tubers per sample, tuber weight per sample, tuber weight per plot.

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