Available Online: https://proceeding.researchsynergypress.com/index.php/cset/index
RSF Conference Series: Engineering and Technology
ISSN 2809-6843 (Online) | 2809-6878 (Print)
Volume 1 Number 1 (2021): 54-58

Morphological Characterization of Ten Genotipes of Large Chili *(Capsicum Annuum L).*

Lagiman[1], Bambang Supriyanta[2]
[1, 2] Agrotechnology Study Program, Faculty of Agriculture, UPN "Veteran" Yogyakarta, Indonesia

Abstract

Chili (Capsicum annuum L.) is one of the horticultural commodities that have high economic value which is used as vegetables or cooking spices, industrial raw materials, and has export opportunities. The development of superior chili varieties requires a large variety of germplasm that can be used as parents to be crossed with each other to obtain new superior traits. One of the efforts to determine the diversity of plants is to characterize the morphology and production. The purpose of this study was to obtain distinguishing characters among ten genotypes of large chilies, to determine the value of genetic parameter estimators for several genotypes of large chilies and to identify important characters that influence the yield of large chili genotypes. The study was a single factor field experiment in the form of 10 large chili genotypes arranged in a Completely Randomized Block Design (RCBD) with 3 blocks as replication. Genotypes of large chili are: Arimbi, Baja, Beautiful, Dewa Rengku, Gada, Jayadi, Jenio, Simpatik, Panex, and Thunder. Observation variables included morphological characters (plant habit, leaf color, leaf position, leaf shape, flower position, anther color, pistil color, leaf edge, fruit color), growth variables (plant height, stem diameter, number of leaves), and yield variable (weight per fruit, fruit length, fruit weight per plant). The results showed that all morphological characters for all varieties were the same, namely having an upright habitus, pointed leaf shape, green leaf color, leaf position falling, flower position lowering, purple anther warrant and green pistil stalk warrant, and red fruit skin color.

Keywords: Chili, Characterization, Morphology, Genetic Parameters

This is an open access article under the CC–BY-NC license

INTRODUCTION

The increase in the population in Indonesia, apparently affects the amount of food needed, including large red chilies (*Capsicum annuum L.*). Based on data from the Central Statistics Agency and the Directorate General of Horticulture (2019), chili harvested area has the highest rank compared to other vegetables, large chili production is also included in the top 5 (mushrooms, potatoes, onions, cabbage, large chilies. Chili is one of the food ingredients). which has a very fluctuating price. On the consumption side, chili is one of the spices that must be on the daily menu of most Indonesians. If the price of chili soars, it will have an impact on people's purchasing power and also cause unrest (Nauly, 2016).

Some of the things that cause low productivity of large chilies are the attack of plant pest organisms, the use of low yielding varieties, and the adaptability of a variety that is less extensive. One way to overcome this problem is to develop new types of hybrid varieties (Sari *et al*., 2014; Setiawan *et al.,* 2019). One of the most important things in the plant breeding process to produce superior varieties is to increase genetic diversity. Genetic diversity is one of the most influential factors for the success of plant breeding efforts. The existence of genetic diversity in a population means that there are variations in genotype values between individuals in the population (Sofiari and Kirana, 2009). Sujiprihati *et al*. (2003) stated that the diversity of plant populations has an important meaning in plant breeding. Efforts to improve the genetics of chili plants require the presence of germplasm with wide genetic diversity. Morphological characterization is the initial

Corresponding author:
lagiman@gmail.com
DOI: 10.31096/cset.v1i1.336

information needed in an effort to find superior characters and the existing diversity is still needed (Santos *et al*. 2011). One of the characterizations used is a qualitative character whose characteristics can be used as a benchmark for determining the type of individual (Apriliyanti et al., 2016). The next step after knowing genetic diversity is by visually selecting plant characters by selecting phenotypes that are considered good and cannot provide satisfactory results without being guided by the values of selection parameters such as genetic variance, phenotype variance, coefficient of genetic diversity and heritability. Selection will be effective if the population has wide genetic diversity and high heritability. Estimation of genetic parameters in relation to the characterization of plant traits is a major component in efforts to improve plant properties as desired. The success of selection in plant breeding depends on how much genetic variability exists from the material to be selected (Akhtar *et al*., 2007). Characters that have wide genetic variability will provide a greater opportunity to obtain the selected genotype with the best characters. Heritability is a quantitative statement of the role of genetic factors compared to environmental factors in giving the final appearance or phenotype of a character (Allard, 1960). Heritability was classified based on the criteria of low to high. Selection of characters that have high heritability will be more effective than characters that have low heritability, this is because the genetic influence is greater than the influence of the environment that plays a role in determining the phenotype of the character (Carsono *et al*., 2004).

RESEARCH METHODOLOGY

The research was carried out at the Wedomartani Experimental Garden, Faculty of Agriculture, UPN "Veteran" Yogyakarta, with an altitude of 115 meters above sea level. The research started from May to August 2021. The materials used in this study were 10 genotypes of large chili from seed company, plantera bags, insecticides, pesticides, and planting media. The tools used are tray, bucket, stake, sprayer, hoe, ruler, caliper, chlorophyll meter, refragtometer, scissors, rope, scales, label paper, and stationery.

The study was a single factor field experiment in the form of 10 large chili genotypes arranged in a Completely Randomized Block Design (RCBD) with 3 blocks as replication. The genotypes of large chilies are: Arimbi, Baja, Beautiful, Dewa Rengku, Gada, Jayadi, Jenio, Simpatik, Panex, and Thunder. Each treatment unit consisted of 8 plants in the planter bag, 3 of which were used as sample plants.

RESULTS AND DISCUSSION

Observations of morphological characters include plant habitus, leaf shape, leaf color, leaf position, flower position, amhter color and pistil stem color. Observation data are in table 1.

Table 1. Qualitative data of plant morphological characters

Variety	Morphological characters						
	PH	LS	LC	LP	FP	AC	PSC
Arimbi	compact	lanceolate	dark green	sparse	pendant	purple	green
Baja	compact	lanceolate	light green	sparse	pendant	purple	green
Beautiful	compact	lanceolate	green	sparse	pendant	purple	green
Dewa Rengku	compact	lanceolate	light green	sparse	pendant	purple	green

Gada	compact	lanceolate	dark green	sparse	pendant	purple	green
Jayadi	compact	lanceolate	dark green	sparse	pendant	purple	green
Jenio	compact	lanceolate	light green	sparse	pendant	purple	green
Panex	compact	lanceolate	dark green	sparse	pendant	purple	green
Simpatik	compact	lanceolate	green	sparse	pendant	purple	green
Thunder	compact	lanceolate	dark green	sparse	pendant	purple	green

Note: PH = Plant Habitus, LS = Leaf Shape, LC = Leaf Color, LP = Leaf Pubescen, FP = Flower Position, AC = Anther Color, PSC = Pistil Stem Color

The data in table 1 shows that all varieties have an upright plant growth type or habitus, with a pointed leaf shape, green leaf color and the position of the leaf color falling. The flower position for all genotypes is bent, with purple anthers and green stigmas.

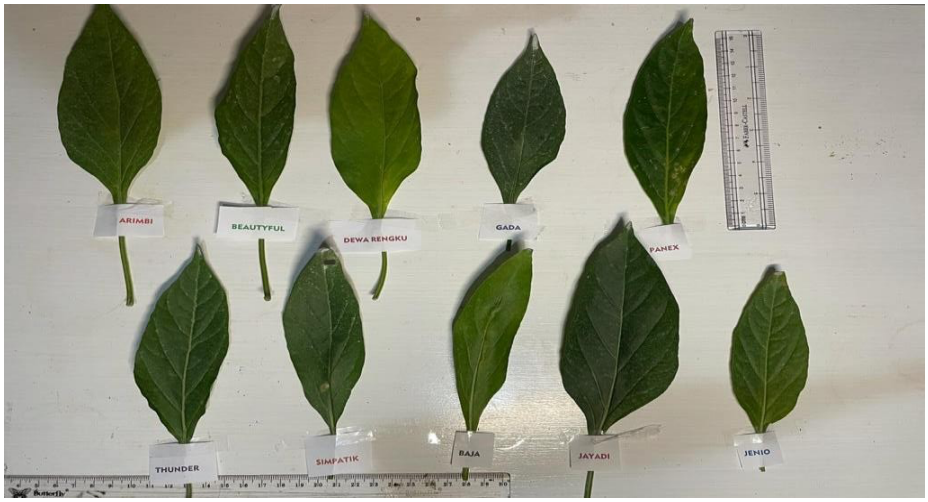

Figure 1. Leaf color and shape of ten genotypes

Figure 1 shows the morphology of the leaf shape of ten different chili genotypes, Baja varieties tend to have elongated leaf shapes with slightly blunt leaf tips, and have narrow leaf areas

Figure 2. Fruit color and shape of ten genotypes when young and ripe

Figure 2 shows the morphology of the fruit shape and color of ten chili genotypes when the fruit is young and when it is ripe which looks different. The Arimbi variety tends to have a rather large, short fruit shape, while the Jenio variety tends to have an elongated, smaller fruit shape like curly chili.

Table 2. Average plant height (cm)

Variety	20 day (cm)	30 day (cm)
Arimbi	23,97 ab	39,50 ab
Baja	19,00 c	30,43 cd
Beautiful	26,40 a	41,73 a
Dewa Rengku	22,10 bc	37,10 abcd
Gada	21,83 bc	34,90 abcd
Jayadi	21,43 bc	37,57 abc
Jenio	18,50 c	32,77 bcd
Panex	21,53 bc	35,03 abcd
Simpati	18,13 c	29,93 d
Thunder	20,47 bc	34,45 bcd

Note: The mean followed by the same letter in the same column shows that there is no significant difference based on the DMRT level of 5%.

Table 2. shows that the plant height of the Beautiful variety has a plant height of 26.40 cm which is significantly different from the Thunder , Baja, Jenio and Panex varieties. However, it is not significantly different from the Arimbi, Dewa Rengku, Gada, Sympatik and Jayadi varieties.

Table 3. Average number of leaves (pieces)

Variety	20 day (pieces)	30 day (pieces)
Arimbi	12,65 ab	21,90 ab
Baja	10,87 bc	16,63 b
Beautiful	13,90 a	22,67 a
Dewa Rengku	12,13 b	20,77 ab
Gada	11,57 bc	20,23 ab
Jayadi	12,00 bc	21,00 ab
Jenio	11,53 bc	19,33 ab
Panex	11,43 bc	18,00 ab
Simpatik	10,33 c	18,90 ab
Thunder	11,47 bc	16,90 b

Note: The mean followed by the same letter in the same column shows that there is no significant difference based on the DMRT test at 5% level.

The number of chili leaves at the age of 20 days after planting showed that the Beautiful variety had more leaves than the Baja and Panex varieties, but the same number of the Arimbi, Dewa Rengku, Gada, Jayadi, Jenio, Simpatik and Thunder varieties. Other leaf characters, namely leaf length and width, are presented in Table 4.

Table 4. Leaf length and width (cm)

Variety	leaf length	leaf width
Arimbi	17,03 ab	6,50 a
Baja	16,00 ab	4,83 bcd
Beautiful	15,67 ab	4,67 cd
Dewa Rengku	17,33 a	6,00 ab
Gada	14,03 b	4,50 cd
Jayadi	17,00 ab	6,53 a
Jenio	14,33 ab	3,89 d
Panex	15,20 ab	5,30 abc
Simpatik	16,73 ab	4,87 bcd
Thunder	17,03 ab	4,47 cd

Table 4 shows that the chili varieties that have long leaf length and wide leaf width are Arimbi, Dewa Rengku, and Jayadi, while the medium group is Baja, Beautiful and Panex varieties. Groups of short leaf length and narrow leaf width are the Gada, Jenio, Sympatik and Thunder varieties

CONCLUSION

The varieties all have the same morphological characters, namely having an compact habitus, pointed leaf shape, green leaf color, fallen leaf position, bent flower position, purple anther color and green pistil stalk color, and green fruit skin color when young and bright red when ripe. .

Acknowledgement

The authors would like to thank the Institute for Research and Community Service UPN "Veteran" Yogyakarta which has assisted in funding this research and all parties who have helped the smooth running of this research.

REFERENCE

Akhtar M.S., Y. Oki, T. Adachi and Md. H.R. Khan. 2007. Analysis of Genetic Parameters (Variability, Heritability, Genetic Advanced, Relationship of Yield and Yield Contributing Characters) for Some Plant Traits Among Brassica Cultivars Under Phosphorus Starved Environmental Cues. *Journal Faculty Environment Science Technology* 12(12): 91-98.

Allard, R.W. 1960. *Principles of Plant Breeding*. John Wiley & Sons Inc. New York.

Nauly, D. 2016. Fluktuasi dan Disparitas Harga Cabai Di Indonesia. *Jurnal. Agrosains dan Teknologi*, Vol. 1 No. 1:

Sari, W.P., Damanhuri, Respatijarti. 2014. Keragaman dan Heritabilitas 10 Genotip pada Cabai Besar (*Capsicum annum* L.). *Jurnal Produksi Tanaman*. Vol 2 nomor 4 : 3011-3017

Setiawan, I.K, B. Waluyo, D. Septadi. 2019. Uji Daya Hasil 6 Genotip Tanaman Cabai Besar (*Capsicum annum* L.) Di Dataran Tinggi. *Jurnal Produksi Tanaman*

Santos, E.A., M.M. Saouza, AP. Viana, AAF. Almeida, JCO. Freitas, P. Lawinsky. 2011. Multivariate analysis of Morphological Characteristic of two Species of Passion Flower with Ornamental Potential and hybrids between them. *Gen Mol. Res* 10 (4) : 2457 – 2471.