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Qualitative and Quantitative Traits of Katokan Toraja Cayenne Pepper Varieties (*Capsicum annuum*)

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ABSTRACT

The Katokkon Toraja chilli, scientifically known as *Capsicum annuum*, is a locally Indigenous chilli variety found in Toraja, South Sulawesi, Indonesia. Renowned for its exceptionally high level of spiciness, this type is particularly popular among aficionados of spicy cuisine. This study was carried out at Labuhanbatu University to examine the qualitative and quantitative attributes of the Katokkon Toraja (*Capsicum annuum*) chilli variety. This study aims to identify the unique attributes of this particular variety in terms of its floral structure, leaf color and shape, and the appearance and color of its fruit. The approach employed in this study was a non-factorial completely randomized design (CRD), wherein the parameters examined encompassed plant height, number of leaves, and number of fruit. Based on qualitative data, it can be observed that Katokkon chili flowers exhibit a slightly upright spreading position, light green leaves, tapered curved fruit, and curly and slightly curved leaves. In the meantime, the chili fruit exhibits a range of color variations, spanning from dark green to reddish-orange, serving as indicators of varying degrees of ripeness and nutritional composition. The study's quantitative findings indicate no significant differences in plant height and number of leaves among the plants. This lack of variation could be attributed to genetic factors and a consistent approach to environmental management. The results suggest that the Katokkon variety exhibits uniform vertical growth and leaf count, which is significant for strategic planting and overall plant care. This study offers significant insights for agricultural workers in effectively managing Katokkon Toraja (*Capsicum annuum*) chili varieties and serves as a foundation for improving cultivation methods to enhance yield and produce higher-quality crops.

Keywords: *Buss Test; Canai Plants Katokkan Toraja variety, Non-Factorial Randomized Block Design (RAK) Method; Qualitative Characters, Quantitative Characters*

1. INTRODUCTION

Chili pepper, scientifically known as *Capsicum annuum*, holds significant importance in culinary practices across numerous countries, such as Indonesia (Gulo, 2023). This plant is recognized for its adaptability to diverse climate conditions, although it thrives best in warm environments with ample sunlight (Raras et al., 2021). Belonging to the Solanaceae family, which encompasses other popular crops like tomatoes, potatoes, and eggplants, chili serves as a staple food ingredient and a lucrative agricultural product. Due to its substantial market demand both domestically and globally, many farmers opt to cultivate chili as a means of generating income (Jaya & Santoso, 2022) (Chairiyah et al., 2022) (Priyono & Triadyaksa, 2020).

Katokkon Toraja chili, a *Capsicum annuum* variety indigenous to Toraja, South Sulawesi, Indonesia, is renowned for its intense spiciness and highly favoured by spicy cuisine enthusiasts. In addition to its fiery heat, this chili variety is distinguished by its slightly sweet flavor and lower spiciness level, as implied by its name. The fruit of this chili is elongated and sizable, resembling a banana, and typically starts off as a light green color before maturing into a vibrant red hue. A comprehensive understanding of this chilli variety's characteristics necessitates qualitative and quantitative analysis. Qualitative analysis is essential for identifying attributes such as shape, color, and flavor, which play a crucial role in influencing consumer preferences and market acceptance (Maulana et al., 2023). Quantitative analysis, in the meantime, permits the impartial assessment of factors such as fruit size, heat level (measured in Scoville heat units), and nutritional composition. By carrying out both forms of analysis, comprehensive and precise data can be obtained to bolster the development of superior varieties and more efficient marketing strategies. Furthermore, such analysis is crucial for ensuring the uniformity of product quality and meeting the agronomic criteria necessary for enhancing chili production and quality. This variety is well-suited for individuals who appreciate the aroma and flavor of chili without overwhelming heat. Chili is commonly utilized in various dishes to introduce color and flavor without overpowering the dish with spiciness.

Katokkon Toraja chili (*Capsicum annuum*) has gained recognition in Indonesia and internationally, particularly among enthusiasts of extremely spicy cuisine (Wulandari et al., 2024). The cultivation of this chili necessitates careful attention due to its susceptibility to changes in climate and soil conditions. In Toraja, farmers often employ traditional methods handed down through generations to maximize plant growth, such as utilizing organic fertilizers and sustainable soil management. The distinctiveness and spiciness of Katokkon Toraja (*Capsicum annuum*) have elevated it to a symbol of local cultural pride and have the potential to be a valuable export commodity.

Studying the qualitative and quantitative features of two chili varieties, Katokkon Toraja (*Capsicum annuum*), can provide valuable information regarding these chilli types' genetic diversity and agronomic potential. Qualitative characteristics, including fruit color, shape, and flavor, are essential in determining consumer preferences and adaptation to local growing conditions. On the other hand, quantitative traits involve more objective measurements such as fruit size, weight, and spiciness level measured using the Scoville scale and productivity analysis per plant.

According to the research conducted by Suryadi et al. (2018), applying organic fertilizer resulted in a significant increase in the growth and yield of Katokkan chili on marginal land. On the other hand, Yuniarti et al. (2020) conducted a comparative analysis on the adaptability of Katokkan chili to varying climate conditions, demonstrating its high

tolerance to fluctuations in temperature and humidity. By conducting a comparative study that examines the growth of these two varieties under similar environmental conditions, researchers can assess the impact of climate, soil quality, and agricultural techniques on their development and productivity. The data obtained from this investigation can be utilized to determine the strengths and weaknesses of each variety under different circumstances, which can then be leveraged for breeding programs and enhancing the overall quality of chili production. Furthermore, genetic analysis can be incorporated into the study to explore the genetic diversity between the two varieties. Techniques like DNA barcoding and molecular marker analysis can aid in identifying and characterizing genetic traits that influence specific characteristics. The findings of this study not only hold significance in an academic setting and offer practical benefits to farmers and stakeholders in the chili industry, enabling them to enhance cultivation methods and marketing strategies based on the insights gained.

2. MATERIAL AND METHODS

2.1 Research site and time

The investigation into the qualitative and quantitative analysis of the Katokkon Toraja chili variety (*Capsicum annuum*) was carried out at Labuhanbatu University situated on Sisingamangaraja St No. 126 A Aek Tapa, Rantauprapat, Labuhanbatu Regency, North Sumatra, Indonesia. The geographical coordinates are approximately 2.096° North Latitude and 99.831° East Longitude, with an elevation of about 30 meters above sea level. The study took place from April 29 to May 4, 2024. The equipment utilized in this research comprised a 2-meter black cloth used as a backdrop for photography, a ruler for measuring sample dimensions, stationery for data recording, and a cellphone for documentation purposes. The research materials included leaves, stems, fruits, and flowers from the Katokkon Toraja chili variety (*Capsicum annuum*), chosen due to their distinctive characteristics relevant to the study's focus on plant adaptation and growth in specific environments with an average temperature ranging from 26-28°C throughout the year. This temperature remains relatively stable with minimal fluctuations. The area also experiences an average annual rainfall of approximately 2,500-3,000 mm, with the rainy season from September to April. These environmental conditions play a crucial role in evaluating the adaptation and growth of the Katokkon chili, as this variety must exhibit resilience to high rainfall and warm tropical temperatures to ensure optimal productivity.

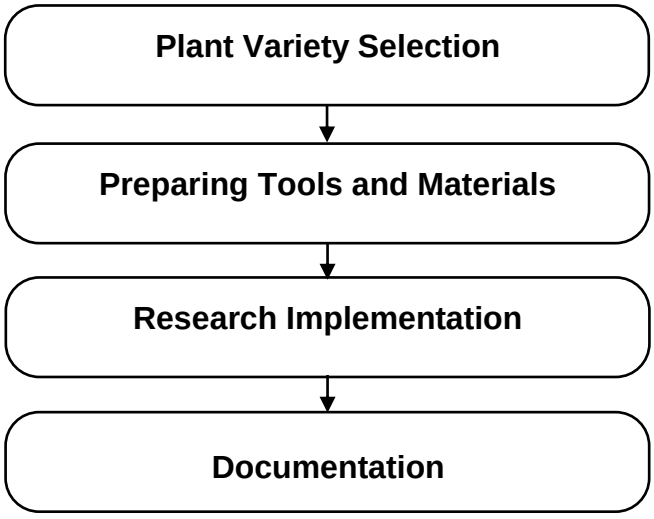

Figure 1. Research Flow Diagram

3. RESULT AND DISCUSSION

3.1 Qualitative Traits

The research findings indicate that the qualitative characteristic of the flower shape in the Katokon chili variety is somewhat upright and spreading. This suggests that the chili flowers are neither fully erect (vertical) nor entirely spreading (horizontal). The position of the flowers lies between these two extremes, forming an angle smaller than 90 degrees but larger than 45 degrees relative to the stem. (Figure 2).

Figure 2. Chili Plant Flowers

Research findings reveal that the Katokon chili variety has leaves that tend to be light green. The light green hue of the chili leaves may indicate a high level of chlorophyll, essential for photosynthesis. Furthermore, this light green color can signify that the leaves are healthy and actively producing energy through photosynthesis. This characteristic can influence the overall growth and health of the Katokon chili plants and provides a useful visual cue for identifying this variety in the field. (Figure 3).

Based on the study's findings, it is evident that the Katokon chili variety exhibits a fruit shape that is both curved and tapered in nature. The curved and tapered shape of the Katokon variety sets it apart from other types of chili, serving as a distinctive feature. This particular attribute may impact the visual appeal of chili fruit and can also influence the texture and flavor of the fruit when it is eaten. Within plant breeding, this unique fruit shape can also serve as a selection criterion for cultivating preferred chili varieties.

Figure 3. Chili plant leaf

Figure 4. Chili Plant Fruit

Based on the study's findings, it was discovered that the Katokon chili type displays chili fruits that are reddish-orange in color. This particular hue is not only visually pleasing but also serves as an indicator of ripeness and the specific nutritional properties of this variety. The Katokon type demonstrates strong resilience to the surrounding environmental factors, making it a promising option for farmers seeking to enhance both the quantity and quality of their yield.

The study findings unveiled that the Katokon chili type displays chili fruit with a dark green hue. The dark green shade of the Katokon chili fruit signifies a high chlorophyll content in this type, which enhances its nutritional worth and unique flavor. Furthermore, this dark

green color suggests that the Katokon chili can be gathered at the ideal ripeness stage for specific culinary uses, offering farmers and consumers the flexibility to select a suitable harvest time. This type also strongly resists environmental conditions, making it a promising option for chili cultivation in diverse regions.

Figure 5. Chili Plant Fruit

Figure 6. Unripe Chili Fruits

The study findings indicated that the Katokon chili variety displays curly and slightly curved leaves. This particular trait offers insights into the genetic adjustments of plants to specific environmental circumstances, including defense mechanisms against pests and diseases. The curly and curved leaves may also impact the photosynthetic capacity of plants, consequently influencing the quantity and quality of the chili fruit yielded. With a comprehension of these leaf attributes, farmers can devise more suitable farming practices to enhance output and maintain the well-being of Katokon chili plants.

Figure 7. Chili plant leaves

The study findings showed that the Katokon chili variety exhibits partially closed flowers and is not fully bloomed. This observation suggests the early stage of flower development, which may impact the pollination process and the formation of fruits. Additionally, the presence of unopened flowers may also signify the plant's reaction to environmental factors or specific agricultural practices. A comprehensive comprehension of this phase of flower development holds significant importance for farmers, as it enables them to identify the optimal timing for agronomic interventions to enhance the yield and quality of the Katokon chili harvest.

Figure 8. Chili Plant flower

3.2 Quantitative Traits

The collected data revealed notable diversity in the height of chili plants across five replications, with the tallest plant reaching 36 cm in the third replication and the shortest measuring 10 cm in the second replication. The cumulative height of all plants amounted to 127.5 cm, derived from the summation of individual plant heights in each replication. The mean plant height was computed at 25.5 cm, obtained by dividing the total height by the number of

replications. This observed variability may be attributed to factors including environmental influences, nutrient accessibility, or the genetic makeup of the chili plants.

3.2.1 Plant Height (cm)

Examining the qualitative and quantitative attributes of the Katokkon Toraja chili plant type (*Capsicum annuum*) concerning plant height revealed no notable distinction in plant height among individual plants. This uniformity in plant height could be attributed to the genetic components of the variety, ensuring a consistent vertical growth pattern. Furthermore, the measurement of plant height in centimeters further emphasizes the lack of significant variance in height among plants, underscoring the uniformity in the vertical development of this chili plant.

The results align with the typical growth pattern of chili plants, which often exhibit limited vertical growth, particularly in specific varieties. While environmental variables like soil nutrients, sunlight, and water can impact plant height, these factors were likely controlled for in this study, resulting in minimal variation in plant height. Despite the lack of significant differences in plant height, this data remains valuable as plant height can influence productivity and the most effective planting arrangements. A comprehensive understanding of this trait can assist farmers in optimizing the cultivation of Katokkon Toraja chili plants, aiding in strategic planting and efficient space utilization.

Jones et al. (2019) conducted a study on chili plants and found that both environmental and genetic factors influence the height of the plants. Their research indicated that chili varieties grown under favorable conditions with adequate sunlight and balanced nutrition exhibited better growth than those deprived of proper nutrition or subjected to environmental stress. These findings are consistent with the study conducted by Suryadi et al. (2018), which demonstrated that using organic fertilizers led to an increase in the growth of Katokkan chili.

Furthermore, Tan et al. (2020) discovered that the height of chili plants does not always directly correlate with the yield, as some varieties with shorter vertical growth produced more and higher quality fruit. These results underscore the significance of conducting a comprehensive analysis of plant morphology and phenology to comprehend potential productivity and develop optimal cultivation strategies.

Table. 1 Plant Height

Repetition	Plant Height (cm)
1	32
2	10
3	36
4	34
5	15.5
Total	127.5
Mean	25.5

3.2.2 Total Leaves (Strands)

The data provided reveals that the number of leaves of chili plants measured in five replications exhibited minimal differences. The first replication recorded the highest number of leaves at 33, while the fourth replication had the lowest number at 29. The total number of leaves across all replications amounted to 155, derived from summing the leaves in each replication. The average number of leaves was calculated at 31 by dividing the total number of leaves by the number of replications. These findings suggest

that the variation in leaf count between replications was not substantial, indicating consistent leaf growth in chili plants in this study.

Examining the qualitative and quantitative traits of the Katokkon Toraja chili plant variety (*Capsicum annuum*) revealed no significant variance in the number of leaves per plant. The observed phenomenon can potentially be attributed to the genetic nature of the cultivated variety, which contributes to the uniformity and reliability of leaf production. The observations indicate that the quantity of leaves in this chili plant appears to be influenced by genetic factors or environmental management techniques.

Table. 2 Total Leaves

Repetition	Total Leaves (Strands)
1	33
2	32
3	31
4	29
5	30
Total	155
Mean	31

The result aligns with the typical attributes of chili plants, which typically display dense leaf arrangement and minimal branching. In this investigation, it is conceivable that the consistent implementation of environmental management has mitigated the potential impact of factors such as nutrient availability, humidity, and sunlight on leaf production, thereby resulting in no significant difference in the observed number of leaves.

Although the number of leaves does not differ significantly, this information remains important in managing KatokkonToraja chili plants. A better understanding of these characteristics can assist farmers in planning plant maintenance, such as appropriate leaf pruning, to ensure optimal growth and production.

4. CONCLUSION

The study of the qualitative and quantitative traits of the Katokkon Toraja chili variety (*Capsicum annuum*) indicates that this specific variety possesses distinct characteristics that set it apart from other types of chili. The identified qualitative traits comprise an erect and widespread flower shape, a light green leaf color, a tapered and notched fruit shape, a color ranging from dark green to reddish-orange, and curly and curved leaves. In the meantime, quantitative traits such as the height of the plant and the number of leaves demonstrate strong uniformity across different plants, likely due to genetic influences and consistent environmental control. This data holds significance for farmers in the refinement of cultivation methods and in the strategic organization of planting and space utilization to enhance the yield and quality of the Katokkon Toraja chili variety (*Capsicum annuum*) harvest.

REFERENCES

Chairiyah, N., Murtilaksono, A., Adiwena, M., & Fratama, R. (2022). Pengaruh dosis pupuk NPK terhadap pertumbuhan vegetatif tanaman cabai rawit (Capsicum frutescens L.) di tanah marginal. *Jurnal Ilmiah Respati, 13*(1), 1-8.

Priyono, A., & Triadyaksa, P. (2020). Sistem penyiram tanaman cabai otomatis untuk menjaga kelembaban tanah berbasis esp8266. *Berkala Fisika, 23*(3), 91-100.

Gulo, T. (2023). Identifikasi serangga (insekta) yang merugikan pada tanaman cabai rawit di Desa

Sisarahili Ekholo Kecamatan Lolowau Kabupaten …. *Jurnal Sapta Agrica, 2*(1), 50-61. https://jurnal.uniraya.ac.id/index.php/Agrica/article/view/917 https://jurnal.uniraya.ac.id/index.php/Agrica/article/download/917/833

Jaya, I. K. D., Santoso, B. B., & Jayaputra, J. (2022). Penyuluhan tentang budidaya tanaman cabai di luar musim di lahan kering Desa Gumantar Kabupaten Lombok Utara. *Jurnal Gema Ngabdi, 4*(1), 68-76.

Maulana, Z., Tonggo, I. I., Muhibuddin, A., & Nasution, A. (2023). Pendugaan parameter genetik tanaman cabai katokkon (Capsicum chinense Jacq.) dengan iradiasi sinar gamma. *Jurnal Ilmiah Respati, 11*(2), 65-69.

Naiborhu, S. A. A., Barus, W. A., & Lubis, E. (2021). Pertumbuhan dan hasil tanaman kailan dengan pemberian beberapa kombinasi jenis dan dosis pupuk bokashi. *Jurnal Rhizobia, 3*(1), 58-66. https://doi.org/10.36985/rhizobia.v10i1.465

Raras, R. P., Saptiningsih, E., & Haryanti, S. (2021). Respon tanaman cabai rawit (Capsicum frutescens L.) varietas Pelita F1 terhadap penggenangan. *Buletin Anatomi Dan Fisiologi, 6*(1), 56-65. https://doi.org/10.14710/baf.6.1.2021.56-65

Wulandari, V., Senolinggi, P., & Nasution, M. A. (2024). Pengaruh iradiasi sinar gamma terhadap pertumbuhan dan produksi tanaman cabai katokkon (Capsicum chinense Jacq.). *Pallangga, 2*(1), 38-45. https://doi.org/10.56326/pallangga.v2i1.2977