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GROWTH PERFORMANCE OF VEGETATIVELY PROPAGATED CHERRY TOMATO VARIETIES AS INFLUENCED BY DIFFERENT MEDIA UNDER GREENHOUSE CONDITIONS

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ABSTRACT

With growing concerns about climate change and food security, greenhouse farming is becoming more popular for providing stable growing conditions. Cherry tomatoes, valued for their health benefits and ability to reduce the risk of cancer and chronic diseases, are in high demand, creating the need for more efficient production methods. Using seeds and traditional media can be expensive, but vegetative propagation with cuttings offers a cheaper and more effective alternative. However, there is limited research on how different growing media affect the growth of cherry tomatoes grown this way in the country. To address this, a study was conducted at DA-NMACLRC, Dalwangan, Malaybalay City, using a Factorial in CRD design to test the effects of variety and media on seedling growth. The results showed that Machyo Red was the best-performing variety, while M₃ and M₄ media produced the best plant height and stem thickness, respectively.

Keywords: cherry tomatoes, greenhouse farming, vegetative propagation, media, seedling growth

1. INTRODUCTION

Cherry tomatoes (Solanum lycopersicum var. cerasiforme) are a unique variety known for their small size, sweet and juicy flavor, thin skin, and versatility in culinary applications (Thompson & Thompson, 2018). They are nutrient-dense, rich in vitamin C and lycopene, and provide moderate amounts of vitamins A and K, potassium, fiber, and folate, making them a valuable component of a balanced diet (Coyago-Cruz et al., 2017; Wang et al., 2022). These nutritional benefits contribute to their well-documented antioxidant, anti-inflammatory, and anti-atherogenic properties, which have been associated with a reduced risk of cancer, cardiovascular diseases, and other chronic health conditions (Campestrini et al., 2019; Friedman et al., 2021; Ramos-Bueno et al., 2017; Tilesi et al., 2021). As a result, the popularity of cherry tomatoes has risen significantly, driving a need for innovative production techniques to meet increasing consumer demand.

Waheed et. al (2015) mentioned that tomatoes are mainly propagated through seed and by cuttings. Vegetative propagation is promising approach to optimizing cherry tomato production, which offers several advantages over traditional seed-based methods these includes uniform plant characteristics, faster maturation, and enhanced productivity aside from seeds are very costly (Nkongho et al, 2023).

Khobragade et al., 1997 stated that the growing media should have proper aeration, water holding capacity and adequate nutrition supply. Moreover, Vendrame et al (2005) reported growth medium is known to have influence potted plants and plays important role in plant height, number of leaves.

While vegetative propagation shows potential in enhancing crop performance, there is limited research on the impact of different growing media on cherry tomato production in greenhouses. This gap in knowledge highlights the need for further investigation.

OBJECTIVE

The study aims to determine the influence of different media on the growth of different varieties of cherry tomatoes seedlings propagated vegetatively.

2. REVIEW OF RELATED LITERATURE

Vegetative Propagation in Tomato Cultivation. Growing hybrid tomatoes is costly, making it difficult for poor farmers to afford seeds or seedlings. Therefore, vegetative propagation through cuttings is an effective and low-cost method to multiply true-to-type hybrids (Khan et al., 2011). Seedlings grown from cuttings show no significant differences in plant height or stem diameter compared to seed-grown ones but produce significantly more leaves (Nkongho et al., 2023). Propagating tomatoes through cuttings using suitable media can help reduce farmers' expenses on hybrid seeds.

Effects of Growing Media Characteristics on Water and Nutrient Management. A growing medium is a substance that supports plant roots, providing water and nutrients (Landis et al., 1990). It typically consists of a mix of components that supply air, water, nutrients, and structural support (Robbins and Evans, 2011). Soil-based media often reduce crop

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productivity due to issues like imbalanced microorganisms and poor aeration, leading to seedling stress (Baiyeri & Mbah, 2006; Landis et al., 1990). In contrast, soilless media (organic or inorganic) enhance yields by optimizing water, nutrient, and oxygen transport (Blok et al., 2017). Effective growing media require a physical structure that balances air and water for healthy root development throughout the crop cycle (Bilderback et al., 2005). Soilless culture involves growing plants without soil, using substrates like peat moss, vermiculite, perlite, coir, or composted materials (Savvas et al., 2013).

3. METHODOLOGY

The study was laid out in factorial design in Completely Randomized Design (CRD). The factors tested were Factor A: 3 Korean varieties of cherry tomato (KT Red, Machyo Red and Red Joy) and Factor B: different growing media (50% cocopeat + 50% perlite (currently used media for nursery); 60% sawdust + 40% garden soil; 50% garden soil + 30% commercial compost + 20% sawdust and 30% garden soil + 30% compost + 40% rice hull). The study was conducted in 3 replications. The three varieties of cherry tomatoes were planted in the greenhouse to obtain side shoots or cuttings for vegetative propagation. Good quality cherry tomato sideshoots (6-inch sideshoots) from each variety were selected and were planted in seedling trays with the sterilized media and drenched with a nutrient solution at 1.5 EC, gradually increased to 2.0 EC over 2-3 days until 25 days after planting (DAP). Collection of data were gathered in the 10 representative samples. The data collected for all parameters measured were analyzed using Analysis of Variance (ANOVA) Factorial in a Completely Randomized Design (CRD). Means were compared using the Least Significant Difference (LSD) Test to determine statistical significance.

4. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Presented in this chapter are the results of the ANOVA as well as the interpretation and analysis of the respective results. Tables wee used to illustrate the findings of this study, and the discussion and interpretation of tabular data were made for easy understanding.

Analysis of Major Nutrients. The fresh analysis of major nutrients of the media mixtures (Table 1) revealed significant variability in nutrient content. For total % nitrogen (N), M_3 (50% garden soil + 30% commercial compost + 20% sawdust) with 0.62% had the highest content. The lowest N levels were observed in M_1 (50% perlite + 50% cocopeat) and M_4 (30% garden soil + 30% commercial compost + 40% rice hull) at 0.11% and 0.22%, respectively. M_3 recorded the highest total % P₂O₅ content at 0.62%, with M_4 and M_2 showing moderate levels (0.22% and 0.17%). Total %K₂O content was highest in M_1 at 4.45%, while M_4 had the lowest at 0.03%. The total % NPK analysis ranked M_1 the highest at 4.67%, followed by M_3 (2.06%). M_2 and M_4 had lower total % NPK values, at 0.81% and 0.47%, respectively, indicating reduced overall nutrient availability.

MEDIA (as received)	,	Total %N	Total %P ₂ O ₅	Total %K ₂ O	Total %NPK
M ₁ - 50% perlite + 50% cocopeat (control nursery media)		0.11 <u>+</u> 0.01	0.11	4.45	4.67
M ₂ - 60% sawdust + 40% garden soil		0.17	0.17	0.47	0.81
M ₃ - 50% garden soil + 30% commercial compost + 20% sawdust		0.62 <u>+</u> 0.03	0.62	0.82	2.06
M ₄ - 30% garden soil + 30% commercial compost + 40%rice hull		0.22 <u>+</u> 0.01	0.22	0.03	0.47

Table 1	. Major	nutrients	analysis	(as received)) of the	growing	media	used in	the e	xperiment
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Percent Survival Rate in the Nursery

At 15 days after planting (Table 2), Machyo Red and M_2 media recorded the lowest survival rate at 99%, while all other varieties and media achieved 100%. Survival rates were not significantly affected by variety, media, or their interaction.

Plant Height (cm)

Plant height at 15 days after planting (DAP) (Table 2) showed significant differences among treatments. Machyo Red was tallest (25.40 cm), followed by Red Joy (24.29 cm) and KT Red (23.67 cm), reflecting differences in nutrient utilization due to genetic makeup (Ddamulira et al., 2019). Among media, M_3 produced the tallest plants (28.56 cm), followed by M_2 (24.64 cm), while M_4 (21.89 cm) and M_1 (22.72 cm) were shortest. The superior height in M_3 was attributed to its high nitrogen (N) and phosphorus (P) content, as nitrogen promotes internode growth (Biswas et al., 2015), and phosphorus supports photosynthesis and respiration (Sagervanshi et al., 2012).

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Table 2. Growth parameters of vege	etatively propa	agated cherry to	matoes in the nurs	sery
Treatment	Survival Rate (%)	Plant Height (cm)	Stem Diameter (cm)	No. of Leaves
Varieties				
KT Red	100	23.69 b	0.31 b	4.03
Machyo Red	99	25.40 a	0.35 a	4.18
Red Joy	100	24.29 ab	0.31 b	4.16
Rooting Media				
M ₁ - 50% perlite + 50% cocopeat	100	22.72 c	0.34 a	4.22
M ₂ - 60% sawdust + 40% garden soil	99	24.64 b	0.31 b	3.91
M ₃ - 50% garden soil + 30% commercial compost + 20% sawdust	100	28.56 a	0.29 c	4.29
M ₄ -30% garden soil + 30% commercial compost + 40%rice hull	100	21.89 c	0.35 a	4.06

Different letters represent significant statistical values at (p<0.05).

Stem Diameter (cm)

The data (Table 2) showed that variety had a significant effect, and media had a highly significant effect on stem diameter. Machyo Red had the largest stem diameter (0.35 cm), followed by KT Red and Red Joy (0.31 cm), consistent with findings by Uddin et al. (2015) that stem thickness varies among lines, and Klepper et al. (1971) that stem diameter changes with tissue hydration. Among media, M_4 recorded the highest stem diameter, followed by M_1 (Control), with no significant difference between the two. The superior performance of M_4 was attributed to its air-filled pore spaces (Barrett et al., 2016), which improve drainage, gas exchange, and root growth. M_1 's performance was likely due to its richer nutrient content, enhancing photosynthesis and increasing stored material, resulting in thicker stems.

Number of Leaves

The number of leaves (Table 2) in cherry tomatoes was not significantly affected by variety, media, or their interaction. The average number of leaves for KT Red, Machyo Red, and Red Joy were 4.03, 4.18, and 4.16, respectively. The lowest leaf count was observed in M2 with an average of 3.91.

5. CONCLUSION

Based on the findings, both variety and growing media influenced the growth of cherry tomato seedlings, but their effects varied. Survival rates were high across all treatments, with no significant differences caused by variety, media, or their interaction. For plant height, Machyo Red grew the tallest among the varieties, while M₃ media performed best due to its high nitrogen and phosphorus content, which support plant growth. Moreover, stem diameter was also significantly affected, with Machyo Red having the thickest stems. Among the media, M4 performed best because its physical properties improved root growth and overall plant development. Meanwhile, the number of leaves was not significantly affected by any of the treatments.

Overall, Machyo Red stood out as the best-performing variety, while M_3 and M_4 media showed the most positive results for plant height and stem diameter, respectively. These findings highlight the importance of choosing the right variety and growing media to improve cherry tomato seedling growth.

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