

Abstract

Tomato (*Solanum Lycopersicum*) is an important crop cultivated and consumed worldwide. It provides a wide variety of nutrients with many health-related benefits namely; confers protection against cancer, maintains healthy blood pressure and reduces blood glucose in people with diabetes. Its yields are limited by poor cultural practices such as earthing up and pruning systems. Earthing up and pruning play a major role in yield and quality determination. Although there is the potential for increasing tomato productivity through pruning and use of earthing up, there is limited knowledge on the effect of the integrated pruning and earthing up on tomato yield, quality and subsequently growth vigour. This study investigated the techniques that help improve on growth, yields and qualities of tomato to the benefit of farmers, traders, processors, and consumers. Zara F1 tomato variety was used in this study. The study was conducted over two cultivations, October 2019-January 2020 (at Horticultural Research and Demonstration Field, Chuka University) and February 2020-May 2020 (on a farm at Ndagani neighbouring the University). A split-plot experimental design, arranged in a Randomized Complete Block Design, with three replications was used in this study. The study investigated two factors i.e. pruning system (single stem, double stem, and triple stem) and earthing up (0 cm, 10 cm, 20 cm, and 30 cm). The pruning system was allocated to the main plot and earthing up to the sub-plot. Data on plant height was collected weekly throughout the entire growth period, beginning from 45 days after transplanting. Fruit yield and quality data were taken after each harvesting. Data obtained was analysed using SAS version 9.4 and significant means were separated using the Least Significant Difference at $\alpha = 0.05$. The analysis of variance showed that earthing up, pruning system, and combined earthing up levels and pruning systems had a significant ($p < 0.05$) effect on the plant height, stem girth size, yield and net economic benefit. The single stem pruning system and earthing up to level 30 cm gave the tallest and the largest plant height and stem girth size respectively in both cultivations. The triple stem pruning system and earthing up to 30 cm had the highest total yield and net economic benefit as compared to the controls. The results from the analysis of variance for the effect of factors (earthing up and pruning system) and their combined effect showed that there was a significant ($p < 0.05$) effect on the average weight loss percentage and total soluble solids in both cultivations. The treatments had significant ($p < 0.05$) effect on the average weight loss percentage, total soluble solids and fruit firmness in both cultivations. The highest fruit weight loss percentages were recorded from single stem pruning system with no earthing up (SS0), double Stem pruning system with no earthing up (DS0) and triple Stem pruning system with no earthing up (TS0) (control). The highest fruit firmness (3.41 N mm⁻¹ in cultivation 1 and 3.24 N mm⁻¹ in cultivation 2) was recorded from a single stem pruning system, earthing up to 30 cm. The highest total soluble solids (TSS) percentage 6.09 % in cultivation 1 and 6.09 % in cultivation 2) were both recorded from a single stem pruning system and earthing up to 30 cm. Pruning and earthing up to 30 cm provided the best combination for improved plant growth and development. To improve nutrient uptake and partitioning, consequently the number of marketable fruits and total yield growers could consider integrating triple stem pruning system and earthing up to 30 cm. To improve post-harvest qualities (reduce weight loss, increase ripening period, improve tomato firmness and Brix value, the farmers should consider earthing up at 30 cm regardless of pruning system. Based on the benefit-cost ratio, it was observed that a combination of triple stem pruning system and earthing up to 30 cm gave a maximum profitable yield of tomatoes.