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RESEARCH ARTICLE

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Growth and Yield of Salad Cucumber (*Cucumis sativus* L.) Vine Cuttings Under Protected House Conditions in Low Country Wet Zone of Sri Lanka

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Introduction

Cucumis sativus L., also known as salad cucumber, is one of the most widely grown vegetable crops in the world. It is grown in protected houses to increase its economic worth during off-season farming. It produces edible parthenocarpic fruits. According to Kumar et al. (2020), the phenomenon of parthenocarpy is extremely helpful for fruit development in environments as protected houses, where good pollination and fertilization are not possible. The process of producing parthenocarpic hybrids requires the use of chemicals and plant growth regulators to maintain and multiply parthenocarpic lines. This requires the involvement of high technical know-how and the concurrent construction of protected structures to prevent contamination and deterioration (Kumar et al., 2020).

Salad cucumber vines are trained on plant training threads as a single stem by removing lateral branches continuously to maximize vertical space utilization (Jasim & Abed, 2013). Usually, salad cucumbers are

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grown using seeds; but vegetative propagation is not very common. Most often, these pruned lateral branches are considered as waste material (Kumar et al., 2020). However, growing hybrid salad cucumber by seeds is expensive due to high prices of the hybrid seeds, and if pruned lateral branches are used as planting material, it would be of considerable commercial value and reduce the cost of regeneration (Jasim & Abed, 2013). Further, if apical end cuttings can be used for the next crop cycle after one crop cycle, the cost incurred on seedlings can be reduced substantially. Hence, if salad cucumber vine cuttings can be successfully used as seedlings, the costs incurred on purchasing salad cucumber hybrid seeds each time for a new crop cycle can be minimized. However, knowledge on growth and yield performances of salad cucumber vine cuttings is still lacking. Thus, the current investigation was carried out to explore the growth and yield performances of salad cucumber vine cuttings to evaluate their suitability for the next crop cycle.

Research Methodology

This study was conducted in a plant house at the Faculty of Agriculture, University of Ruhuna, Sri Lanka from February to April 2023 to evaluate the growth and yield performances of salad cucumber vine cuttings (Variety: Efdal F1). The experiment was laid out in completely randomized design with four replicates. There were three treatments as apical end cuttings, lateral branch cuttings and control. Salad cucumber seedlings obtained from the seeds were used as control plants. Two nodal cuttings of 20 – 25 cm of length were prepared from lateral branches and apical ends of two-month old salad cucumber mother plants and were used as the treatments. Leaves of the cuttings were removed by pulling them backward and snapping the petioles of the leaves. However, precautions were taken not to damage the buds of the terminal ends. Initial weight of the cuttings was recorded to be between 15 – 17g. Cuttings were dipped in water for a week to induce rooting. After the root initiation, the cuttings were planted in coir grow bags as one cutting per bag. Concurrently, the seeds of salad cucumber were directly seeded in coir grow bags as one seed per bag to obtain control plants. One replicate consisted of two plants. Thus, the sample size of each treatment was eight.

The growth parameters vine length, number of leaves per vine and length of 7th, 14th and 21st internodes were recorded weekly up to six weeks. Fresh weight of fruits, number of fruits and length of fruits were measured at harvesting as yield parameters. The temperature and relative humidity inside the protected house were maintained at optimum levels by an automation system. Recorded data were statistically analyzed using ANOVA, and the means were separated by the least significant difference (LSD) at 5% probability level.

Findings and Discussion

According to the results, there was a significant effect on vine length, number of leaves per vine, fresh weight of fruits and number of fruits between the treatments. However, the length of the salad cucumber fruits was not significantly influenced by the treatments. In addition, there was no significant effect between the treatments in length of 7th, 14th and 21st internodes. Significantly, different higher vine length and number of leaves per vine were recorded by control plants at the end of six weeks (Figures 1 and 2). Although higher vine length values were recorded by the apical end cuttings initially, the plants obtained from the salad cucumber seeds gradually increased their vine length at later stages of growth. This could be due to the potential of salad cucumber seed/seedling to become a complete plant. Cuttings obtained from mother plants may reduce their ability to develop as vigorous plants when they become older. At the initial stage of growth, number of leaves per vine recorded from the control plants showed no significant difference with the number of leaves per vine in plants obtained from cuttings. This might be due to the fast-growing habit of salad cucumber crop. However, at the end of the sixth week, the number of leaves per vine recorded by plants obtained from apical end and lateral branch cuttings were significantly lower than the number of leaves per vine in the control plants. This trend could be due to the potential of salad cucumber seed/seedling to become a vigorous plant over vine cuttings. Kumar et al. (2020) also observed the maximum vine length in salad cucumber plants cultivated *via* seeds over the plants cultivated from pruned side shoots.

Nevertheless, the fresh weight of fruits and the number of fruits at the end of the sixth week were significantly higher in plants obtained from apical end cuttings over control plants. In addition, fresh weight of

fruits and the number of fruits in apical end cuttings were not significantly different with fresh the weight of fruits and the number of fruits in lateral branch cuttings. Moreover, these parameters in lateral branch cuttings were not significantly different with the control plants (Figures 3 and 4). When taking cuttings from the salad cucumber mother plants, those mother plants had reached the reproductive phase of their growth cycle. Salad cucumber plants reached their reproductive growth phase about 21 days after planting (three weeks after planting). Therefore, plants obtained from cuttings were at their reproductive growth phase from the initial stage of planting. According to Figure 1, apical end cuttings have a higher growth rate than lateral branch cuttings. Therefore, apical end cuttings reported significantly higher fresh weight and number of fruits over the control plants which reached the reproductive growth phase three weeks after planting. Kumar et al. (2020) also recommended propagation of greenhouse cucumber cultivars *via* pruned side shoots for getting a comparative yield.

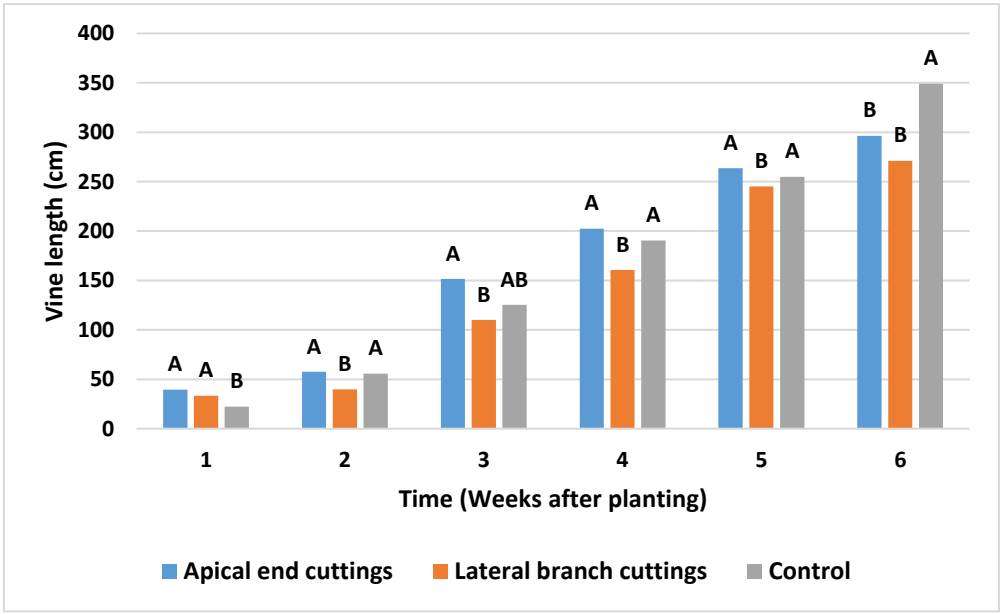

Figure 1. Vine length of salad cucumber vines in different treatments. Mean values indicated by the same letters are not significantly different at *a=0.05*

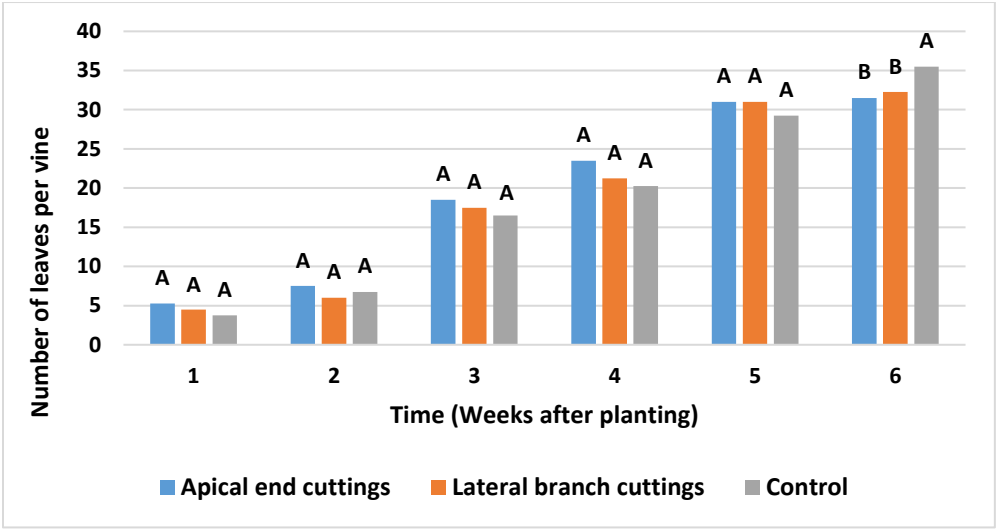

Figure 2. Number of leaves per salad cucumber vine in different treatments. Mean values indicated by the same letters are not significantly different at *a=0.05*

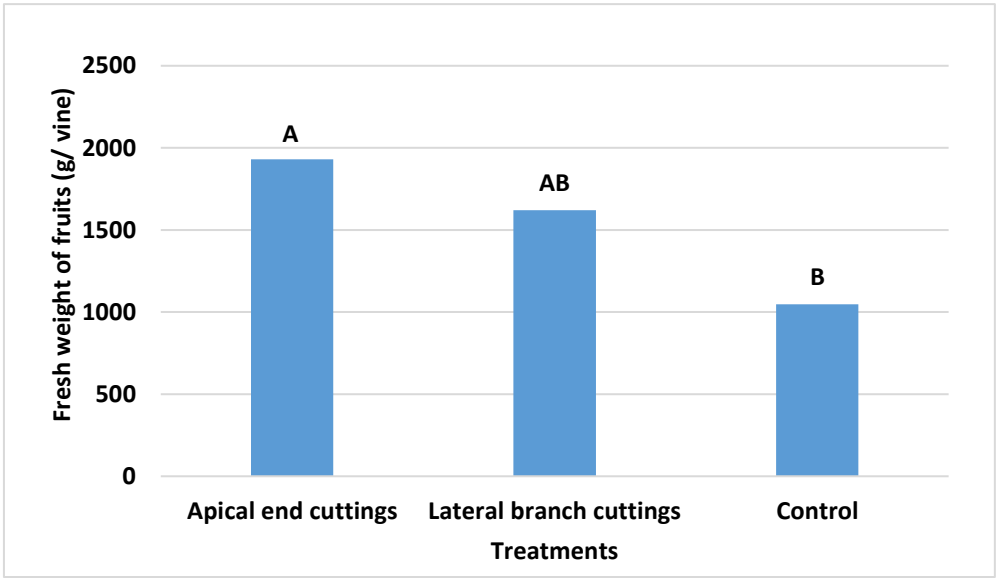

Figure 3. Fresh weight of salad cucumber fruits in different treatments. Mean values indicated by the same letters are not significantly different at *a=0.05*

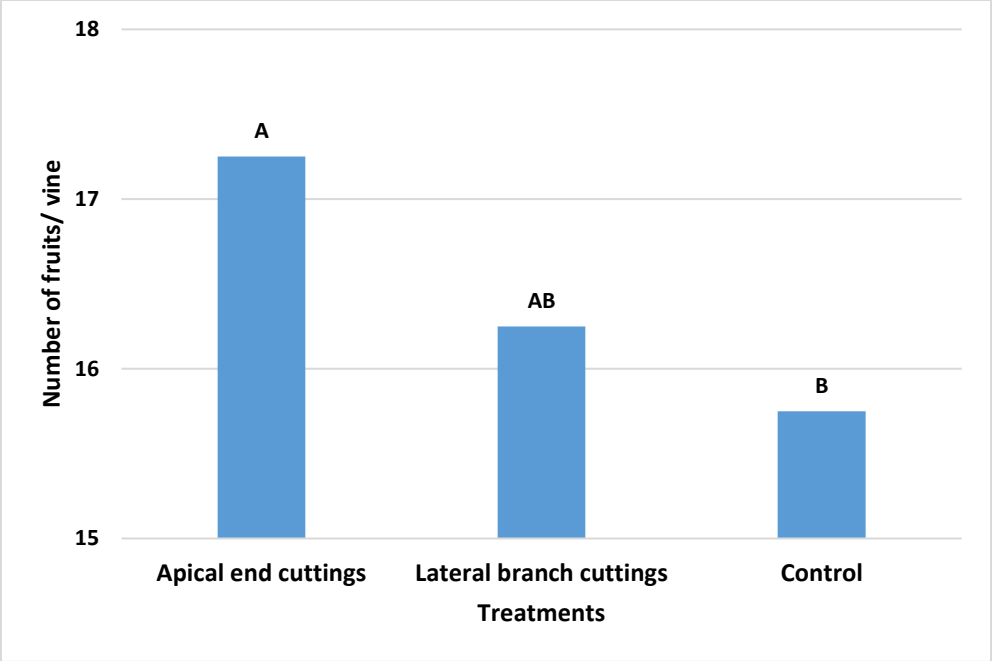

Figure 4. Number of salad cucumber fruits in different treatments. Mean values indicated by the same letters are not significantly different at *a=0.05*

Conclusions

Although the salad cucumber plants obtained from seeds reported significantly higher vine length and number of leaves per vine at the end of the sixth week, the salad cucumber plants obtained from apical end cuttings and lateral branch cuttings reported a higher fruit yield at the end of the sixth week. Therefore, there is a possibility to use those cuttings (apical ends and lateral branches) to obtain new plants without wasting. Thereby, the cost incurred on salad cucumber seedlings can be reduced.

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