

Impact of Different Plant Growth Retardants on Growth Behavior of Young Peach Plants

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Abstract

More number of buds per shoot with suitable internodal distance are key considerations for quality scion wood. Plant Growth Retardants (PGR) Cycocel (CCC) and Alar were used @ 25, 50 and 75 mg/l to study their effect on growth behavior of peach scion plants. CCC @ 75 mg/l produced highest buds per shoot (50.14) with 46.34 shoots per plant on 91.83 cm long scion stick and 2.05 internodal length. Alar application @ 75 mg/l produced 46.75 buds per shoot on 92.67 cm long scionstick and 2.19 cm internodal distance. Minimum number of buds per shoot (22.45), number of shoots per plant (24.96) and 4.67 cm internodal distance was recorded in control. A pragmatic recommendation for treatment of multiplication block of peach scion plants may be given that best results can be obtained from the plants treated with CCC or Alar at 75 mg/l to receive maximum number of buds / shoot, number of shoots /plant with suitable internodal distance.

INTRODUCTION

Increasing demand of peach nursery plants enhanced production of scion shoots in mother plants to meet the nursery requirement of the farmer community. Huge number of mother plants are required to supply scion buds for large scale nursery production. Long shoots of scion wood create problems for scion preservation and transportation from mother blocks to nursery areas. Hence it was realized that smaller scion shoots with suitable number of buds must be produced for easy handling of scion shoots and to keep the mother compact in size for their proper management. It was observed that mother plants growth may be suppressed so that maximum number of buds on suitable size of shoots may be produced from mother plants and mother block area may be reduced. Pruning is done as a way to keep their size small and manageable but other methods are also popular among growers. Chemical growth retardants were developed as an inexpensive approach to limit size and the growth rate of trees and to enhance their tolerance to the harsh environmental conditions (William, 2005).

In recent years, a number of plant growth retardants have been used for inducing compact growth, dwarfness and increased number of healthy branches (Song and Lee, 1995 and Banon *et al.*, 2002). Plant growth retardants are commonly applied in order to

produce high quality, compact plants. They permit a direct approach to growth control by retarding internodal elongation without seriously disrupting growth processes (Jasbir, 2011). Among various plant growth retardants, CCC and Alar are well known for production of short stature plants by reducing internodal distance of buds resulting in reduction of shoot length. CCC is widely used to control stem size by suppression of cell elongation (Renu and Srivastava, 2013). Growth retardants inhibit the Gibberellin synthesis originating internally causing reduction in cell size (Odabas *et al.*, 2007). The application CCC and Alar notably reduced internode length, stem length, number of main branches (Ismael *et al.*, 2013). Plants of carnation were compact and dwarf with increased number of shoots and maximum number of flowers, when treated with higher level of CCC (Iftikhar *et al.*, 2007). The studies were envisaged to produce compact mother plants of peach having more number of shoots, smaller in length having maximum number of buds per shoot for quality production scion material.

MATERIALS AND METHODS

The experiment was laid out according to RCBD layout design in Germ Plasm Unit (GPU) of peach at Khatwai, Soon Valley, District Khushab at Horticultural Research Station, Nowshera. Alar and CCC each were used @ 25, 50 and 75 mg/l. The effect of growth retardants was compared with control for comparison of their efficacy. Peach cultivar "Earligrande" was taken as experimental material, each treatment was sprayed on a single plant in four replications at the time of leaf bud burst stage. The second spray of growth retardants was done after 40 days of first spray. Standard cultural practices were applied to the mother plants and data was collected during the last week of May at the time of scion bud collection. Internodal length was recorded by measuring the distance between two adjacent nodes with the help of a scale. Number of buds per shoots were counted on ten branches of scion and mean was calculated for statistical analysis. Number of shoots per plants were counted for statistical analysis. Shoot length (cm) was measured by means of a measuring tape. Reading was taken by measuring distance between the base of shoot and shoot tip. All the data noted on plant growth parameters was subjected to analysis of variance (ANOVA). The data were analyzed statistically using Mstat C program. The means were compared using the LSD test at 5% level of significance (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Internodal Length (cm)

Data regarding internodal length presented in figure 1 show that growth retardants had a significant effect on node length as compared with control which had maximum internodal length (4.67 cm). Higher concentrations of both Alar and CCC noticeably reduced internodal length. Jasbir (2011) and Renu and Srivastava (2013) have also reported similar results.

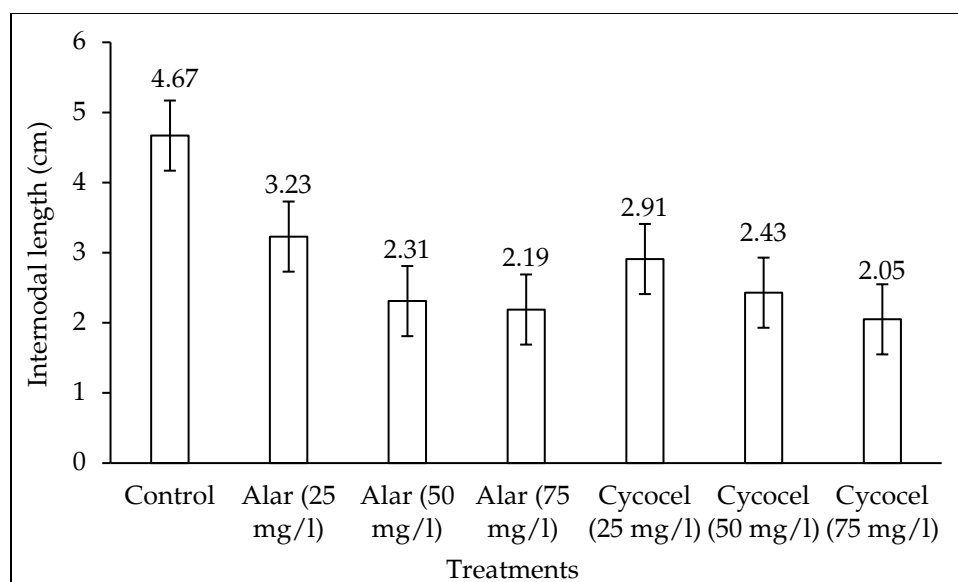


Figure 1: Effect of plant growth retardants on internodal length.

Number of Buds Per Shoot

Alar and CCC affected the number of buds per shoot as shown in figure 2, 75 mg/l CCC had the higher number of buds per shoot (50.14) as compared to control (22.45). Alar @ 75 and 50 mg/l had the next best results with higher number of buds (46.75 and 46.58) both were statistically at par. This may be due to reduction of shoot length by the effect of growth retardants. These findings are in conformity with the findings of Iftikhar *et al.* (2007).

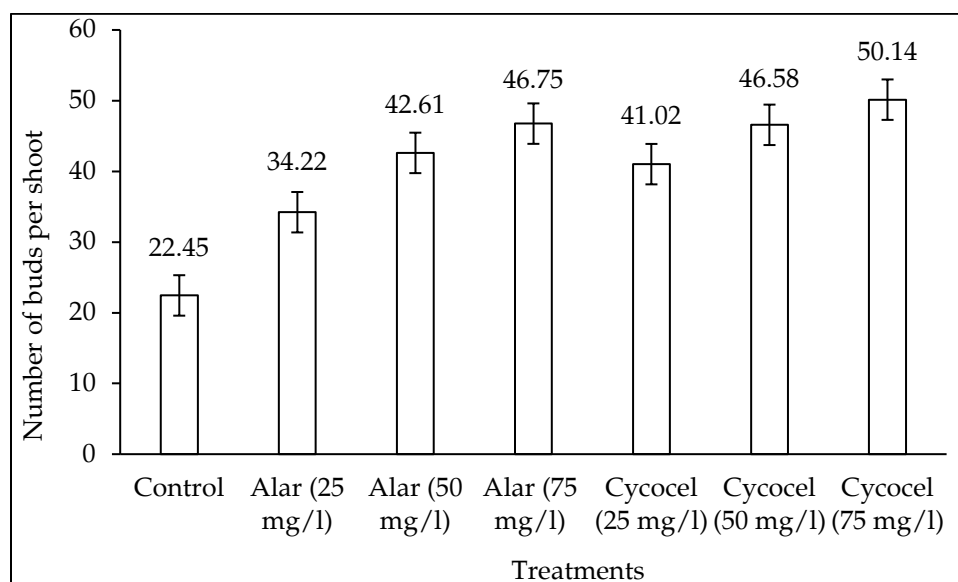


Figure 2: Effect of plant growth retardants on number of buds per shoot

Number of Shoots Per Plant

Maximum number per plants were produced by the plants treated with 75 mg/l CCC (46.34) as depicted in figure 3 followed by plants sprayed with Alar @ 75 mg/l (42.16). Lowest number of shoots per plants (24.96) was recorded in control. This might be due to pinching effect of growth retardants by suppression of shoot growth. William (2005) has also reported similar results in his studies.

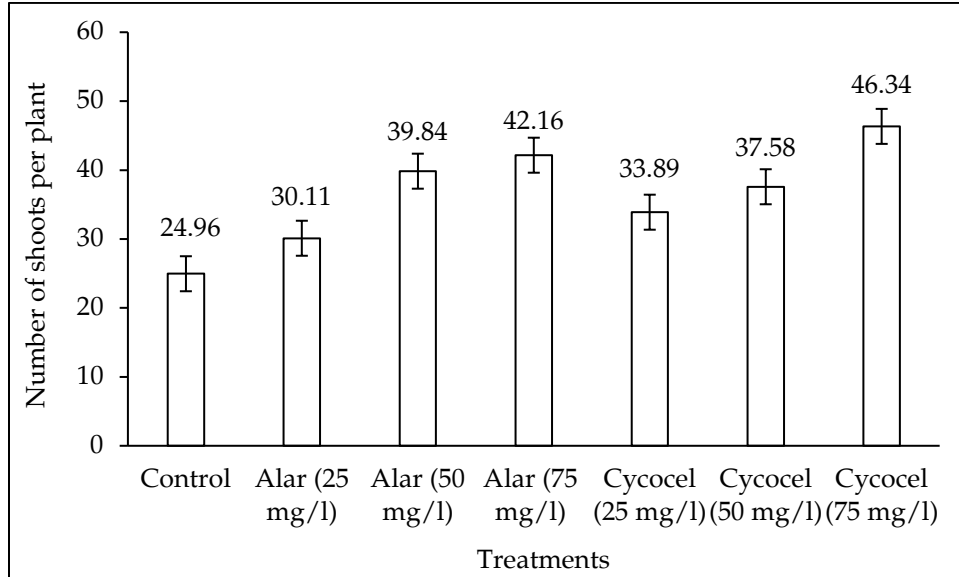


Figure 3: Effect of plant growth retardants on number of shoots per plant

Shoot Length (cm)

Shoot length (Figure 4) was maximum in control (132.78) and statistically differed from all the other treatments. Minimum shoot length was recorded in both higher concentrations of Alar and CCC (92.67 and 91.83 cm). Ismael *et al.* (2013) also reported notably reduced internode length with the application of Alar and this may be due to the inhibition of Gibberellins synthesis as stated by Odabas *et al.* (2007).

CONCLUSION

Compact mother plants of peach may be maintained by the use of Alar and CCC in higher concentrations resulting in more number of buds per shoot and maximum number of shoots per plant with short shoot length. Commercial nursery growers of peach can maintain their multiplication blocks in smaller space economically and get maximum number of scion buds per plant.

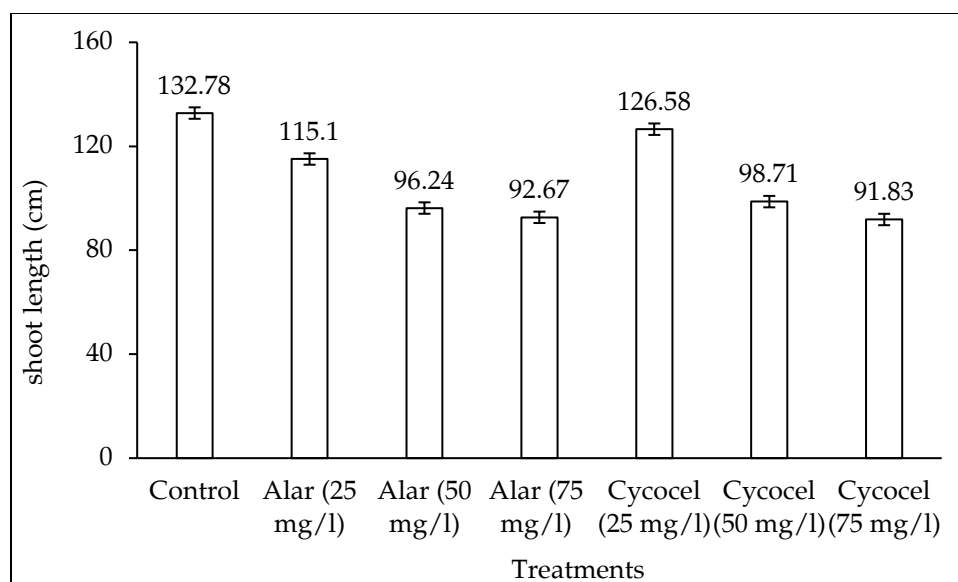


Figure 4: Effect of plant growth retardants on shoot length.

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