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# Response of varying degrees of dormant pruning on vegetative growth, flowering, fruit set, fruit retention and fruit yield of promising peach (*Prunuspersica* L.) Cultivars under mid hill conditions of Uttarakhand

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ABSTRACT

Pruning is considered essential in the regulation of the tree vigour, fruit quality and productivity potential. To study the response of various pruning severity on vegetative growth, flowering, fruit set, fruit retention and fruit yield five pruning intensities *viz.* Control (no pruning), 10%, 25%, 50% and 75% pruning of current season's growth were excised with 3 replications on three cultivars *i.e.* 'Red June', 'Elberta' and 'Early White Giant' in Factorial Randomized Block Design (FRBD). As the severity in pruning was increased, the vegetative growth and fruit retention percentage were increased. There was also a decreasing pattern in flowering, fruit set percentage and fruit yield which decreased according to the increase in the pruning intensity.

## 1. Introduction

Pruning is an important cultural practice, which affect the tree growth, yield and fruit quality in peaches. Pruning has been used since long to manipulate tree growth/vigour so as to make it better manageable, without reduction in yield of marketable fruit and its quality. Pruning is crucial as peach trees left unpruned resulted into weak trees with shorter life and increased diseases. Peach trees are such that the fruit is borne on the second year wood, which makes it important for good fruiting branches to grow every spring and summer, for a good yield. Pruning will ensure a steady volume of peach production every year and will also keep the fruiting shoots from moving higher and higher. Pruning involves the removal of old, dead, decaying and slow growing branches that are in no way fruitful. Removal of 40% of the tree once in a year stimulates new growth each spring. Opening the center of the tree improves air circulation and fruit color by allowing adequate sunlight penetration.Proper pruning is quite instrumental in regulating tree vigour and productivity potential of peach plantations. Judicious pruning practices at appropriate stage also help in enhancing fruit quality (Singh and Nautiyal, 2005). Determination of optimum level of pruning is to be standardized according to cultivar, location and prevailing agro-climatic conditions (Sharma and Chauhan, 1996).

## 2. Materials and Methods

Six-year-old peach trees of cvs. namely 'Red June', 'Elberta' and 'Early White Giant', having uniform size and vigour, planted 5 x 5 m apart at sub research station, Gaja, TehriGarhwal of G.B. Pant University of Agriculture and Technology, Hill Campus Ranichauri, Uttarakhand (1950 m. above mean sea level) during two consecutive years. Pruning was done in the last week of December during both the years. The trial was laid out with five pruning treatments which were replicated three times in Factorial Randomized Block Design (FRBD). The treatments were (i) control (no pruning); (ii) removal of 10% of current season's shoot growth; (iii) removal of 25% of current season's shoot growth; (iv) removal of 50% of current season's shoot growth and (v) removal of 75% of current season's shoot growth. In all the pruning treatments, basal buds were retained on the last year's wood. There were fifteen trees in each variety and one tree was allotted to each treatment. The diseased and dry woods

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were also removed from the experimental trees. Experiment started during dormant stage of the adult bearing trees applied with five levels of pruning. The trees selected under present study were used for recording of observations on vegetative growth (shoot length and width), flowering, fruit set, fruit retention and fruit yield characters.

## 3. Results and Discussion

Vegetative growth in terms of shoot length and girth increased with the increase in pruning severity. However, maximum increase in shoot length as well as its girth was recorded in the most heavily pruned trees (75% pruning) which was found to be significantly higher than the lightly and medium pruned trees and minimum under control (no pruning) in cvs. Red June, Elberta and Early White Giant (Table-1). Observations recorded in the present investigation on the increase in vegetative growth in terms of shoot length and its girth as a consequence of pruning severity are in accordance with earlier reports of Kanwar and Nijjar (1990) and Rathi*et al.* (2003), who have also reported the occurrence of vigorous growth due to heavy pruning. Increase in vegetative growth (length and girth) under various pruning treatments possibly might be attributed to vegetative growth due to higher amount of photosynthates and the nutrients as well particularly in the heavy pruned trees,which in turn enhanced cell division and formation of more tissues resulting into more vegetative growth. It is evident from experiment that pruning delayed the flowering. The time of 50% and75%flowering under severe pruning was latest. The 50% and 75% flowering was earliest under control three of the cvs. (Red June, Elberta and Early White Giant) (Table-2).The adverse effect of different pruning severities on flowering parameters may be attributed to the fact that moderate or slow growth of shoots which is indispensable to initiation of flower bud formation. Flower buds were formed when the shoot apex slowed its growth (Mika, 1982). Similar findings were also reported by Kumar and Srivastava (1983).The present investigation revealed that drastic reduction in fruit set was found with increase in pruning severity. Maximum fruit set was recorded under control while minimum was recorded with severely pruned trees *i.e.* 75% pruning whereas the fruit retention was found to be increase with increasing pruning severity which resulted due to decrease in fruit drop with increasing pruning severity. The minimum fruit retention was found under control (no pruning) in cvs. Red June, Elberta and Early White Giant (Table-3). The decrease in fruit set with increase in pruning severity may be attributed to lesser number of flowers retained on the pruned shoots as a consequence of decreased fruiting area. These results are in agreements with the findings of Sharma and Chauhan (1996), Badiyala and Awasthi (1989) and Rathi*et al.* (2003), who have also reported the adverse effects of pruning severity on fruit set in different peach cultivars.Yield per tree also decreased with increasing severity of pruning.The maximum fruit yield was recorded from unpruned control while it was recorded minimum under severelypruned trees *i.e.* 75% pruning in three of the cvs.

**Table 1.**Response of varying degrees of dormant pruning on shoot length and shoot width

| **Pruning Severity** | **Pooled Shoot length (cm)** | | | **Pooled Shoot width (cm)** | | |
|---|---|---|---|---|---|---|
| | Red June | Elberta | Early White Giant | Red June | Elberta | Early White Giant |
| **Control(no pruning)** | 9.98 | 11.31 | 9.77 | 0.91 | 0.86 | 0.95 |
| **10% Pruning** | 10.67 | 11.77 | 10.04 | 0.89 | 0.84 | 0.89 |
| **25% Pruning** | 11.02 | 11.97 | 10.40 | 0.82 | 0.79 | 0.82 |
| **50% Pruning** | 11.46 | 12.26 | 10.67 | 0.75 | 0.75 | 0.77 |
| **75% Pruning** | 11.97 | 13.05 | 11.15 | 0.74 | 0.70 | 0.70 |
| **CD at 5%** | 0.43 | 0.64 | 0.12 | 0.37 | 0.17 | 0.44 |

**Table 2.**Response of varying degrees of dormant pruning on date of flowering (Date/month) of peach cultivars

| **Pruning Severity** | **Date of 50% flowering (Pooled)** | | | **Date of 50% flowering (Pooled)** | | |
|---|---|---|---|---|---|---|
| | Red June | Elberta | Early White Giant | Red June | Elberta | Early WhiteGiant |
| **Control(no pruning)** | 14/3 | 19/3 | 21/3 | 22/3 | 27/3 | 27/3 |
| **10% Pruning** | 15/3 | 20/3 | 22/3 | 23/3 | 28/3 | 27/3 |
| **25% Pruning** | 16/3 | 21/3 | 23/3 | 23/3 | 29/3 | 28/3 |
| **50% Pruning** | 18/3 | 22/3 | 23/3 | 24/3 | 29/3 | 28/3 |
| **75% Pruning** | 19/3 | 24/3 | 25/3 | 25/3 | 31/3 | 29/3 |

(Red June, Elberta and Early White Giant) (Table-3). Other pruning treatments produced average yield per tree thus showed a negative correlation between severity of pruning and yield. The reduction in fruit yield due to severity of pruning could be explained; on the basis that less number of floral buds where available in severe pruning treatments and hence fruiting area was reduced. The yield reduction effect of a pruning operation depends on how much it stimulates new shoot growth. These findings are in agreement with Chitkara*et al.* (1991) and Rathi*et al.* (2003).

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**Table 3.**Response of varying degrees of dormant pruning on Fruit set, Fruit retention and Yield

| **Pruning Severity** | **Pooled Fruit set (%)** | | | **Pooled Fruit retention (%)** | | | **Pooled Yield (kg/tree)** | | |
|---|---|---|---|---|---|---|---|---|---|
| | Red June | Elberta | Early White Giant | Red June | Elberta | Early White Giant | Red June | Elberta | Early White Giant |
| **Control (no pruning)** | 9.98 | 11.31 | 9.77 | 0.91 | 0.86 | 0.95 | 9.14 | 9.83 | 8.70 |
| **10% Pruning** | 10.67 | 11.77 | 10.04 | 0.89 | 0.84 | 0.89 | 9.68 | 10.27 | 9.07 |
| **25% Pruning** | 11.02 | 11.97 | 10.40 | 0.82 | 0.79 | 0.82 | 10.03 | 10.59 | 9.67 |
| **50% Pruning** | 11.46 | 12.26 | 10.67 | 0.75 | 0.75 | 0.77 | 10.53 | 10.97 | 10.14 |
| **75% Pruning** | 11.97 | 13.05 | 11.15 | 0.74 | 0.70 | 0.70 | 10.93 | 11.30 | 10.43 |
| **CD at 5%** | 0.43 | 0.64 | 0.12 | 0.37 | 0.17 | 0.44 | 0.29 | 0.18 | 0.18 |