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A REVIEW

Pruning in peach

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Abstract : The temperate fruit trees need annual pruning when dormant *i.e.* before the bud break. The main objective in developing and perfecting a pruning method is to remove the non productive parts so as to divert the energy into those parts that are capable of bearing fruits. Performance of peach trees depends heavily on the proper pruning annually. The peach fruits are born on one year old wood which becomes barren afterwards and no flower bud differentiation or subsequent fruit formation takes place in this part of the branch. If the trees are not pruned annually, the volume of fruiting wood reduces each year and the fruiting shoot move higher and higher getting out of reach. The unpruned trees are oftenly subjected to over crowding between the trees in close planting, exhibiting reduction in productivity and fruit quality. Hence, proper pruning is quite instrumental in regulating the tree vigour, fruit quality and productivity potential in peach plants.

Key Words : Peach, Pruning, Heading back, Thinning out, Yield, Quality

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INTRODUCTION

The peach [*Prunus persica* (L.) Batsch] is one of the important stone fruit with wide range of climatic adaptations. Peach is the third most important temperate fruit cultivated in India. Presently, this crop is mainly cultivated in the states of Himachal Pradesh, Jammu and Kashmir and Uttarakhand. Pruning is an important horticultural operation to get higher yield of superior quality fruits. It prevents excessive fruiting, increases fruit size and facilitates light penetration into the interior of tree canopy, which improves fruit colouration (Mika, 1986). Pruning is an important cultural practice which affects tree growth, yield and fruit quality in peaches. The objective of pruning is to reduce the barren and unproductive parts having one or two buds and to facilitate the light penetration for excellent fruit quality and colour development. The stone fruit plants in general and peaches in particular are pruned in two ways *i.e.* heading back and thinning out. When only one-third to one-half terminal portions of the branches, having their basal portion intact are removed, it is heading back. The apical dominance of the twig is destroyed and the lateral buds are stimulated to grow. When the branches are considered undesirable, they are removed entirely from the base or point of attachment with the main trunk without leaving any stub, it is thinning out (Kaur, 2010). The pruning operation encourages the initiation of multiple shoots which bear flowers and fruits. The severity of pruning varies depending upon the vigour of the shoot. Several researchers have used the terms light, moderate and severe pruning by removing one quarter, half and three quarter length of a shoot, respectively (Shukla *et al*., 2007). The objective of the approach is efficient and judicious use of pruning to get maximum economic yield in peach. The relevant literature on the effect of pruning on peach has been reviewed under the following heads:

Tree growth :

The shoot extension, trunk growth, leaf emergence and leaf area are commonly used as the indices to evaluate the effect of different pruning severities on the growth characteristics. Song (1983) established a positive correlation between pruning severity and the vigour of shoots after dormant pruning of peach trees. He found that when 50 per cent of the one year old growth was removed in winter, the shoot vigour increased with the height and width of the crown

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at each shoot position. Awasthi and Singh (1990) observed a significant increase in the shoot growth of peach with heavy pruning. Hassan (1990) observed in 8 year old peach trees of cultivar Mit Ghamr that reducing the number of fruiting shoots, the tree growth was improved. Singh (1992) recorded maximum trunk girth in medium level of pruning than the light and heavy pruning. Light pruning also has been reported to increase the trunk girth as compared to severe pruning in different cultivars of peach (Thakur, 1993). Singh *et al*. (1997) reported in peach trees that the leaf size increased with the increasing severity of pruning. Zegbe and Rumayor (1998) found that in Clingstone peach trees, the highest vegetative growth rate was observed when trees were pruned to 50 per cent of the shoot length as compared to unpruned trees or the trees where 25 per cent of the shoot length was pruned. Deeb (1999) pruned 6, 10 and 14 buds per shoot of peach cultivar Earli Grande. He observed that the leaf area increased with the increasing pruning severity. Kaundal *et al*. (2002) reported in Pratap cultivar of peach that when the shoots were headed back to one half of the length and thinned out to 50 per cent, maximum increase in the trunk girth was recorded. Rathi *et al*. (2003) observed that the longest (43.54 cm) and thickest (0.51 cm) shoots were obtained under 60 per cent pruning as compared to 15, 30 and 45 per cent pruning severities in Tessia Samisto peach trees. The shortest (16.31 cm) and thinnest shoots (0.40cm) were recorded under the control treatments where, no pruning was performed. Bussi *et al*. (2005) applied three pruning intensities *viz.*, light, medium and severe on the Alexandra cultivar of peach and reported that increasing the severity of pruning tended to enhance the growth of young shoots. Myriam *et al*. (2005) also gave three pruning intensities on peach cv. Alexandra and found that high pruning levels where 60 shoots per tree were maintained, enhanced the shoot growth. Hassani and Rezaee (2007) conducted field studies on the peach cultivars, Anjiri and Mahalli. Three pruning intensities *viz.*, one half, one third and one fourth cutting back of the bearing shoots were applied on the trees, it was found that there was a significant increase in vegetative growth with the heavy pruning.

Flowering and fruit set :

The pruning delays the process of flower bud differentiation and flowers open later in the spring. Vigorously growing shoots of pruned trees are overloaded with growth promoting hormones *viz.*, auxins and gibberellins that prevent fruit bud formation (Gryochowska *et al*., 1984). Similarily, Rom and Ferree (1984) also reported that the pruning intensities reduced flower bud number as to compared no pruning. Mika (1986) observed that pruning retarded fruit bud formation and decreased the fruit buds by disrupting natural growth and promoting shoot growth. Singh and Daulta (1986) also found that 4 and 8 bud pruning reduced the per cent fruit set over 12 bud pruning and no pruning treatments in Sharbati peach trees. Thakur (1993) reported that maximum fruit set was observed by retaining 120 fruiting shoots per tree than 100, 80, 60 and 40 fruiting shoots per tree in July Elberta peach. Singh *et al*. (1997) observed that heavy pruning reduced the fruit set. Deeb (1999) reported in Earli Grande peach trees that the number of fruits per shoot decreased with the increasing pruning severity, whereas fruit set, fruit retention and fruiting were not affected by pruning. He found that light pruning (14 buds/shoot) enhanced the fruiting. Kaundal *et al*. (2002) observed that heavy pruning resulted in minimum number of days for full bloom emergence. They reported 27.2 days for full bloom emergence with heavy pruning *i.e.* 50% TO + ½ HB while, the maximum days (35.1) were taken for full bloom emergence with the corrective pruning where, little pruning intensity was given to the trees of peach cv. Pratap. Rathi *et al*. (2003) observed that the highest fruit set was obtained from the unpruned trees and the lowest fruit set was obtained by 60 per cent heading back of the previous year wood in Tessia Samisto peach trees. Kumar *et al*. (2005) reported in Sharbati, Flordasun and Prabhat cvs. of peach that among the three pruning intensities *viz.*, light, medium and severe; light pruning induced early flowering and also increased the number of flowers as compared to other pruning treatments.

Fruit yield :

Pruning stimulates the growth of young trees, prolongs the vegetative phase and delays reproductive process. As a consequence, cropping is delayed and depressed, mainly as a result of inhibition of fruit bud formation. Lemus and Valenzuela (1986) found that except for the first harvest, yield was higher in Independence and Fantasia cultivars of nectarine which were subjected to mild pruning *i.e.* removal of $^{1}/_{3}$ of the previous season growth as compared to severe pruning *i.e.* $^{2}/_{3}$ removal of the previous season's growth. Badiyala and Awasthi (1989) reported yield reduction with the increase in severity of pruning. Fideghelli *et al*. (1989) reported in peach and nectarine trees that the unpruned trees produced more fruits than the pruned trees. However, Hassan (1990) reported highest yield in peach cultivar Mit Ghamr trees when they were pruned to leave 200 fruiting shoots as compared to those trees where 300 and 100 fruiting shoots were kept. Chitkara *et al*. (1991) demonstrated in Flordasun peach that the trees where ¼ length of one year old shoots were removed, recorded highest yields than those where removal of $^{1}/_{3}$ and ½ of the shoots was done. Prakash and Nautiyal (1994) reported that the average fruit yield was inversely related to the dormant pruning intensity and was significantly affected by severe pruning followed by moderate pruning. Kappel and Bouthillier (1995) subjected Fairheaven peach trees to two different dormant pruning *viz.*, short dormant pruning where weak shoots were removed and all one year old wood was headed by $^{1}/_{3}$ to ½ and the long dormant pruning where, weak and

more vigorous branches were removed. It was found that the long dormant pruning increased yield as compared to short dormant pruning. Miller and Byers (2002) reported in peach cv. Balke that the yield and return were lowest in trees which were left unpruned or were severely pruned than the light and heavily pruned trees. Sharma *et al*. (2001) recorded that heading back one year old fruit bearing shoot to 75 per cent gave the highest three layer grade fruits whereas, heading back to 25 per cent gave the lowest grade fruits in July Elberta peach. Vitaglianoet *al.* (2001) also reported increased yield of unpruned plants than the pruned peach trees. Mahajan and Dhillon (2002) reported that the unpruned trees of Shan-i-Punjab peach produced the highest yield than the trees where 25, 50 and 75 per cent of the previous year wood was headed back. Radivojevic *et al*. (2002) also observed highest yield in lightly pruned than the severely pruned trees in Redhaven and Suncrest cultivars of peach. Singh and Chauhan (2002) applied three pruning intensities in July Elberta peach trees *viz.*, light pruning by shortening one year old shoots by $^1/_3$, moderate pruning by shortening ½ the shoots ; heavy pruning by heading back the shoot to ¾ and in each treatment, 45-50 per cent of thinning was done. They observed that severe pruning and thinning of fruit shoots decreased the fruit yield in Elberta cultivar of peach. Sharma and Chauhan (2004) recorded the highest fruit yield in lightly pruned trees where 25 per cent of current season's growth was removed than the moderate and severely pruned trees where 50 and 75 per cent of the current season growth were removed, respectively. Hua *et al*. (2006) also found in peach trees that high yields were obtained with light pruning as compared to severe pruning. Robinson *et al*. (2006) reported in peach that the yield per tree was largely affected by the severity of pruning and the yield was greatest in the least pruned trees.

Fruit quality :

Various physico-chemical characteristics of the fruit like surface colour, size, weight, TSS, acidity, total sugars content, sugar acid ratio and pulp stone ratio of the fruits have been used by various researchers as the fruit quality attributes in peaches/nectarines. Kaundal *et al*. (2002) reported that the fruit size, TSS acid ratio and total sugar were enhanced with the increasing pruning severity in Pratap peach trees. Mahajan and Dhillon (2002) observed on 6 year old Shan-i-Punjab peach trees that the pruning at 75 per cent produced the highest TSS whereas, the highest acid content was noticed in unpruned plants. They also observed that the pulp weight was maximum in case of 75 per cent pruning, which was statistically at par with 50 per cent pruning. The stone weight remained unaltered as a result of different pruning intensities. Hence, the pulp stone ratio increased by increasing the pruning severity. Singh and Chauhan (2002) in their experiment on peach cultivar July Elberta found that with various pruning levels *viz.*, light, medium and heavy with shortening one year old shoot by $^1/_3$, ½ and ¾ the fruit weight, fruit size and TSS increased with increasing pruning severity. On the contrary, Miller and Byers (2002) did not report any difference in fruit size among the unpruned, light pruned, heavy and severely pruned peach trees. Sharma and Chauhan (2004) further reported that heavy pruning where cutting back the annual shoots to 75 per cent of their original length was done in July Elberta peach produced higher TSS, acidity and total sugars as compared to pruning treatment where cutting back of annual shoots to 25 and 50 per cent was done. Bussi *et al.* (2005) found that increasing the severity of pruning in peach cultivar Alexandra stimulated the average fruit weight and fruit diameter. On the contrary, Kumar*et al*.(2005) observed that medium pruning, resulted in significantly better fruit size than the severe pruning but was at par with the light pruning in various cultivars of peach. Myriam *et al*. (2005) observed that the severe pruning promoted heavier fruit production with increased diameter. Qing *et al.* (2006) found in 6 year old peach trees that all the largest fruits were born on the branches with a length of 35-60 cm as compared to those where length was less than 15 cm and where length was longer than 60 cm. They also reported in Kyolea cultivar of peach that the fruit soluble solids content of 15 cm branch was slightly higher than that of branches with 35-60 cm and more than 60 cm in length. Hassani and Rezaee (2007) also obtained heavier fruits from heavily pruned trees *i.e.* ½ heading back of bearing shoots than the medium ($^1/_3$ heading back) and lightly pruned (¼ heading back) in Anjiri and Mahalli peach trees. They also observed increase in fruit TSS with the increase in the pruning severity. Mercier *et al.* (2008) reported in peach cultivar Nectross that manual pruning tended to enhance peach taste quality measured as increased total soluble solids.

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