IMPACT OF PRUNING FALSA ON THE GROWTH AND ECONOMIC RETURNS UNDER RAIN FED CONDITIONS OF DERA ISMAIL KHAN

BY

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ABSTRACT

Five pruning treatments i.e. 50, 100, 150 cm and ground level including control were studied in local cultivar of falsa under the rain fed conditions of Dera Ismail Khan to determine the best pruning level for growth and yield potential. Pruning at the level of 100 cm above the ground produced the maximum fruit yield plant$^{-1}$ (4.04 kg) and appeared with increased growth parameters like (122.2) shoots plant$^{-1}$, (165.5 cm) shoot length, (41.9) number of leaves shoot$^{-1}$, (94.4) number of fruit clusters plant$^{-1}$, (64.8) number of fruits cluster$^{-1}$, (47.4 gm) weight of clusters plant$^{-1}$ among the treatments. The same treatment gave the maximum gross income of Rs. 67827.8 as well as highest net returns of Rs. 50870.8 per acre. While the minimum in all the above-mentioned parameters were found in control (un-pruned) treatment.

KEYWORDS: Falsa (Grewia asiatica L.); Pruning, Growth, Economic Returns, Rain fed

INTRODUCTION

Falsa (Grewia asiatica L.) belongs to the family Tiliaceae and is of commercial importance. It is an exotic plant considered horticulturally as a small fruit crop but also used as a folk medicine. It is native to the Indo-Pak subcontinent and Southeast Asia (Hays 1953; Chundawat and Singh 1980). Falsa is a deciduous bushy plant and thrives best in the tropical climate. Hot dry summers are considered typical for ripening of fruits. It is grown on a very limited scale, mostly in the vicinity of towns. However, it has considerable prospects for making falsa juice and syrup which are highly esteemed as a refreshing and cooling drink. The ripe falsa fruits are consumed fresh, in desserts, or processed into refreshing fruit and soft drinks (Salunkhe and Desai 1984). Its juice has an attractive light purple colour and has a pleasing flavour and is relished much during the summer season. Falsa is also a good source of vitamin A & C (Yadav. 1999). The fruit is astringent and stomachic. Morton (1987) reported that when unripe, falsa fruit alleviates inflammation and is administered in respiratory, cardiac, and blood disorders, as well as in fever reduction. Furthermore, an infusion of the bark is given as a demulcent, febrifuge, and treatment for diarrhea. The root bark is employed in treating rheumatism. The leaves are applied on skin eruptions and they are known to have antibiotic action. The fresh leaves are valued as animal fodder. The bark is used as a soap substitute in Burma. A mucilaginous extract of the bark is useful in clarifying sugar. Fiber extracted from the bark is made into rope. The wood is yellowish-white, fine-grained, strong, and flexible. It is used for archers' bows, spear handles, shingles, and poles for carrying loads on the shoulders. Stems that are pruned serve as garden poles and for basket-making. The flowers have been found to contain grewinol, a long chain keto-alcohol, tetratricontane 22-ol 13-one (Lakshmi and Chauhan 1976). The falsa seeds produce approximately 5% yield of a bright yellow oil that contains 8% palmitic acid, 11% stearic acid, 13.5% oleic acid, and 64.5% linoleic acid with 3% unsaponifiable (Morton 1987).

Falsa is commonly grown in Dera Ismail Khan Division where the climatic conditions are favorable for its production. However, the productivity and quality of this fruit plant is low. Of many factors pruning is one of the most important factor responsible for the decline in the yield and quality of falsa.
Ahmad and Ghafoor (1962) stated that pruning is considered to be the most suitable and cheapest practice in order to give the plant a regular frame work, yield and quality of the falsa fruit. In pruned trees, the size and colour of the fruit is also improved due to more exposure to light. Annual pruning encourages new vigorous shoots and ensures regular and heavy fruiting. Ghafoor et al. (2001) found that the yield parameters increased with maximum fruit yield plant$^{-1}$ in the pruning level of 90 cm above the ground level. Ali et al. (2001) reported maximum number of fruit clusters plant$^{-1}$ and also highest fruit yield plant$^{-1}$ in the pruning level of 100-125 cm. Ginali (1969) reported that pruning of falsa at a height of 3.5 to 4 feet is considered the best which produces a greater number of shoots and a much higher yield than pruning at 1.5 to 2 feet or at just ground level. Stino and Barkat (1979) reported that fruit size and fruit weight were much greater in pruned trees than un-pruned peach trees. Singh (1980) recommended the cutting of the plant at a height of about 0.5 to 1 meter from the ground level. Shanker (1985) proposed the desirable height for pruning as 0.9 to 1.2 meters from the soil surface. Wazir (1980) reported that pruning Falsa 91.44 cm above the ground level produced higher yield than Control and the pruning at 30.48 cm above the ground level. Similarly, Ghafoor and Rahman (1987) obtained better response in terms of vigour, yield, fruit size and quality of Falsa from pruning bushes at 90 cm above the ground level. Keeping in view the importance of pruning in falsa, the present study was carried out to evaluate the influence of different pruning levels on the growth and economic returns of falsa and to optimize the pruning level for obtaining maximum fruit yield under the rain fed conditions of D. I. Khan.

MATERIALS AND METHODS

The experiment was carried out on eight years old falsa trees at the Research Orchard of Agricultural Research Institute D.I. Khan during 2006. The monthly mean temperature and precipitation was recorded during the studies as shown in (Table 1). Five plants of similar size and vigour were included in each treatment. The distance between falsa trees was 15 feet and rows were spaced 12 feet apart. The treatments consisted of different levels of pruning above the ground viz. control, 50 cm, 100 cm, 150 cm and at ground level. The experiment was laid out in randomized Complete Block Design (RCBD) with three replications. Pruning was done in the last week of January before sprouting of buds. The data were recorded on number of shoots, length of shoots (cm), number of leaves shoot$^{-1}$, number of clusters plant$^{-1}$, number of fruits cluster$^{-1}$, weight of cluster plant$^{-1}$ (gm) and yield plant$^{-1}$ (kg). The picking cost of labour charges based on $\frac{1}{4}$ produce per kilogram given to the picker and subtracted from the gross income to obtain the net income value per tree and multiplying with 242 number of trees accommodated per acre to have the net income on acreage basis. Data were analyzed using the analysis of variance (ANOVA) procedure and LSD ($p < 0.05$) values were calculated after (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Number of Branches Plant$^{-1}$

Number of branches per plant was significantly more (122.2) in trees pruned at 100 cm above ground followed by 50 cm pruning level producing (116.0) branches per plant (Table 2). But significantly the lowest branches (87.0 plant$^{-1}$) were recorded in control (un-pruned) treatment. These results are almost in line with the findings of Ginali (1969).

Branch length (cm)

Significant differences were observed with pruning at different levels. Pruning at 100 cm level produced the longest branches (165.5 cm) followed by control with the branch length of 153.0 cm as shown in (Table 2) while minimum branch length (123.1 cm ) was observed in 150 cm pruned trees.

Number of Leaves Branch$^{-1}$

The data concerning number of leaves per branch elaborates that the maximum (41.9) number of leaves per branch were recorded in the pruning at 100 cm above the ground level. It was followed by (34.5) leaves per branch at 50 cm pruning level. While the minimum of 29.3 and 26.6 number leaves per branch were obtained with 150 cm and control (un-pruned) treated trees, respectively. Shanker (1985) also reported the similar results.

Number of Fruit Clusters Plant$^{-1}$

Different pruning levels significantly affected the number of fruit clusters per plant (Table, 2) with maximum fruit clusters (94.4) recorded in 100 cm pruning which showed its significance over other pruning levels. Minimum number of fruit cluster (26.0) was recorded in un-pruned trees. Myer (1983) and Ali et al. (2001) also reported that 100 cm pruned trees produced more number of fruit clusters than un-pruned.
**Number of Fruit Cluster**
Pruning levels significantly affected the number of fruit per cluster per plant (Table 2). Maximum number of fruits was counted as 64.8 per cluster at 100 cm pruning level, whereas, the minimum of 9.0 fruits per cluster were recorded in un-pruned trees. These results are in conformity with the results obtained by Myer and Ferree (1983) who also observed that pruned trees produced more number of fruits than un-pruned trees in apples.

**Weight of Cluster Plant**
Pruning intensities significantly affected the weight of clusters (Table 2). Weight of cluster (47.4 gm) produced by 100 cm pruning level was the best, whereas, minimum weight of 05.93 gm was recorded in un-pruned trees. This may be due to the vigourosity of fruit. These results are in agreement with those the findings of Stino and Barket (1979) and Kolev et al. (1980) who found same results.

**Yield (kg) per plant**
The results regarding the yield of fruit plant revealed significant among the treatments (Table 2). Pruning at 100 cm from the ground level gave highest fruit yield i.e. 4.04 kg plant$^{-1}$, followed by 0.99 kg plant$^{-1}$ with 50 cm pruning level, whereas, the lowest yield of 0.15 kg plant$^{-1}$ was observed in the un-pruned trees. Rao and Reddy (1990) and Ghafoor et al. (2001) reported that at a certain pruning level i.e. 90 to 100 cm the yield of falsa per plant was highest as compared to the other levels of pruning including un-pruned trees.

**Gross Income acre$^{-1}$**
Falsa produced the maximum gross income of Rs. 67827.8 per acre at 100 cm pruning level followed by treatment where only 50 cm above ground pruning was done appeared with a gross income of Rs. 16770.6. The lowest gross income of Rs. 2541.0 per acre was obtained from control treatment amongst all the pruning treatments (Table 3).

**Net Returns acre$^{-1}$**
Similarly, the highest net returns of Rs. 50870.8 was produced from treatment pruned at 100 cm level followed by 50 cm pruning level with a net value of Rs. 12569.5. Net value in the control treatments was minimum i.e. Rs. 1897.3 per acre among the treatments (Table 3).

**CONCLUSION**
Pruning of falsa trees at 100 cm above the ground is the optimum level for obtaining maximum growth, production and economic returns of falsa under the rainfed conditions of Dera Ismail Khan.

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**Table-1:** Mean monthly temperature ($^\circ$C) and monthly precipitation during 2006

<table>
<thead>
<tr>
<th>Month</th>
<th>Temperature $^\circ$C</th>
<th>Precipitation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum</td>
<td>Minimum</td>
</tr>
<tr>
<td>January</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>February</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>March</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>April</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>May</td>
<td>42</td>
<td>25</td>
</tr>
<tr>
<td>June</td>
<td>41</td>
<td>25</td>
</tr>
<tr>
<td>July</td>
<td>41</td>
<td>28</td>
</tr>
<tr>
<td>August</td>
<td>38</td>
<td>27</td>
</tr>
</tbody>
</table>

*Source: Arid Zone Research Institute Dera Ismail Khan*
Table-2: Effect of different pruning levels on the growth and production of falsa

<table>
<thead>
<tr>
<th>Pruning levels</th>
<th>Number of branches plant$^{-1}$</th>
<th>Length of branch (cm)</th>
<th>Number of leaves branch$^{-1}$</th>
<th>Number of fruit clusters plant$^{-1}$</th>
<th>Number of fruits cluster$^{-1}$</th>
<th>Weight of clusters plant$^{-1}$ (gm)</th>
<th>Yield plant$^{-1}$ (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>87.0 E</td>
<td>153.0 B</td>
<td>26.6 C</td>
<td>26.0 D</td>
<td>09.0 E</td>
<td>05.9 E</td>
<td>0.15 D</td>
</tr>
<tr>
<td>50 cm</td>
<td>116.0 B</td>
<td>143.7 C</td>
<td>34.5 B</td>
<td>38.7 B</td>
<td>37.8 B</td>
<td>24.9 D</td>
<td>0.99 B</td>
</tr>
<tr>
<td>100 cm</td>
<td>122.2 A</td>
<td>165.5 A</td>
<td>41.9 A</td>
<td>94.4 A</td>
<td>64.8 A</td>
<td>47.4 A</td>
<td>4.04 A</td>
</tr>
<tr>
<td>150 cm</td>
<td>97.0 D</td>
<td>123.1 D</td>
<td>29.3 C</td>
<td>28.3 D</td>
<td>15.0 D</td>
<td>10.5 D</td>
<td>0.40 CD</td>
</tr>
<tr>
<td>Ground level</td>
<td>103.1 C</td>
<td>147.3 C</td>
<td>34.3 B</td>
<td>33.1 C</td>
<td>30.0 C</td>
<td>19.9 C</td>
<td>0.58 C</td>
</tr>
<tr>
<td>LSD &lt; 0.05</td>
<td>2.91</td>
<td>4.39</td>
<td>3.45</td>
<td>4.02</td>
<td>3.59</td>
<td>2.16</td>
<td>0.34</td>
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</tbody>
</table>

Means followed by similar letters are non-significant at $P < 0.05$

Table-3: Effect of different pruning levels on gross and net returns generated from sale of falsa produce

<table>
<thead>
<tr>
<th>Pruning levels</th>
<th>Values (Rs/acre)</th>
<th>Gross income</th>
<th>Picking cost</th>
<th>Net returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2541.0</td>
<td>643.7</td>
<td>1897.3</td>
<td></td>
</tr>
<tr>
<td>50 cm</td>
<td>16770.6</td>
<td>4201.1</td>
<td>12569.5</td>
<td></td>
</tr>
<tr>
<td>100 cm</td>
<td>67827.8</td>
<td>16956.9</td>
<td>50870.8</td>
<td></td>
</tr>
<tr>
<td>150 cm</td>
<td>6776.0</td>
<td>1694.0</td>
<td>5082.0</td>
<td></td>
</tr>
<tr>
<td>Ground level</td>
<td>9825.2</td>
<td>2456.3</td>
<td>7368.9</td>
<td></td>
</tr>
</tbody>
</table>

1. Total trees 242 Acre$^{-1}$
2. Price of falsa fruit @ Rs. 70/- per kilogram
3. Labour picking cost based on ¼ yield kg$^{-1}$ given to the picker
REFERENCES


