

Effect of Time and Intensity of Pruning on Vegetative Growth, Fruit Yield and Quality of Phalsa

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Abstract: Phalsa (*Grewia subinaequalis*) is one of the few fruit crops of semi-arid region, which can successfully be grown in hostile climatic condition of arid region with limited supplemental irrigations. Pruning is essential for fruit bearing. Thus, exact time and severity of pruning needs to be standardized under arid conditions. The plants were pruned on three dates viz., 21st December, 31st December and 10th January at three levels, i.e. 80 cm, 100 cm and 120 cm height from ground level. Pruning time and intensity had significant effect on plant height, number of branches, number of nodes per branch, number of effective nodes, acidity of fruits and fruit yield. Maximum fruit yield (1867 g plant⁻¹) was obtained by pruning the bushes at 120 cm from ground level on 31st December, which was significantly higher from rest of treatment combinations of pruning time and intensity. Based on the results of the study, it could be concluded that pruning in phalsa should be done on 31st December at 120 cm height from ground level under the agroclimatic conditions of north-western Rajasthan.

Key words: Phalsa, *Grewia subinaequalis*, pruning intensity, total soluble solids acidity.

Phalsa (*Grewia subinaequalis*) is a minor under-exploited fruit crop with an ability to grow fast and withstand drought. Once established, it requires only few supplementary irrigations for fruit production. Pruning is an essential cultural operation since flowers are borne as axillary cyme on new growth, which is induced by pruning. The presence of mature leaves inhibit axillary bud sprouting in unpruned shoots. The flowering and fruiting is confined to 15-20 nodes from the base depending on vigor. In general under north Indian condition, it is pruned when it sheds off leaves during middle of winter (Singh, 1979). Hayes (1957) suggested late December or early January as the best time of phalsa pruning. Now a days, phalsa cultivation is gaining popularity in arid

regions due to high returns, on the other side the exact time and intensity of pruning has not been well standardized. Therefore studies were carried out to see the effect of time and intensity of pruning on vegetative growth, fruit yield and quality of phalsa.

Materials and Methods

Field experiment was conducted on 5-year-old plantation of phalsa variety Agra Local during the year 2002-03 at Horticulture Farm, CAZRI, Jodhpur. The treatments comprised of three levels of pruning, i.e. 80 cm, 100 cm and 120 cm from ground level with three dates of pruning viz., 21st December, 31st December and 10th January. The experiment was laid out in RBD with three replications each

having three bushes. The fruits were harvested in three pickings starting from last week of April to 2nd week of May at weekly intervals. The total soluble solids were determined using hand refractometer calibrated at 20°C, while titratable acidity was determined as per AOAC (1990). The data were analyzed statistically.

Results and Discussion

Effect of pruning on growth parameters

All the growth parameters except branch length were significantly influenced by pruning (Table 1). The plant height was maximum (253.6 cm) when pruned on 31st December at 120 cm from ground level while it was least when pruned on 21st December. The number of branches per pruned shoot was also highest when pruned on 31st December at 120 cm height, though; it was at par with 120 cm pruning done on 21st December. Similarly, number of nodes, effective nodes per branch (Number of nodes bearing fruit), per cent effective nodes and number of nodes per branch were also influenced by different combinations of dates and intensity of pruning. Hayes (1957) suggested late December or early January as the best time of pruning in phalsa. As per meteorological records, last week of December to second week of January is the peak winter period under north-western parts of Rajasthan. At this point of time, the plant is in complete rest and automatically sheds off leaves and as a principle, pruning is advisable at this time. Singh (1967) also suggested December-January pruning in north India. As regards pruning severity, less severe pruning is considered more beneficial under arid zone conditions. Singh and Sharma (1961) reported delayed

sprouting and flowering with increased severity of pruning. Singh (1967) recorded greater number of vigorous shoots in phalsa bushes pruned to a height of 75-120 cm than those 40-60 cm.

Fruit yield

Fruit yield is influenced by number of growth parameters such as plant height, number of nodes per branch effective nodes etc. (Table 2). Irrespective of intensity of pruning, maximum fruit yield (1679 g bush⁻¹) was recorded by pruning on 31st December and it was significantly higher than the fruit yield recorded in other two dates of pruning (Table 2). Similarly, irrespective of pruning time, significantly higher fruit yield (1490 g bush⁻¹) was recorded by pruning the bushes at 120 cm from ground level. This is in accordance with earlier findings of Singh and Sharma (1961) who also obtained maximum fruit yield from lightly pruned bushes at 120-135 cm from ground level. The interaction between pruning time and intensity of pruning was highly significant with highest fruit yield (1867 g bush⁻¹) in plants pruned at 120 cm from ground level on 31st December. However, Singh (1979) reported good yield by pruning to a height of 100 cm from ground level and lower yield from the more or less severely pruned bushes. The highest fruit yield recorded by light pruning (120 cm) may be attributed to higher number of new shoots with greater number of effective nodes. Similar observations were recorded under Bangalore conditions (Anonymous, 1988).

Fruit quality

The total soluble solids ranged from 25.33 to 30.66% in different treatment

Table 1. Effect of time and intensity of pruning on vegetative growth, fruit yield and quality of fruits in phalsa

| Pruning time/intensity | Plant height (cm) | No. of branches pruned shoot ⁻¹ | Mean branch length (cm) | Total No. of nodes/branch ⁻¹ | Effective nodes branch ⁻¹ | Per cent effective nodes branch ⁻¹ | No. of fruits branch ⁻¹ | TSS (%) | Acidity (%) | Fruit yield g bush ⁻¹ |
|------------------------|-------------------|--|-------------------------|---|--------------------------------------|---|------------------------------------|---------|-------------|----------------------------------|
| Dec. 21/80 cm | 191.66 | 21.33 | 90.66 | 20.00 | 10.73 | 54.10 | 73.48 | 28.66 | 1.67 | 740 |
| Dec. 21/100 cm | 233.33 | 25.00 | 98.33 | 21.06 | 10.60 | 50.44 | 77.80 | 25.33 | 1.86 | 1293 |
| Dec. 21/120 cm | 221.66 | 29.66 | 86.66 | 19.26 | 11.66 | 60.50 | 84.50 | 26.33 | 1.89 | 1633 |
| Dec. 31/80 cm | 211.66 | 22.66 | 90.10 | 21.06 | 11.53 | 54.76 | 100.53 | 26.33 | 1.54 | 1636 |
| Dec. 31/100 cm | 216.66 | 24.66 | 95.29 | 19.86 | 11.06 | 54.70 | 105.48 | 28.33 | 1.58 | 1536 |
| Dec. 31/120 cm | 253.33 | 29.66 | 88.33 | 22.00 | 11.93 | 54.27 | 146.08 | 26.00 | 1.22 | 1867 |
| Jan. 10/80 cm | 208.33 | 15.00 | 94.66 | 18.73 | 10.73 | 57.31 | 80.33 | 29.00 | 1.99 | 1048 |
| Jan. 10/100 cm | 221.66 | 17.00 | 79.66 | 17.86 | 9.90 | 55.42 | 88.56 | 30.00 | 1.69 | 1163 |
| Jan. 10/100 cm | 206.66 | 18.00 | 88.58 | 19.60 | 9.53 | 48.80 | 79.70 | 30.66 | 1.38 | 970 |
| LSD (P = 0.05) | 14.63 | 4.20 | NS | 1.59 | 0.91 | 4.36 | 4.11 | NS | 0.36 | 185 |

Table 2. Effect of time and intensity of pruning on fruit yield (g bush⁻¹) of phalsa

| Pruning time | Pruning intensity | | | Mean |
|--------------|-------------------|--------|--------|------|
| | 80 cm | 100 cm | 120 cm | |
| 21 December | 740 | 1293 | 1633 | 1222 |
| 31 December | 1636 | 1536 | 1867 | 1679 |
| 10 January | 1048 | 1163 | 970 | 1060 |
| Mean | 1141 | 1330 | 1490 | 1320 |

LSD (P = 0.05), Pruning intensity: 106, Pruning time: 106, Interaction: 182.

combinations (Table 1) but the differences were statistically non significant. The acidity in the fruits was lowest (1.22%) in best treatment combination, i.e. pruning at 120 cm height from ground level on 31st December and it was significantly lower than most other levels of dates and intensity of pruning. Somewhat similar trends have been reported by Singh and Singh (2003) who obtained non-significant variation in TSS and acidity of fruit by different levels of pruning and nitrogen doses.

It can be inferred that to maximize fruit yield in phalsa, pruning should be done at 120 cm height from ground level on 31st December.

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