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Short communication

Effect of shoot Pruning on Yield and fruit quality of Jamun cv. Goma Priyanka

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Jamun (*Syzygium cuminii* Skeels) is one of the important fruit crops belonging to the family Myrtaceae. It is indigenous to India, Burma and to the Andman Islands (Zeven and de Wet, 1982) and available throughout Indian plains as well as in Kumaon hill up to 1,600 m (Mishra *et al.*, 2015). Fruits are used as an effective medicine against diabetes, heart and liver trouble. Owing to its varied uses, it has now emerged as a potential fruit crop of country (Singh *et al.*, 2016). In Gujarat, it is grown commercially in Vadodara, Anand, Navsari, Kheda and Junagarh districts. Most of the plantations of jamun in these areas are established through planting of seedling types. However, now farmers are showing much interest in the plantation of grafted planting material of Goma Priyanka developed by the station. Jamun trees whether seedlings or grafted grow erect and reaches to a height of 25-30 m due to which harvesting and other management practices become difficult. In the absence of proper canopy management practices orchards become overcrowded which pose problem for orchard access and for adequate light interception needed for optimum photosynthesis, flowering, fruit set and quality (Mishra and Goswami, 2016). Pruning has been used as a tool to regulate tree size and shape to achieve a desired architecture of the canopy and also to reduce the foliage density by removing the unproductive branches of the tree. To maintain the dwarf framework of the jamun tree, toping of main stem (4–6 meters) is needed which also facilitates easy harvesting of the fruits. It is also observed that pruning of 50 % annual extension growth after harvesting was effective to reduce the plant canopy and to improve the fruit quality attributes (Singh et al., 2011). Pruning is a practice which performed in a manner to provide the plant such a shape and size so that its marketable yield can be enhanced. There was an increase in marketable yield in Konkan Bahdoli jamun trees when subjected to different pruning intensities (Lawande *et al.*, 2014). The fruit bearing branches in jamun are present on the periphery of canopy throughout its height. Also all fruits on a tree do not mature at once. Therefore, at least 3-4 pickings are required for harvesting of fully ripened firm fruits from a tree. The jamun fruits are also delicate and have very thin peel; therefore, fruits are to be essentially harvested by hand picking. For this, it is necessary to climb up the jamun tree. Thus, harvesting in jumun becomes tedious and 25 to 30 % fruits are spoiled due to mechanical damage during harvesting. The jamun being a non-climacteric fruit, fully ripened fruits essentially has to be plucked for getting desirable fruit quality. As hand picking is the only way to harvest fruits, managing tree canopy at suitable height is the only lasting option to have clean harvest of ripe fruits in economical manner. Pruning in jamun has not been considered as a regular practice to contain the tree canopy so far. In view of this, different intensities of pruning were imposed on mature bearing tree of jamun cv. Goma Priyanka to see its effect on fruit yield and quality.

Uniformly grown, 8 years old grafted plants of jamun cv. Goma Priyanka spaced at 5x5 m were selected at CHES, Godhra experimental farm and all the trees were maintained under uniform cultural practices. The soil is medium black and the climate is semi-arid with a rainfall of 700-800 mm annually. Selected jamun trees were of average 6.15 m height with an average spread of 5 m. The experiment was conducted in Randomized Block Design with four treatments viz. T1 - 25 % shoot pruning, T2 - 50 % shoot pruning, T3- 75 % shoot pruning of annual extension of growth and T4 - control (no pruning). All treatments were replicated four times with a unit of two trees per treatments per replication. Each respective treatment was pruned by the heading back in month of September. The observations on flowering, fruit yield (kg/tree) and physico-chemical characters were recorded using standard procedures. From each treatment, twenty five fruits were randomly selected from all the directions for recording the data and brought to the laboratory of Central Horticultural Experiment Station, Vejalpur, Panchmahal (Godhra), Gujarat. TSS of fruits was measured with the help of hand refractrometer while titratable acidity, ascorbic acid, protein, anthocyanin and sugar contents were determined by AOAC (1990) methods. The data were statistically analyzed as per method of Gomez and Gomez (1984).

Different levels of pruning recorded significant variation in per cent of flowering shoots and other yield attributing characters except fruit retention percentage. The maximum percentage of flowering shoots (70.33 %), panicle length (13.97 cm), number of flower/panicle (46.25), pollen viability (93.80 %), pollen germination (37.29 %), fruit set (45.74 %), fruit length (3.84 cm), fruit

width (2.96 cm) and fruit weight (20.50 g) with 25 % shoot pruning. It was followed by 50 % shoot pruning in which 60.17 % shoots flowered with 13.12 cm panicle length, 43.91 flowers/panicle, 92.27 % pollen viability, 36.01 % pollen germination, 42.27 % fruit set, 3.80 cm fruit length, 2.90 cm width and 20.25 g weight (Table 1). Whereas in case of pulp percentage, the maximum value was recorded with 50 % shoot pruning (88.50 %) non-significantly followed by 25 % shoot pruning (88.0 %) and the minimum pulp content (84.20 %) was observed with control (Table 2). In control, 42.12 per cent shoots recorded flowering with the minimum panicle length (12.43 cm), number of flowers/panicle (35.70), pollen viability (88.57 %), pollen germination (34.05 %), fruit set (38.23 %), length (3.69 cm), width (2.73 cm) and weight (18.06 g). This increment in yield attributing characters at 25 % level of pruning might have been resulted in the stimulation of optimum vegetative and floral growth at this intensity, which might have brought a balance between fruiting wood and leaf area. Earlier workers also recorded higher flowering and yield attributing characters in citrus (Goswami *et al.*, 1993), litchi (Mishra *et al.*, 2013) and jamun (Lawande *et al.*, 2014) through imposition of various levels of pruning. Also, Serrano et al. (2008) reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma.

The fruit yield was reduced with the increase in intensity of pruning, however, all the levels of pruning recorded significantly higher yield than the control tree (Table 2). This may be attributed to the reduction in concentration of vital substances from severely pruned shoots. The maximum fruit yield was obtained in the trees with 25 % level of pruning (42.70 kg/tree) followed by 50 % level of pruning (38.33 kg/tree). The non-pruned trees produced significantly lower yield (25.05 kg/tree), however, it was found at par with 75 % level of pruning (27.02 kg/tree). Mistry and Patel (2009) also found beneficial effect of heading back on earliness and yield in mango cv. Alphonso. This finding is also in agreement with the reports of Lawande *et al.* (2014) and Singh *et al.* (2011) for getting higher yield in jamun.

Fruit chemical quality characters were also significantly affected by various levels of shoot pruning (Table 2). In respect to chemical parameters of fruit quality, significant improvements have been observed in TSS (18.20^0 Brix), TSS/acidity ratio (49.18), pulp protein (0.70 g/100) and anthocyanin content (1.90) with 25 % shoot pruning. However, the maximum total sugar (14.0 %), reducing sugar (7.12 %) and vitamin C (51.40 mg/100 g pulp) were recorded with 50 % pruning of annual extension growth. The minimum values for these chemical quality parameters were recorded in control. Improvement in fruit quality parameters may be due to the improved light penetration inside the canopy and assimilation of more photosynthates. These results are in agreement with Mishra et al. (2013) in litchi and Mistry and Patel (2009) in mango. In conclusion, 25 % shoot pruning may be adopted to increase yield with improved fruit weight and quality in jamun.

Table 1: Effect of shoot pruning on yield atributing characters of jamun cv. Goma Priyanka

Treatments	Flowering shoot (%)	Panicle length (cm)	No. of flower panicle^{-1}	Pollen viability (%)	Pollen germination (%)	Fruit set (%)	Fruit retention (%)	Fruit Length (cm)	Fruit width (cm)	Fruit weight (g)
25 %	70.33	13.97	46.25	93.80	37.29	45.74	30.01	3.84	2.96	20.50
50 %	60.17	13.12	43.91	92.27	36.01	42.27	28.48	3.80	2.90	20.25
75 %	45.66	12.65	42.48	90.33	35.45	39.98	27.33	3.77	2.84	18.23
Control	42.01	12.43	35.70	88.57	34.05	38.23	27.02	3.69	2.73	18.06
CD (P= 0.05)	6.12	0.33	4.28	1.22	0.62	4.14	NS	0.04	0.07	0.64

Table 2: Effect of shoot pruning on fruit yield and quality attributes of jamun cv. Goma Priyanka

Treatments	Yield tree^{-1} (kg)	Pulp (%)	TSS ^{0}Brix	Acidity (%)	TSS:acidity	Total sugar (%)	Reducing sugar (%)	Vitamin C (mg/100g)	Protein (g/100 g pulp)	Anthocyanin (OD)
25 %	42.70	88.00	18.20	0.37	49.18	13.50	6.50	49.00	0.70	1.90
50 %	38.33	88.50	18.00	0.39	46.15	14.00	7.12	51.40	0.65	1.83
75 %	27.02	85.10	17.00	0.39	43.58	13.00	6.00	47.20	0.60	1.80
Control	25.05	84.20	16.50	0.40	41.25	12.00	5.42	46.50	0.59	1.76
CD (P= 0.05)	4.22	1.10	1.12	NS	0.05	0.14	0.15	1.25	0.05	0.02

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