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Canopy Manipulation for Production of Winter Guava (*Psidium guajava* L.) in the Eastern Himalayan Region of India

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ABSTRACT

Elimination of rainy-season crops is pivotal to encourage winter crops in guava. In general, rainy-season guava fruits are of poor fruit quality, insipid in taste, have poor shelf life, and mostly affected by many insect pests. Pruning is also considered one of the most eco-friendly methods for crop regulation. To fully comprehend the impact of pruning time and severity on flowering, fruit quality, and crop production, a field experiment was carried out. Three alternative pruning times (mid-April, mid-May, and mid-June) at different pruning levels (low, moderate and heavy pruning) were employed in the experiment, which was designed as two-factor factorial RBD. For obtaining optimal fruiting, size of fruit and quality of fruit attributes, mid-May pruning has proven to be the best time for guava pruning. Whereas, concerning pruning severity, moderate pruning (pruning 1/2 of the current season's shoot length) showed a good response to yield and fruit quality parameters. Therefore, the present study concluded that moderate pruning of guava trees during the month of mid-May proved to be the most effective for producing winter-season guava with good yield and superior quality.

Keywords Winter guava, Guava, Pruning severity, Pruning time, Fruit quality.

INTRODUCTION

Guava (*Psidium guajava* L.), native to tropical America, has spread throughout tropical and subtropical areas of the world due to its ability to adapt to variety of soil and climatic conditions. It was introduced in India by the Portuguese at the dawn of 17th century, and it is currently India's fifth-most significant fruit crop. Guava is also considered a superfruit as it has rich sources of vitamin C, vitamin A, folate, dietary fiber, phosphorus, copper, manganese, iron. A fruit crop that is ideal for the country's nutritional security due to its cheap and easily availability. Guava tree generally blooms twice a year, in August–September

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for winter harvest and April–May for rainy crop. A third crop blooms is observed in Maharashtra and Tamil Nadu during October. The winter-season guava crop produces superior fruit quality, commands a higher price and stored well for a longer period than the rainy-season guava, which is of low quality, infested with fruit flies, and does not keep well. Therefore, crop regulation, viz. deblossoming, defoliation, thinning of flowers with growth regulators, withholding irrigation, exposing roots, pruning of shoots are the techniques followed to obtain winter guavas. Crop regulation of guava by with holding irrigation, root exposure, shoot pruning, or use of chemicals and growth regulators, viz., urea, NAA is not much effective in humid and high rainfall areas of the north-eastern region of India because the plant does not go into dormancy due to abundant rainfall commencing from March onwards until September. The elimination of rainy-season crops by shoot pruning could be an alternative way to remove rainy-season crop to encourage winter guava. Pruning has proven to notably increase both the yield and quality of fruit, as well as overall vitality, in aging orchards (Bhagawati *et al.* 2015). When a tree is left unpruned for an extended period, it tends to prolong vegetative growth, limit bearing area and decrease fruit size, yield and quality. As a result, pruning is a crucial step in achieving an optimum balance between vegetative and reproductive growth.

Pruning apical shoots improved guava tree growth and yield (Ali *et al.* 2014), while different pruning levels also improved growth and yield in grapes and other crops (Porika *et al.* 2015, Malviya and Sharma 2016). Several researchers have studied and reported on the degree to which the plant needs to be pruned and the ideal time for pruning guava trees (Shaban and Haseeb 2009, Jadhav *et al.* 2002), but their findings varied greatly due to differences in edaphic and climatic conditions. There have been few to no reports on guava pruning time and pruning severity in North-eastern Indian conditions. Keeping the foregoing facts in mind and to gain a better understanding, the current investigation was undertaken with the following goals, to optimize the time and severity of shoot pruning in guava plants to eliminate the rainy season crops and to obtain superior fruit quality for the winter season.

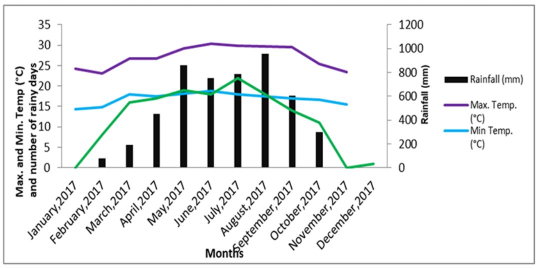

Fig. 1. Graphical representation of meteorological data during the period of investigation.

MATERIALS AND METHODS

Experimental site, climate and weather

The experiment was conducted in 2017–18 at Fruit Research Farm, Department of Fruit Science, College of Horticulture and Forestry (CAU), Pasighat, Arunachal Pradesh. The experiment farm is located at an elevation of 153 m (502 feet) above mean sea level at 28°04' 43" N latitude and 95°19' 26" E longitude. The prevailing climatic condition in this region is humid subtropical, with maximum rainfall of more than 4000 mm per annum. Pre-monsoon rain begins in March, while post-monsoon rain lasts until October. Figure 1 depicts the maximum and minimum temperatures, number of rainy days and rainfall (mm) statistics for the investigation period.

Experimental details

The experiment was conducted on a 7-year-old guava orchard of cultivar Lucknow-49 (Sardar) planted at 6 m × 6 m spacing in a 2-factor Factorial Randomized Block Design with three different pruning times, i.e., M_1 (mid-April), M_2 (mid-May), and M_3 (mid-June), and three levels of pruning, i.e., heading back of the current season growth from shoot tip, viz., Light pruning (pruning 1/4th of the current season shoot length), Moderate pruning (pruning 1/2th of the current season shoot length) and Heavy pruning (pruning 3/4th of the current season shoot length). Thus, it comprises nine combinations: T_1= Light pruning in mid-April, T_2= Moderate pruning in mid-April, T_3= Heavy pruning in mid-April, T_4 = Light pruning in mid-May, T_5 = Moderate pruning in mid-May, T_6= Heavy pruning in mid-May, T_7 = Light pruning in mid-June, T_8 =

moderate pruning in mid-June, T_9 = Heavy pruning in mid-June. Each treatment was replicated thrice, with two uniform plants per replication. Thereafter, the entire plant was defoliated manually by using secateurs, followed by smearing the cut ends of branchlets with Copper oxychloride paste to prevent secondary infection. A common dose of nitrogen (500 g), phosphorus (200 g), potassium (500 g) and FYM (40 kg) per plant per year was also applied. All the selected trees were provided with uniform plant protection and cultural practices during the entire experiment.

Studies attributes

Flowering, fruit set and physical fruit attributes

Ten branches from each tree were chosen randomly and tagged in all four directions (North, East, West and South) for observations of first vegetative bud burst (when 5–10% bud burst begins), duration of vegetative bud burst (days from first burst to last burst), first flower bud appearance (days from treatment imposition), duration of flowering (days from first flower bud appearance to fruit set) and time taken for fruit maturity (days from flowering).

Fruit quality attributes

Fruit maturity was determined by changes in color from deep green to yellowish green. Twenty fruits from each treatment were taken, and their average fruit weight (g) was recorded. Five fruits were randomly selected from each treatment for studying fruit quality parameters, fruit pulp was extracted along the peel and filtered with muslin cloth. Total soluble solids (°Brix), titratable acidity (%), total sugar content (%), reducing sugar content (%), ascorbic acid content (mg/100 mg) and pectin content (%) were determined.

The recorded observations were statistically analyzed using two factors factorial-RBD. The significance and non-significance of variance attributable to different treatments were determined by computing the relevant value of 'F' at 5% probability level values using the approach provided by Gomez and Gomez (2010). The Critical Difference value was calculated at 5% probability level by comparing different treatments among themselves.

RESULTS AND DISCUSSION

Flowering, fruit set and physical fruit attributes

Early pruning has a substantial impact on early shoot emergence. In regards to pruning time, the minimum days (5.44 days) for first vegetative bud sprout were recorded in mid-April pruning which was statistically at par with mid-May pruning (5.73 days) depicted in Table 1. An increase in level of pruning severity also causes early vegetative bud burst, the minimum days (5.43 days) for bud burst was recorded in heavily pruned trees and was found to be statistically at par with moderately pruned trees (6.06 days). However, the interaction between pruning time and pruning severity were found to be non-significant. Early pruning produces new shoots; this may be due to the scaffold branches remaining wet due to ample rainfall during the month of May and June (Basu *et al.* 2007). Early vegetative bud emergence was noted as pruning severity increased due to better light interception, which induces early sprouts. The result are in support with the findings of Bhagawati *et al.* (2015), who concluded that severe pruning makes more nutrients and carbohydrates available to the plant for latent vegetative buds, which may possibly be related to better light interception, resulting in early sprouts. The minimum days (38.11 days) for floral bud appearance were observed in mid-April pruning, which was at par with mid-May pruning (38.67 days). With regards to pruning severity, light pruning required the least amount of time (37.61days) for floral bud appearance, while heavily pruned trees took the maximum (41.44 days). However, the interaction effect of the two parameters had no significant effect on floral bud initiation. Early pruning combined with mild pruning shortened the time required for flower bud initiation and vice versa. Adhikari and Kandel (2015) reported similar findings, stating that this could be related to early vegetative development in early pruned trees, which eventually leads to early flowering. Delayed-pruned trees began flowering late due to later vegetative growth.

Shoot pruning encourages rapid growth of new shoots. However, the response varied depending on both the timing and intensity of the pruning. The minimum number of days (33.38 days) of flowering

Table 1. Response of guava (*Psidium guajava* L.) to different pruning time and severity on bud initiation, flowering, fruiting and yield.

Treatment	1st vegetative bud burst (days)	Duration of vegetative bud burst (days)	1st flower bud appearance (days)	Duration of flowering (days)	Time taken for maturity (days)	Fruit set (%)	No. of fruits per plant	Fruit weight (g)	Fruit yield (kg/tree)
Pruning time									
M_1 (mid-April)	5.44	39.22	38.11	33.83	136.11	76.58	172.70	130.17	22.28
M_2 (mid- May)	5.73	42.72	38.67	35.78	138.22	79.20	163.11	145.82	23.86
M_3 (mid-June)	6.79	46.94	41.17	38.67	139.56	75.28	100.44	143.88	14.39
SE (m)±	0.201	0.709	0.827	1.039	0.816	1.339	3.66	2.83	0.783
CD (5%)	0.61	2.15	2.49	3.14	2.47	NS	11.07	8.56	2.37
Pruning intensity									
P_1 (Light pruning- pruning 1/4th of the current season shoot length)	6.55	40.39	37.61	34.00	134.56	76.63	151.00	130.53	19.37
P_2 (Moderate pruning- pruning 1/2th of the current season shoot length)	6.06	43.61	38.89	35.78	137.78	78.79	154.56	146.71	22.68
P_3 (Heavy pruning- pruning 3/4th of the current season shoot length)	5.43	44.89	41.44	38.50	138.56	72.49	130.78	142.64	18.48
SE(m)±	0.201	0.709	0.827	1.039	0.816	1.339	3.66	2.83	0.783
CD (5%)	0.61	2.15	2.49	3.14	NS	4.05	11.07	8.56	2.37
Interaction									
T_1 (Light pruning in mid-April)	5.70	35.50	35.67	32.67	134.33	75.73	180.67	105.33	18.79
T_2 (Moderate pruning in mid-April)	5.73	38.50	37.67	33.67	137.33	76.57	192.00	141.47	27.15
T_3 (Heavy pruning in mid-April)	4.90	43.67	41.00	35.17	136.67	77.47	145.67	143.71	20.88
T_4 (Light pruning in mid-May)	6.23	41.50	37.17	34.33	138.67	83.00	160.33	150.10	24.06
T_5 (Moderate pruning in mid-May)	5.63	44.50	38.83	35.33	137.00	83.33	172.33	152.04	26.34
T_6 (Heavy pruning in mid-May)	5.33	42.17	40.00	37.67	139.00	71.33	156.67	135.34	21.18
T_7 (Light pruning in mid-June)	7.5	44.17	40.00	35.00	139.67	80.17	112.00	136.16	15.23
T_8 (Moderate pruning in mid-June)	6.80	47.83	40.17	38.33	139.00	77.00	99.30	146.61	14.56
T_9 (Heavy pruning in mid-June)	6.07	48.83	43.33	42.67	140.00	68.67	90.00	148.87	13.39
SE (m)±	0.348	1.228	1.432	1.800	1.414	2.319	6.34	4.902	1.356
CD (5%)	NS	3.71	NS	NS	NS	7.01	19.17	14.82	4.10

duration was recorded in mid-April pruning, which was statistically at par with mid-May pruning (35.78 days). In terms of pruning severity, mildly pruned trees recorded the shortest period of flowering (34.00 days), which was statistically at par with moderately pruned trees (35.78 days). However, their interaction effects showed no significant variation. Meena *et al.* (2016) found that control plants had a delayed flowering period of 51.33 days, whereas pruning of 45 cm shoots length in April triggered earlier blooming (32.67 days), contrasting with other pruning methods that took about 45 days for flower initiation.

The difference in pruning time has no effect on fruit set. However, as severity of pruning increases, fruit set percentage increases up to some extent but began to decline with the advancement of pruning severity. The maximum fruit set (78.79%) was recorded in moderately pruned tree, which was statistically at par with lightly pruned trees (76.63%) and minimum (72.49%) in heavy pruned trees (Table 2). The interaction between pruning time and pruning severity had a substantial effect, the highest fruit set (83.33%) was recorded in T_5 (moderate pruning in mid-May) followed by T_4 (light pruning in mid-May) and T_7 (light pruning in mid-June) and minimum (68.67 days) in T_9 (heavy pruning in mid-June). Sah *et al.* (2017) stated that mildly pruned trees promote reproductive growth, whereas severely pruned trees increase vegetative growth of the plant. Boora *et al.* (2016) also noted that decreasing of fruit set during the rainy season crop is essential to enhance fruit set

Table 2. Response of guava (*Psidium guajava* L.) to different pruning time and severity on fruit size and fruit quality parameters.

Treatment	Fruit size Polar (mm)	Fruit size Equatorial (mm)	TSS (°B)	Titratable acidity (%)	Total sugars (%)	Reducing sugars (%)	Ascorbic acid (mg/ 100 g)	Pectin content (%)
Pruning time								
M_1 (mid-April)	119.56	117.62	9.93	0.38	7.10	4.45	200.79	0.54
M_2 (mid- May)	121.76	120.70	11.71	0.38	8.68	4.89	199.51	0.59
M_3 (mid-June)	120.94	119.75	11.82	0.37	8.36	5.23	197.18	0.64
SE (m)±	0.86	0.98	0.13	0.02	0.09	0.13	0.96	0.02
CD (5%)	NS	NS	0.38	NS	0.28	0.39	2.90	0.06
Pruning intensity								
P_1 (Light pruning- pruning 1/4th of the current season shoot length)	118.06	113.84	10.81	0.39	7.86	4.93	190.28	0.54
P_2 (Moderate pruning- pruning 1/2th of the current season shoot length)	121.30	121.80	11.31	0.37	8.46	4.98	204.87	0.63
P_3 (Heavy pruning- pruning 3/4th of the current season shoot length)	122.89	122.50	11.34	0.37	7.82	4.66	202.32	0.60
SE (m) ±	0.86	0.98	0.13	0.025	0.09	0.13	0.96	0.0
CD (5%)	2.61	2.98	0.38	NS	0.28	NS	2.90	0.06
Interaction								
T_1 (Light pruning in mid-April)	114.47	111.0	9.16	0.39	6.83	4.60	188.83	0.44
T_2 (Moderate pruning in mid-April)	121.45	120.20	10.20	0.39	8.14	4.60	208.00	0.63
T_3 (Heavy pruning in mid-April)	122.75	121.67	10.43	0.37	6.33	4.15	205.53	0.55
T_4 (Light pruning in mid-May)	120.26	115.27	11.50	0.40	8.69	4.91	194.00	0.58
T_5 (Moderate pruning in mid-May)	122.13	123.45	12.03	0.36	8.81	4.90	204.27	0.59
T_6 (Heavy pruning in mid-May)	122.90	123.38	11.60	0.38	8.53	4.77	200.27	0.61
T_7 (Light pruning in mid-June)	119.47	115.27	11.75	0.38	8.06	5.26	188.03	0.59
T_8 (Moderate pruning in mid-June)	120.32	121.61	11.70	0.38	8.43	5.37	202.33	0.68
T_9 (Heavy pruning in mid-June)	123.03	122.37	12.00	0.36	8.60	5.07	201.17	0.64
SE (m) ±	1.49	1.71	0.22	0.02	0.16	0.23	1.66	0.03
CD (5%)	NS	NS	0.65	NS	0.49	NS	5.03	NS

for winter crop.

With delay in pruning, the extent of fruit maturity is prolonged. The minimum day (136.11 days) for fruit maturity was observed in mid-April pruning and maximum (139.56 days) in mid-June pruning. However, effect on pruning severity and their interaction between the two parameters were found to be non-significant. The present investigation showed that days taken for fruit maturity ranged from 136 to 140 days from anthesis, depending on temperature during fruit growth. Singh *et al.* (2001) noted that pruning during the month of May began to mature in mid-November, with the initial harvest occurring in the last week of November. Harvesting was mainly concentrated between November and January. In contrast, fruits from plants pruned in June matured towards the end of December. Similarly, Singh *et al.* (2015) noted that fruit maturity took place 136 days when pruning in done during the month of May.

The maximum number of fruits (172.7) per plant was noted in mid-April pruning, which was statistically at par to mid-May pruning (163.11) within the different pruning times. In regards to pruning severity, the maximum number of fruits per plant (154.56) was recorded in moderately pruned trees and statistically at par with light pruned trees (151.00). With respect to the interaction between the pruning time and pruning severity, the highest number of fruits (192.00) were obtained in T_2 (moderate pruning in mid-April) which was found to be at par with T_1 (light pruning in mid-April) and the minimum (90.00) in T_9 (heavy pruning in mid-June). When compared to late and severely pruned trees, early and mildly pruned trees produce more fruits per tree. On the other side, the reduction in fruiting area supported vegetative growth at the expense of reproductive growth (Kumar and Rattanpal 2010).

The fruit weight varied significantly depending on pruning time, maximum fruit weight (145.82 g) was observed in mid-May pruning, which was statistically at par with mid-June pruning (143.88 g). In terms of pruning severity, the maximum fruit weight (146.71 g) was recorded in moderate pruning which was found to be at par with heavily pruned trees (142.64 g). The interaction effect of the two factors was significant, with maximum (152.04 g) fruit weight in T_5 (moderate pruning in mid-May) and was found to be at par with T_4 (light pruning in mid-May) while the minimum (105.33 g) in T_1 (light pruning in mid-April). Due to pruning, there is an increase in both the number and size of leaves, leading to a rise in photosynthates and subsequently resulting in increased fruit weight during the winter season crop (Singh *et al.* 2001). Adhikari and Kandel (2015) observed that fruit weight increased with intensive pruning and delayed pruning times. Pruning at a 30 cm level in early May resulted in heavier fruits during the rainy season, whereas heavier fruits during winters were achieved with pruning at the 30 cm level in mid-May. Basu *et al.* (2007) noted a similar pattern when pruning eleven-year-old Sardar guava plants with four scaffold branches in May.The data in Table 2 showed that no significant difference in fruit size (polar and equatorial) based on varied pruning times. However, fruit size were considerably larger with increased pruning severity, with maximum fruit size being noted in heavily pruned trees (122.50 mm) and minimum (113.84 mm) in lightly pruned trees. The interaction between pruning time and pruning severity on fruit size was found to be non-significant. Severe pruning had a noticeable impact on fruit size. Adhikari and Kandel (2015) observed that the largest fruit size was achieved in plants pruned at a 30 cm level during mid-May. Similarly, Basu *et al.* (2007) noted that the maximum fruit size was observed in fruits from plants pruned in May.

Fruit yield (kg/tree)

Table 1 clearly depicts that there is a significant variation in fruit yield with different pruning times, maximum (23.86 kg/tree) fruit yield was recorded in mid-May pruning, which was statistically at par with mid-April pruning trees, and minimum (14.39 kg/tree) in mid-June pruning trees. With respect to pruning intensities, an increase in level of pruning severity increased the yield up to some extent but gradually decreased later on. The maximum fruit yield (22.68 kg/tree) was noted in moderately pruned trees, and the minimum (18.48 kg/tree) in heavily pruned trees. The interaction between the two parameters was found to be highly significant with the highest yield (27.15 kg/tree) in T_2 (moderate pruning in mid-April) which was statistically at par with T_5 (moderate pruning in mid-May) and T_4 (light pruning in mid-May), and the minimum (13.39 kg/tree) in T_9 (heavy pruning in mid-June). Das *et al.* (2018) found that the maximum yield during rainy season when pruning was done in October, while pruning in May resulted in the highest crop yield during the winter season. Similar outcomes regarding fruit yield were reported by Joshi *et al.* (2014), Meena *et al.* (2005) when plants were pruned in May for the winter season crop. Adhikari and Kandel (2015) also noted a significant decrease in fruit yield during the winter season with increase in pruning severity. However, the highest yield in the winter season crop was achieved with mild pruning of guava plants in early May. Similarly, Sah *et al.* (2017) and Prabhakar *et al.* (2016) observed a comparable trend in fruit yield.

Fruit quality parameters

From Table 2, TSS of fruits significantly increases with an increase in both pruning time and pruning severity. The maximum TSS (11.82^{o}B) was recorded in mid-June pruning, which was at par with mid-May pruning, while minimum (9.93^{o}B) in mid-April pruning. With respect to pruning severity, heavily pruned trees recorded the maximum TSS (11.34^{o}B) which was at par with moderately pruned trees (11.31^{o}B) and minimum (10.81^{o}B) in lightly pruned trees. Similarly, their interaction effect also showed a significant influence on TSS of fruits; maximum TSS content (12.03^{o}B) was recorded in T_5 (Moderate pruning in mid-May pruning), which was statistically at par with T_9 (heavy pruning in mid-June) and minimum (9.16^{o}B) in T_1 (light pruning in mid-April). Pruned trees exhibited a larger leaf/fruit ratio, which may have contributed to higher TSS concentrations due to increased metabolite synthesis (Adhikari and Kandel 2015).

The titratable acidity of the fruits has no effect on pruning time, severity, or their interactions. Singh *et al.* (2007) also concluded that guava shoot pruning during the summer season had no effect on titratable acidity of winter fruits.

The total sugar content of fruits increased initially with an increase in both pruning time and pruning severity, but gradually declined later with an increase in pruning severity and delayed pruning. Pruning in mid-May yielded maximum sugar content (8.68%) which was at par with mid-June pruning, while minimum (7.10%) in mid-April pruning. With regards to level of pruning intensities, moderately pruned trees recorded the maximum total sugar content (8.46%) and minimum (7.82%) in heavily pruned trees. Their interaction effect also had a significant variation, with the maximum sugar content (8.81%) noted in T_5 (moderate pruning in mid-May) which was statistically at par in T_4 (light pruning in mid-May), T_6 (heavy pruning in mid-May) and T_8 (moderate pruning in mid-June), while the minimum (6.83%) in T_1 (light pruning in mid-April). The abundance of photosynthates in a restricted number of fruits may explain the increase in sugar content in winter fruits. The results are also in line with Kumar and Rattanpal (2010).

Table 2 demonstrated that different pruning times in guava plants had a significant impact on reducing sugar in fruit, with the maximum reducing sugar (5.23%) noted in mid-June pruning followed by mid-May pruned trees and the least (4.45%) in mid-April pruned trees. However, interaction between the two parameters and different levels of pruning was found to be non-significant.

The ascorbic acid content of fruits decreased as the pruning time was delayed. The maximum ascorbic acid content was recorded in mid-April pruning (200.79 mg/g), which was found to be at par with mid-May pruning, while the minimum (197.51 mg/g) in mid-June pruned trees. In regards to pruning severity, initially the ascorbic content increased but subsequently dropped with advancement in pruning severity; while the maximum (204.87 mg/g) was noted in moderately pruned trees followed by heavily pruned trees, while the minimum ascorbic acid (190.28 mg/g) in lightly pruned trees. The interaction between the two parameters had a significant effect, the maximum ascorbic content (808.00 mg/g) observed in T_2 (moderate pruning in mid-April) which was at par with T_3 (heavy pruning in mid-April), T_5 (moderate pruning in mid-May), T_8 (moderate pruning in mid-June) and T_6 (heavy pruning in mid-May), while minimum (188.03 mg/g) in T_7 (light pruning in mid-June). These outcomes aligned with the findings of Balamohan and Kala (2019), Kumar and Rattanpal (2010). The rise in sugars and ascorbic acid content could potentially be attributed to the influence of elevated temperatures throughout flowering, fruit development, and maturation. This may have led to the breakdown of polysaccharides into simpler sugars via diverse metabolic pathways, the transformation of organic acids into sugars and reduction in moisture content (Lakpathi *et al.* 2013).

A delay in pruning enhances the pectin content of fruits. Pectin content was found to be considerably higher in late-pruning trees, with the maximum (0.64%) being noted in mid-June pruned trees followed by mid-May pruned trees, while the minimum in mid-April pruned trees (0.54%). Moderately pruned trees recorded the maximum pectin content (0.63%), followed by heavily pruned trees, the minimum in lightly pruned trees (0.54%). However, the interaction between the two parameters was found to be non-significant. Winter guavas produce larger, better and higher-quality fruit overall. Fruits produced higher total soluble solids, ascorbic acid, reducing sugar, total sugar and pectin content while their acidity decreased. The enhancement in the quality of winter fruit may be due to increase in availability of photosynthates for a limited number of fruits. The superior performance of the winter crop of guava could be attributed due to the low temperatures that prevailed throughout winter season during fruit ripening. Lower temperatures not only prevent the excessive loss of respiratory components but also hasten the movement of photosynthates from leaves to other parts of the plant, particularly fruits.

CONCLUSION

The current study concludes that pruning current season's shoots of the guava plant at different periods of time with varying degrees of severity has significant effect on vegetative growth and floral buds initiation, flowering, fruit set, maturity, yield and fruit quality parameters. In terms of pruning time, fruit quality attributes were comparatively better in mid-May pruned trees than in mid-April and mid-June pruned trees. Regarding the level of pruning severity, moderate pruning has the best results on both yield and fruit quality parameters. In order to eliminate rainy-season crops and promote winter guava in the cv Lucknow-49 (Sardar) under sub-tropical climatic conditions in Arunachal Pradesh, moderately pruning trees (pruning 1/2 of the current season's shoot length) during mid-May has been found to be the best approach.

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