www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(4): 664-671

www.thepharmajournal.com
Received: 22-01-2023
Accepted: 24-02-2023

Ravi Shankar Singh
Research Scholar, Department of Fruit Science, C.S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Dr. AK Dwivedi
Assistant Professor, Department of Fruit Science, C.S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Dr. VK Tripathi
Professor & Head, Department of Horticulture and Fruit Science, C.S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Akash Shukla
Assistant Professor, PSS Central Institute of Vocational Education, Bhopal, Madhya Pradesh, India

Corresponding Author:
Ravi Shankar Singh
Research Scholar, Department of Fruit Science, C.S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Study to enhance flowering, physical fruit quality and yield through pruning time, pruning intensity and fruit bagging in Mrig bahar Guava cv. Lucknow-49

Ravi Shankar Singh, Dr. AK Dwivedi, Dr. VK Tripathi and Akash Shukla

Abstract
A field experiment was carried out at Garden of Department of Horticulture Kalyanpur, Kanpur, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur-208002 during the tenure of 2020-2021 and 2021-2022 to evaluate the flowering, physical fruit quality and yield through different pruning time, intensity and bagging of fruit in Mrig bahar Guava cv. Lucknow-49. The experiment was conducted in a Randomized block design (Factorial) with three replications. The treatment combination comprise of 3 factors *viz*.3 pruning time, 2 pruning intensity and 2 bagging levels. Based on the experimental results it can be concluded that result obtained from the present investigation, among different pruning time (15th June), pruning intensity (50%) and fruit bagging (30 DAFS) was found most effective in improving flowering, physical fruiting characters and yield parameters of guava fruit. The results showed that application of $T_3P_2D_2$ (15 June + Pruning of 50% of the annual growth + Bagging at 30 DAFS) has resulted in the maximum fruit yield (69.69 and 72.18 kg/tree), fruit efficiency (74.96 and 76.97 kg/m^3), number of new shoot per prune branch (6.33 and 8.0), length of new shoot (69.29 and 73.32 cm), number of flower per bunch (331.66 and 395.33), fruit set (62.32 and 74.57%), fruit retention (49.59 and 62.66%), number of fruit per tree (169.00 and 177.00), fruit weight (182.26 and 220.53g), volume of fruit (134.86 and 205.26 cc), fruit length (8.14 and 8.45cm), fruit width (8.12 and 8.31cm),during both the year of observation. Pruning of guava trees in the second week of June with 50 percent pruning intensity of annual shoot growth and bagging 30 days after fruit set can be recommended to obtain higher yield with better physical quality fruit and maximum return for guava growers of Central-Western part of the state of Uttar Pradesh.

Keywords: Pruning time, pruning intensity, bagging, fruit yield, number of flower per branch, fruit retention

Introduction
Guava (*Psidium guajava* L.) also known as “apple of tropics” or “poor man’s apple” is one of the most popular fruit crops of tropical and sub-tropical climate. It belongs to the Myrtaceae family having chromosome number 2n= 22 and is native to Tropical America, extending from Mexico to Peru**.** Guava is the fifth most important fruit in respect of area and production after banana, mango, citrus, and papaya in India. In India, largest area and highest production under guava fruit is in Uttar Pradesh and highest Productivity in Andhra Pradesh. It grows everywhere in India in the homestead gardens, even without or little care, but it is commercially cultivated in the states of Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal, Punjab, Gujarat, Maharashtra, Karnataka, and Andhra Pradesh. Lucknow-49 is a selection made at Poona, (Cheema and Desmukh, 1927) [1] also known as Sardar guava‟. Semi-dwarf tree, 2.3 to 3.4 m tall, vigorous, heavy branching type with flat crown; leaves large, 12.8 to 13.2 cm long, 6.8 cm broad, elliptic-ovate to oblong in shape. Fruits roundish ovate in shape, skin colour primrose-yellow with occasional red dots on the skin; taste sweet and keeping quality excellent. Sardar Guava has comparatively better field tolerance to wilt and sodicity compared to Allahabad Safeda. Pruning and Training of guava trees has been found to improve yield and fruit quality. The primary objectives of training are to develop single trunk tree with well-spaced scaffold branches to form a strong framework and for bearing a heavy crop without damaging the branches. The trees should be kept open for better penetration of sunlight leading to more number of shoots and higher yield. The central part of the canopy should remain open, but at the initial stage tree is allowed to grow undisturbed. Which is then headed back at 60-90 cm height and 3-4 well-spaced, vigorously growing laterals, projected at different directions are retained.

The laterals are subsequently pruned by cutting one-third to half of their length after 3 months. After making the initial framework, 2-side shoots are permitted to grow initially and after 3-4 years subsequent doubling of selected branches is continued.

Materials and Methods

The experimental site is located at Garden of Department of Horticulture Kalyanpur, Kanpur, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur-208002 during the tenure of 2020-2021 and 2021-2022. Kanpur having an even topography with adequate irrigation and proper drainage facilities. Geographically district Kanpur city of Uttar Pradesh falls under subtropical climate zone and is situated between the latitude 25.260 and 26.280 North and longitude 79.310 and 80.340 East and at an altitude of 125.90 meter above mean sea level in the alluvial belt of Gangatic plains located in the central part of Uttar Pradesh. Kanpur is characterized by sub-tropical climate with hot dry summer and cold winters. The annual rainfall is about 800-880 mm. The major portion of rain is received between July to September, with scattered shower in winter from the North-East monsoon. The maximum temperature ranges from 24 to 46 °C and minimum 7.0 to 24.8 °C with relative humidity from 32 to 98% in different months of the year. The soil was sandy loam, good in fertility with belt of Central-Western part of the state of Uttar Pradesh.

Results and Discussion

1.1 Effect of pruning time, pruning intensity and bagging on Fruit yield (kg/tree)

The pruning on 15th June increased fruit yield during both the years. The pruning was effective with 50% intensity and bagging 30 days after fruit set during both the years of experimentation. The Interaction effect among different time of pruning time, Pruning intensity and Bagging gave highest fruit yield under $T_3P_2D_2$(15 June+50%+30 days after fruit set) treatment combination during both the years. The lowest fruit yield was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. The results are in close conformity with the finding of Meena *et al.* (2016) [2] reported that pruning in May at 45 cm length increased in yield than the normal fruiting in control. They concluded that 45 cm shoot pruning in May was the best time for off season fruit production of guava, reported in winter season guava crop, fruit yield per plant with 30th May pruning, Singh *et al.* (1996) [27] observed that 50% pruning of current season's growth of the guava tree gave the highest yield and 100% pruning the lowest. The results of the study revealed that among the various pruning treatments the pruning of 30 cm of apical shoots on 15th May proved to be the best in increasing the fruit yield**.**

1.2 Effect of pruning time, pruning intensity and bagging on yield efficiency (Kg/m^3)

The main effect of yield efficiency was increased for pruning time, pruning intensity and bagging against control during both the years. Interaction effect among different time of pruning, Pruning intensity and Bagging gave high5est yield efficiency in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest yield efficiency was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years**.** Quijada *et al.* (2005) [5] reported that pruning had a positive effect on the production of guava fruits and thus found that the pruned trees had greater production efficiency.

1.3 Effect of pruning time, pruning intensity and bagging on Number of new shoot per pruned branch

The 15th June pruning, 50 percent pruning intensity and 30 days after fruit set bagging gave significantly higher number of shoot per pruned branch of guava. Bagging was not effective for number of new shoots per pruned branch of guava. The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest Number of new shoot per prune branch in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest Number of new shoot per prune branch was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. Overall the treatments were found effective against control during both the years. Lal (1983) [6] found that number of new shoot and flower bud emergence were significantly increased in all the pruning treatments. They concluded that 3/4 shoot pruning in May was best for good crop during winter season guava. Singh *et al.* (2001) [26] reported that 50% pruning in April and July have positive effect towards vegetative growth, results in less rainy season yield and more number of emergence of new shoots per plant, flower buds per plant and increased fruit weight during winter season guava.

1.4 Effect of pruning time, pruning intensity and bagging on length of new shoots (cm)

The 15th June pruning, 50 percent pruning intensity 30 days after fruit set bagging caused significant effect and maximum length of new shoots of guava. The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest Length of new shoot in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest Number of new shoot per pruned branch was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. The treatments were found effective against control in the year 2022. Jadhav *et al.* (2002) [8] reported that the number of days before sprouting increased, whereas the average length of shoots, number of flowers and fruits per shoot, average weight of fruits per shoots and crop yield decreased with the delay in pruning in sardar guava. Singh and Chauhan (1998) [9] reported that the heavily pruned trees had significantly longer shoots than light pruning trees. The increase in growth was primarily a function of greater availability of photosynthates and nutrients in the heavily pruned trees in guava. Dubey *et al.* (2001) [10] found that greatest length of shoots and number of shoots that emerged after pruning (lateral shoots) were obtained with 100 and 25% pruning intensities in guava cv. Allahabad safeda. The treatment, pruning at 45 cm shoot length in May gave the highest increase in new shoot length (1.83 cm) at 15 days after pruning (DAP) followed by the treatment 30 cm pruning in April and the lowest (0.31 cm) was recorded in the control (Meena *et al.* 2016) [2].

1.5 Effect of pruning time, pruning intensity and bagging on number of flowers per branch

The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest Number of flower per branch in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest Number of flower per

branch was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. Jadhav *et al.* (2002) [8] reported that the number of days before sprouting increased, whereas the average length of shoots, number of flowers and fruits per shoot decreased with the delay in pruning in guava. Widyastuti *et al.* (2019) [11] reported that pruning treatment was able to accelerate the appearance of flowers and increase the number of generative shoots, the number of flowers per tree, the amount of fruit harvested. Increased flowering response due to pruning is supported by the rate of stomatal conduction; the number of stomata is higher than without pruning. The pruning treatment can accelerate the time the flower appears 10 days faster than without trimming. The minimum number of flowers and fruits in the rainy season and minimum flowers and fruit per shoot in winter season were recorded at 60 cm pruning treatment. (Suleman *et al.* 2006) [12].

1.6 Effect of pruning time, pruning intensity and bagging on number of Fruit set and Fruit retention

Interaction effect among different time of pruning, Pruning intensity and Bagging gave Higher number of fruit set and fruit retention were observed with in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest Number fruit set and fruit retention was recorded in $T_1P_1D_1$ (15 May+25% +20 days after fruit set) during both the years However, the treatments were found effective against control during year 2022. (Boora *et al.* 2016) [13] reported, minimum number of flowers and fruit set per shoot was recorded with 30th May pruning in summer season flush, subsequently increased number of flowers and fruits set per shoot with 30th May pruning during kharif season flush. To regulate the guava crop, it is essential to reduce the fruit set during the rainy season where subsequently increase it during winter season.

1.7 Effect of pruning time, pruning intensity and bagging on number of fruit/ Tree

The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest Number of fruit per tree in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest Number of fruit per tree was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. The treatments were also found effective against control in both the years. Dhaliwal *et al.* (2000) [14] reported that the maximum of it was recorded with 50% pruning intensity, while the minimum number of fruits was obtained with 100% pruning intensity in guava. The study revealed that heading back at the level of 200 cm and two pinching were found most effective in increasing the growth characters of the plant, number of fruits/plant as compared to control than other treatments (Saini *et al.* 2016) [15]. In case of yield and fruit attributes, highest numbers of fruits per tree was obtained in 30 cm of pruning. (Choudhary and Dhakare 2018) [16]. The results of the study revealed that among the various pruning treatments the pruning of 30 cm of apical shoots on 15th May proved to be the best number of fruits per tree (Singh *et al.* 2020) [17].

1.8 Effect of pruning time, pruning intensity and bagging on length and width (cm) of guava fruit

The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest fruit length and width in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest number of fruit length and width was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. Adhikari and Kandel (2015) [18] reported that the increased level of pruning and delayed pruning increased the fruit size in both seasons (rainy and winter). El-Souda (2005) [19] reported that the guava fruit size increased by increasing severity of pruning. The size of fruit were maximum in a tree pruned at the 45 cm level followed by 15 cm level and minimum in unpruned trees (Brar *et al.* 2007) [20]. Maximum fruit length and fruit width in winter season were recorded with pruning of total flower/ fruit bearing portion of current season shoot treatment (Singh *et al.* 2007b) [21].

1.9 Effect of pruning time, pruning intensity and bagging on Fruit weight (g)

The Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest fruit weight in $T_3P_2D_2$ (15 June+50%+30 days after fruit set) during both the years. The lowest number of fruit weight was recorded in $T_1P_1D_1$ (15 May+25%+20 days after fruit set) during both the years. However the effect of treatment on control was also found significant during both the years. Adhikari and Kandel (2015) [18] studied the increased level of pruning and delayed pruning increased the fruit weight in both seasons (rainy and winter). The half shoot (50%) pruning in April and July have positive effect towards vegetative growth, results in less rainy season yield, increased fruit weight during winter season guava (Sah *et al.* 2017) [22]. The maximum return per tree was obtained from 30 cm pruned tree and minimum in 100 cm pruned tree. They also observed highest fruit weight under severe pruning than control. The guava plant subjected to heavy pruning have lower rates of fruit set fewer fruit per plant and consequently, lower production. However, these fruits produce higher average weight compared to plants subjected to light pruning (Luiz *et al.* 2008) [23]. Maximum fruit weight (305.21 g) was found due to 90 cm of pruning intensity (Choudhary and Dhakare 2018) [16].

1.10 Effect of pruning time, pruning intensity and bagging on volume of fruit (cm^3)

Interaction effect among different time of pruning, Pruning intensity and Bagging gave highest volume of Fruit in $T_3P_2D_2$ (15 June+50% +30 days after fruit set) during both the years. The lowest Number of volume of fruit was recorded in $T_1P_1D_1$ (15 May+25% +20 days after fruit set) during both the years. The effect of treatments on control was also found significant during both the years. Bajpai *et al.* (1973) [28] observed that more volume and fruit weight under severe pruning than control. Ali *et al.* (2014) [24] reported that the fruit volume gave the highest values at 20 cm of new pruned shoots in the month of May and June.The maximum fruit weight and volume of fruit was found in the Lucknow-49 variety according to Mehta *et al.* (2018) [25].

Table 1: Interaction effect among different time of pruning, pruning intensity and bagging on fruit yield (kg/tree)

Treatment Combinations	Fruit yield (kg/tree) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	14.48	19.60	30.38	41.79	50.73	63.42
D_2 (30 Days After Fruit Set))	18.49	24.69	36.90	46.53	58.80	69.69
Factors	A	B	C		AXBXC	
SE (m)±	0.48	0.39	0.39		0.97	
C.D	1.43	1.16	1.16		NS	
Treatment Combinations	**Fruit yield (kg/tree) (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1 (20 Days After Fruit Set)	17.82	21.81	32.52	43.81	39.42	65.33
D_2 (30 Days After Fruit Set))	20.52	26.60	38.92	48.55	60.97	72.18
Factors	A	B	C		AXBXC	
SE (m)±	1.87	1.52	1.52		3.74	
C.D	5.49	4.48	4.48		NS	

Table 2: Interaction effect among different time of pruning, pruning intensity and bagging on fruit efficiency

Treatment Combinations	Fruit efficiency (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	18.78	24.66	33.65	42.70	52.80	64.46
D_2 (30 Days After Fruit Set))	22.81	26.67	37.44	47.41	56.31	74.96
Factors	A	B	C		AXBXC	
SE (m)±	0.472	0.386	0.386		0.945	
C.D	1.386	1.132	1.132		2.772	
Treatment Combinations	**Fruit efficiency (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1 (20 Days After Fruit Set)	20.80	26.85	36.34	44.73	54.82	66.50
D_2 (30 Days After Fruit Set))	24.83	35.14	39.48	49.46	58.42	76.97
Factors	A	B	C		AXBXC	
SE (m)±	0.659	0.538	0.538		1.317	
C.D	1.932	1.577	1.577		NS	

Table 3: Interaction effect among different time of pruning, pruning intensity and bagging on number of new shoot per prune branch

Treatment Combinations	Number of new shoot per prune branch (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	2.33	3.00	3.33	4.00	5.33	6.00
D_2 (30 Days After Fruit Set))	2.66	3.33	3.66	4.00	5.33	6.33
Factors	A	B	C		AXBXC	
SE (m)±	0.21	0.17	0.17		0.42	
C.D	0.62	0.50	0.50		NS	
Treatment Combinations	**Number of new shoot per prune branch (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1 (20 Days After Fruit Set)	3.00	3.66	4.33	4.66	5.66	7.00
D_2 (30 Days After Fruit Set))	4.33	3.66	4.33	5.00	6.66	8.00
Factors	A	B	C		AXBXC	
SE (m)±	0.35	0.29	0.29		0.71	
C.D	1.05	0.92	0.92		NS	

Table 4: Interaction effect among different time of pruning, pruning intensity and bagging on length of new shoot

Treatment Combinations	Length of new shoot (cm) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	43.50	44.82	52.71	54.55	57.03	67.03
D_2 (30 Days After Fruit Set))	44.52	44.64	52.76	55.43	61.82	69.29
Factors	A	B	C		AXBXC	
SE (m)±	0.65	0.53	0.53		1.31	
C.D	1.92	1.57	1.57		NS	
Treatment Combinations	**Length of new shoot (cm) (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1 (20 Days After Fruit Set)	45.17	46.21	54.90	56.71	57.87	69.22
D_2 (30 Days After Fruit Set))	46.72	47.01	53.66	57.79	63.50	73.32
Factors	A	B	C		AXBXC	
SE (m)±	0.35	0.29	0.29		0.71	
C.D	1.05	0.92	0.92		NS	

Table 5: Interaction effect among different time of pruning, pruning intensity and bagging on number of flower per branch

Treatment Combinations	Number of flower per branch (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	114.33	260.00	283.33	291.33	300.66	297.66
D_2 (30 Days After Fruit Set))	162.66	279.33	263.66	297.66	306.33	331.66
Factors	A	B	C		AXBXC	
SE (m)±	9.34	7.63	7.63		18.69	
C.D	27.41	22.38	22.38		NS	
Treatment Combinations	**Number of flower per branch (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1 (20 Days After Fruit Set)	144.33	261.00	248.00	264.33	310.00	360.00
D_2 (30 Days After Fruit Set))	192.66	231.66	251.66	296.33	304.00	395.33
Factors	A	B	C		AXBXC	
SE (m)±	6.84	5.58	5.58		13.68	
C.D	20.0	16.38	16.38		40.13	

Table 6: Interaction effect among different time of pruning, pruning intensity and bagging on fruit set (%)

Treatment Combinations	Fruit set (%) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	53.63	52.77	54.28	56.40	58.46	60.43
D_2(30 Days After Fruit Set))	51.47	53.73	55.48	57.53	59.52	62.32
Factors	A	B	C		AXBXC	
SE (m)±	0.63	0.51	0.51		1.26	
C.D	1.86	1.51	1.51		NS	
Treatment Combinations	**Fruit set (%) (2022)**					
	T_1 (15 May)		**T_2 (30 May)**		**T_3 (15 June)**	
	P_1 (25% Pruning)	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**	**P_1 (25% Pruning)**	**P_2 (50% Pruning)**
D_1(20 Days After Fruit Set)	52.44	56.78	61.98	64.92	68.40	72.46
D_2(30 Days After Fruit Set))	54.39	58.34	62.34	66.56	70.44	74.57
Factors	A	B	C		AXBXC	
SE (m)±	0.64	0.52	0.52		1.28	
C.D	1.88	1.54	1.54		NS	

Table 7: Interaction effect among different time of pruning, pruning intensity and bagging on fruit retention (%)

Treatment Combinations	Fruit retention (%) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	37.67	40.44	42.46	44.52	46.48	48.52
D_2(30 Days After Fruit Set))	39.56	41.53	43.59	45.71	47.25	49.59
Factors	A	B	C		AXBXC	
SE (m)±	0.37	0.30	0.30		0.75	
C.D	1.10	0.89	0.89		NS	
Treatment Combinations	**Fruit retention (%) (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3(15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	40.57	44.51	48.36	52.91	56.31	60.32
D_2(30 Days After Fruit Set))	42.91	53.10	50.84	54.33	58.78	62.66
Factors	A	B	C		AXBXC	
SE (m)±	1.27	1.03	1.03		2.54	
C.D	3.73	3.04	3.04		NS	

Table 8: Interaction effect among different time of pruning, pruning intensity and bagging on number of fruit per tree

Treatment Combinations	Number of fruit per tree (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	82.00	102.33	114.00	132.33	142.33	166.00
D_2(30 Days After Fruit Set))	101.66	111.33	120.33	135.66	155.33	169.00
Factors	A	B	C		AXBXC	
SE (m)±	1.14	0.93	0.93		2.28	
C.D	3.34	2.73	2.73		NS	
Treatment Combinations	**Number of fruit per tree (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	86.66	107.33	119.00	136.00	145.66	171.33
D_2(30 Days After Fruit Set))	106.66	116.33	125.33	140.00	160.00	177.00
Factors	A	B	C		AXBXC	
SE (m)±	1.11	0.91	0.91		2.23	
C.D	3.28	2.67	2.67		NS	

Table 9: Interaction effect among different time of pruning, pruning intensity and bagging on fruit weight (g)

Treatment Combinations	Fruit weight (g) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	62.73	118.10	133.46	158.06	166.20	164.36
D_2(30 Days After Fruit Set))	73.00	123.96	153.26	161.76	160.96	182.26
Factors	A	B	C		AXBXC	
SE (m)±	3.94	3.22	3.22		7.89	
C.D	11.57	9.45	9.45		NS	
Treatment Combinations	**Fruit weight (g) (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1(20 Days After Fruit Set)	68.16	98.41	107.21	109.74	103.12	120.81
D_2(30 Days After Fruit Set))	84.45	87.09	101.52	96.13	138.72	220.53
Factors	A	B	C		AXBXC	
SE (m)±	3.50	2.86	2.86		7.01	
C.D	10.29	8.40	8.40		20.58	

Table 10: Interaction effect among different time of pruning, pruning intensity and bagging on volume of fruit (cc)

Treatment Combinations	Volume of fruit (cc) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	56.00	99.60	101.13	96.63	127.43	134.86
D_2 (30 Days After Fruit Set))	85.26	76.06	100.53	91.40	141.00	196.63
Factors	A	B	C		AXBXC	
SE (m)±	5.51	4.50	4.50		11.02	
C.D	16.17	13.20	13.20		32.35	
Treatment Combinations	**Volume of fruit (cc) (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	60.04	99.82	110.82	100.65	130.96	134.05
D_2 (30 Days After Fruit Set))	88.74	79.75	104.59	95.62	130.30	205.26
Factors	A	B	C		AXBXC	
SE (m)±	5.54	4.52	4.52		11.08	
C.D	16.25	13.27	NS		32.50	

Table 11: Interaction effect among different time of pruning, pruning intensity and bagging on fruit length (cm)

Treatment Combinations	Fruit length (cm) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	4.64	5.45	5.73	6.60	7.04	7.41
D_2 (30 Days After Fruit Set))	4.44	6.23	6.15	6.80	7.03	8.14
Factors	A	B	C		AXBXC	
SE (m)±	0.13	0.10	0.10		0.26	
C.D	0.39	0.32	0.32		NS	
Treatment Combinations	**Fruit length (cm) (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	4.78	5.76	6.40	7.38	7.23	7.56
D_2 (30 Days After Fruit Set))	4.93	6.66	6.62	6.85	7.30	8.45
Factors	A	B	C		AXBXC	
SE (m)±	0.08	0.06	0.06		0.16	
C.D	0.24	0.19	0.19		0.48	

Table 12: Interaction effect among different time of pruning, pruning intensity and bagging on fruit width (cm)

Treatment Combinations	Fruit width (cm) (2021)					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	4.50	4.87	6.10	6.87	7.05	7.50
D_2 (30 Days After Fruit Set))	4.91	6.05	6.31	7.03	7.05	8.12
Factors	A	B	C		AXBXC	
SE (m)±	0.10	0.08	0.08		0.20	
C.D	0.30	0.24	0.24		NS	
Treatment Combinations	**Fruit width (cm) (2022)**					
	T_1 (15 May)		T_2 (30 May)		T_3 (15 June)	
	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)	P_1 (25% Pruning)	P_2 (50% Pruning)
D_1 (20 Days After Fruit Set)	4.55	5.49	6.24	7.14	7.29	7.63
D_2 (30 Days After Fruit Set))	5.23	6.13	6.37	6.84	7.70	8.31
Factors	A	B	C		AXBXC	
SE (m)±	0.09	0.07	0.07		0.18	
C.D	0.27	0.22	0.22		NS	

Conclusion

The result obtained from the present investigation, it can be concluded that among different pruning time 15th June, Pruning intensity 50% and bagging 30 days after fruit set was found most effective in improving flowering, physical fruiting attributes and yield parameters of guava fruit. Thus, pruning of guava trees on 15th June following 50 percent pruning intensity of annual shoot growth and bagging 30 days after fruit set can be recommended to obtain higher yield of quality fruit, and maximizing the return for guava growers of Northern Gangetic plains of India.

References

1. Cheema GS, Deshmukh SB. Culture of guava and its improvement by selection in Western India. India Bull. Dept. Agric. Bombay; c1927. p. 38.
2. Meena KR, Maji S, Kumar S, Verma S. Influence of shoot pruning for crop regulation and Improving fruit yield of guava. Bioscan. 2016;11(2):1355-1359.
3. Kumar A, Pande NC, Tripathi VK. Influence of pruning severity on the flowering and fruiting of peach. Farm Science Journal. 2005;14(1):12-13.
4. Singh G, Pandey D, Rajan S, Singh AK. Crop regulation

in guava through different crop regulation treatments. Fruit Paris. 1996;51(4):241-246.
5. Quijada O, Ramirez R, Castellano G, Sayago E. The effect of pruning on production in guava (*Psidium guajava* L.) cultivation in Sucre municipality, Zulia, Venezuala. Proc. Inter- Am Soc. Trop. Hort. 2005;49:115-117.
6. Lal S. Effect of pruning on crop regulation in guava (*Psidium guajava* L.) var. Lucknow - 49. Prog. Hort. 1983;7(3):60-62.
7. Singh G, Singh AK, Rajan S. Influence of pruning date on fruit yield of guava (*Psidium guajava* L.) under subtropics. J Appl. Hort. 2001;3(1):37-40.
8. Jadhav BJ, Mahurkar VK, Kale VS. Effect of time and severity of pruning on growth and yield of guava (*Psidium guajava* L.) cv. Sardar. Orissa J Hort. 2002;30(2):83-86.
9. Singh D, Chauhan JS. Effect of different pruning and Nitrogen levels on growth, yield and quality of peach (*Prunus persica* Batsch) cv. July Elberta. Haryana J Hort. Sci. 1998;27(2):92-97.
10. Dubey AK, Singh DB, Dubey N. Deblossoming of summer season flowering of guava (*Psidium guajava* L.) by shoot pruning. Prog. Hort. 2001a;33(2):165-168.
11. Widyastuti RD, Susanto S, Melati M, Kurniawati A. Effect of Pruning Time on Flower Regulation of Guava (*Psidium guajava*). IOP conf. series: journal of physics conf. series, 2019, 1155.
12. Suleman M, Sharma JR, Kumar R, Gupta RB, Singh. Effect of pruning on growth and cropping pattern in guava cv. Lucknow- 49. Haryana J Hort. Sci. 2006;35(3/4):211-212.
13. Boora RS, Dhaliwal HS, Arora NK. Crop regulation in guava. Agric. Rev. 2016;37(1):1-9.
14. Dhaliwal GS, Rattanpal HS, Gill HS. Effect of time and severity of pruning on cropping and physico-chemical properties of Sardar guava. Haryana J Hort. Sci. 2000;29(1/2):17-20.
15. Saini H, Baloda S, Vijay. Impact of heading back and pinching on vegetative and reproductive parameters of guava (*Psidium guajava* L.) under high density plantation. J Krishi Vigyan. 2016;4(2):47-53.
16. Choudhary K, Dhakare BB. Influence of Pruning Intensities on Growth, Yield and Fruit Attributes of Custard Apple. Int. J Curr. Microbiol. App. Sci. 2018;7:5311-5315.
17. Singh A, Singh S, Kaur Amarjeet. Effect of pruning on yield attributes in guava cv. Allahabad Safeda. J.of Emer. Techno. and Innov. Res. 2020;7(3):2349-5162.
18. Adhikari S, Kandel TP. Effect of time and level of pruning on Vegetative Growth, Flowering, Yield, and Quality of Guava. Int. J of Fruit Sci. 2015;15:290-301.
19. El-Sauda A. Effect of pruning on growth, flowering and fruiting of some guava cultivars. M.Sc. Agri. Thesis, Department of Pomology, Facultyof Agriculture, Cairo University; c2005.
20. Brar JS, Thakur A, Arora NK. Effect of pruning intensity on fruit yield and quality of guava (*Psidium guajava* L.) cv. Sardar. Haryana J Hort. Sci. 2007;36(41):65-66.
21. Singh H, Boora RS, Singh G. Effect of pruning on crop regulation of guava cv. Allahabad Safeda. Haryana J Hort. Sci. 2007b;36(3/4):270.
22. Sah H, Lal S, Negi SS. Effect of pruning on growth, flowering and yield in high density planting of guava. Int. J Pure App. Bio-sci. 2017;5(1):285-292.
23. Luiz AL, Claudia SM, Claudio RP, Inorbert DM, Marlon VM, Flavio DT. Times and intensities of pruning in guava 'Paluma'. Rev. Bras. Frutic. 2008, 30(4).
24. Ali F, Sahar F, Abdel-Hameed AA. Effect of pruning on yield and fruit quality of guava trees. J Agric. Vet. Sci. 2014;7(12):41-44.
25. Mehta SK, Singh KK, Rana DK, Bhartwal Pratibha, Brahmanand. Evaluation of Physico-Chemical Parameters of different Varieties of Guava (*Psidium guajava* L.) under Sub-tropical Condition of Garhwal Himalaya (Uttarakhand), India. Int. J Advanced Scientific Res. and Management, Special, 2018 I. ISSN 2455-6378.
26. Singh A. Irradiation of polymer blends containing a polyolefin. Radiation Physics and Chemistry. 2001 Jan 1;60(4-5):453-9.
27. Singh G, Ramey DR, Morfeld D, Shi H, Hatoum HT, Fries JF. Gastrointestinal tract complications of nonsteroidal anti-inflammatory drug treatment in rheumatoid arthritis: a prospective observational cohort study. Archives of internal medicine. 1996 Jul 22;156(14):1530-6.
28. Bajpai RK, Gupta AK, Rao MG. Binary and ternary ion-exchange equilibriums. Sodium-cesium-manganese-Dowex 50 W-X 8 and cesium-manganese-strontium-Dowex 50 W-X 8 systems. The Journal of Physical Chemistry. 1973 May;77(10):1288-93.