

## Role of Pruning and Bioregulators in Reproductive and Yield Attributes of Guava (*Psidium guajava* L.) Variety Sardar

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### ABSTRACT

The present investigation was conducted to ascertain the effect of pruning (10-20cm of shoot length) and bio regulators (NAA 250ppm, Urea 15%, Ethrel 500ppm and Cycocel 50ppm) on reproductive and yield parameters of guava variety Sardar. Observations revealed that pruning treatment significantly influenced both reproductive and yield parameters of trees. Significantly maximum Days taken from 50% flowering to harvesting (56.50), Duration of flowering (21.85), Number of flowers per plant (48.97), Per cent fruit set (78.10%), Number of fruits/plant (37.60), Fruit yield /plant (5.51), Fruit yield /ha (1.52) and minimum total crop duration (120.25) were noted in pruned plants. Although, the minimum days taken from 50% flowering to harvesting (51.75) and maximum duration of flowering (24.38), Number of flowers per plant (52.81), Per cent fruit set (85.50%), total crop duration (127.38), Number of fruits/plant (41.75), Fruit yield/plant (6.31), Fruit yield /plant (1.83) were found in bio regulator treatments, effect of NAA was more pronounced. All reproductive and yield parameters were significantly influenced by interaction of pruning and bio regulators except Total crop duration which showed non significant difference, In interaction Pruning with NAA 250ppm treated plants exhibited maximum Number of fruits/plant (48), Fruit yield /plant (6.88), Fruit yield /ha (1.92).

**Key words:** NAA, Guava, Bioregulators, Urea, Cycocel.

### INTRODUCTION

Guava (*Psidium guajava* L.) belongs to family Myrtaceae, the apple of tropics and it is one of highest fruit in area and production after citrus, mango, grapes and banana. The fruit is extensively used in the processing industry and

many delicious products such as Jam, Jelly, excellent salad and pudding. Pruning is one of the oldest cultural practices which are practiced in temperate and sub-tropical fruit crops to bring a balance between vegetative and reproductive growth of the plant.

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## MATERIALS AND METHODS

The research experiment was conducted during 2014-15 at Kittur Rani Channamma College of Horticulture, Arabhavi, Karnataka, India. Experimental material consisted of ten-year-old uniform trees of guava variety Sardar. The treatment consisted of two pruning levels, i.e. no pruning (P1), pruning (P2) and five bio regulators treatment, i.e. control = T1, NAA 250 ppm = T2, Urea 15% = T3, Ethrel 500 ppm = T4 and Cycocel 50 ppm = T5 all treatments were applied as foliar spray at 50% flowering stage. There were ten treatment combinations each replicated four times in factorial randomized block design. Shoot pruning of current season's growth was done at 10- 20 cm of shoot length. It was performed in the first week of May. In order to study the percentage of fruit set, twenty branches for each tree of eight treatments were selected at random; then tagged and their flowers were counted during the full bloom. Fruit lets were also counted and recorded at the right time of fruit setting in mid June. Fruit set was calculated as a percentage of the initial number of flowers as follows:

$$\text{Fruit Set \%} = \frac{\text{Number of developed fruit lets}}{\text{Total number flowers at full blooms}} \times 100$$

Fruits were harvested at regular intervals at full maturity. The total yield was calculated by adding the values obtained in different harvesting and it is expressed in kilogram per plant. Statistical analysis was performed using web agri stat package (WASP) Version 2.0<sup>8</sup>. All the data collected were analyzed by one way analysis of variance (ANOVA). Significant differences among means at  $P = 0.05$  were determined by post hoc tests using Duncan's multiple range test.

## RESULTS AND DISCUSSION

**Effect of pruning and bio regulator treatment on reproductive parameters in guava (Table.1)**

**Days taken from 50% flowering to harvesting:**

The perusal of the data related to days taken from 50% flowering to harvesting revealed

significant differences for pruning. Highest values (56.5 days) were obtained from plants pruned trees. This may be because light pruned trees stored more reserved food compared to severe pruned trees. Moreover, in severe pruned trees, a part of energy is always lost in healing the pruning setback in plants. Sundarajan and Muthuswamy<sup>24</sup> reported that shoots flowered earlier by 3-28 days in pruned plants, than in the unpruned plants of guava, and also pruning increased the number of flowers and fruits per shoot in guava. The interpretation of data related to days taken from 50% flowering to harvesting as influenced by bio regulator treatment also showed significant differences. The days taken were significantly higher (55.38) in the plants sprayed with urea 15% and lower (51.75) in cycocel treated plants. Brar and Bal<sup>3</sup> reported ethephon 500 ppm recorded less number of days taken for harvesting. Garasiya *et al*<sup>6</sup> reported NAA 40ppm recorded late harvesting compared to control. Urea 15% influenced early cropping<sup>4</sup>. The interaction effect revealed that maximum days taken was obtained in the treatment combination of P1T1 (pruned but not sprayed with any bio regulator).

### Duration of flowering

The longest (21.85) duration of flowering was found in pruned plants when compared to unpruned plants, this may be because light pruned trees stored more reserved food compared to un pruned trees. Moreover, in severe pruned trees, a part of energy is always lost in healing the pruning setback in plants. Among different bio regulator treatments significantly maximum (24.38) duration of flowering observed in urea 15% sprayed plants and lesser (18.38) duration in ethrel treated plants. Interaction also exhibited significant difference with longest (26.5) duration from P1T3 treatment combination and shortest (17.00) was observed in P1T2 and P1T4 respectively. Brar and Bal<sup>3</sup> also found a positive response with respect to ethrel treatment. Ethrel induced leaf shed, causing reduced transfer of the stimulus necessary for induction of flower buds this reduces duration of flowering<sup>3</sup>.

### Number of flowers per plant

The trend of results of present investigations with respect to number of flowers per plant as influenced by pruning showed significant difference. The interpretation of results indicated that the number of flowers per plant after pruning was considerably high (48.97) compared to unpruned plants. These findings are in agreement with the results of Serrano *et al.*<sup>18</sup> who reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma. Sundarajan and Muthuswamy<sup>24</sup> reported that pruning increased the number of flowers and fruits per shoot in guava. Mehta *et al.*<sup>12</sup> also reported that pruning three times a year resulted in maximum number of flowers per plant, the present findings are in close conformity with Bajpai *et al.*<sup>2</sup>, Gopikrishna<sup>7</sup> in guava. With respect to bio regulator treatment, there was a significant effect observed. Maximum number of flowers of 52.81 was recorded in urea treated plants, which is due to significant increase in shoot number that ultimately ended in an individual flower. It is in agreement with the results obtained by Giriraj Jat and Kacha<sup>9</sup>. The interaction effect revealed significant differences for number of flowers, high values for number of flowers (56.00) was recorded in P2T3 treatment combination.

### Per cent fruit set (%)

The data pertaining to the per cent fruit set as influenced by pruning revealed significant differences, plants under gone pruning were recorded maximum values for per cent fruit set (78.10 %). It might be due to the fact that the plant accumulates food reserve during rainy season which was diverted for the development of more fruits during winter season. Similarly Shaban and Haseeb<sup>19</sup> found increased in fruit set in pruned trees compared to control. The interpretation of data related to bio regulator treatment on per cent fruit set was found to be significantly higher in plants that were treated with NAA and cycocel. Similar result was reported by Kundu and Mitra<sup>10</sup>. Interactions revealed that plants pruned and sprayed with NAA recorded maximum per cent fruit set.

### Total crop duration

The perusal of the data related to total crop duration revealed significant differences for pruning, highest values were obtained from unpruned plants. Similarly Ming-Ya Huang<sup>13</sup> reported reduced crop duration when plants are pruned in May-June. The interpretation of data related to total crop duration as influenced by bio regulator also showed significant differences. Total crop duration was significantly higher in the plants treated with NAA. The interaction effect revealed non-significance for crop duration, among that maximum total crop duration was obtained in the treatment combination of P1T2 (130.21).

### Effect of pruning and bio regulator treatment on yield parameters in guava (Table.2)

Pruning, bio regulators and their interaction had significant effect on number of fruits per plant, weight of fruit per plant and yield per hectare. As compared to unpruned plants pruned plants got maximum number of fruits per plant (37.60), weight of fruit per plant (5.51) and yield per hectare (1.52). This performance of plants may be because light pruning which might have increased the reproductive growth compared to unpruned plants which gave rise to more vegetative growth, Further there is possibility that the zone of flowering/fruitlet buds in guava may be located at this length of shoot (10-15 cm from tip of shoot) thereby resulting in more flowering and fruit set in these plants. Among the bio regulator treatment, highest number of fruits plant (41.75), weight of fruit per plant (6.31) and yield per hectare (1.83) was recorded in T2. Exogenous application of auxins maintains the ongoing physiological and biochemical functions which influence the pattern of organ differentiation that may change uptake translocation and accumulation of mineral nutrient in plant. Mohammad *et al.*<sup>14</sup>, Abbas *et al.*<sup>1</sup> also reported similar results. Among interaction of pruning and bio regulator showed significant variation with respect to number of fruits per plant (48.00), Weight of fruit per plant (6.88) and yield per hectare (1.92) were recorded in P2T2 plants which were highest compared to other

treatment combinations. It may be due to the fact that control trees were exhausted because of heavy crop load during rainy season resulting into poor yield in winter<sup>25</sup>. The findings of Tiwari *et al.*<sup>26</sup> have given support to the findings of this investigation. They reported that significantly higher yield in winter season (64.8 Kg) was recorded in the

trees subjected to hand deblossoming and it was followed by half-shoot pruning (54.0 kg) and 1000 ppm NAA (49.6 Kg). Serrano *et al.*<sup>18</sup> reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma. Similar results were also given by Salah<sup>16</sup>, Bajpai *et al.*<sup>2</sup>, Gopikrishna<sup>7</sup> in guava.

**Table 1: Effect of pruning and bio regulators on reproductive parameter of guava**

Treatments	Days taken from 50% flowering to harvesting	Duration of flowering	Number of flowers per plant	Per cent fruit set	Total crop duration
<b>Pruning</b>					
P <sub>1</sub> (No pruning )	51.55	19.45	42.70	73.75	125.20
P <sub>2</sub> (Pruning)	56.50	21.85	48.97	78.10	120.25
S.Em±	0.49	0.83	1.10	1.43	1.51
CD at 5%	1.41	2.42	3.20	4.15	4.37
<b>Bio regulator treatments</b>					
T <sub>1</sub> ( Control)	54.63	18.75	33.26	62.63	113.13
T <sub>2</sub> ( NAA 250 ppm)	53.00	18.63	48.75	85.50	127.38
T <sub>3</sub> ( Urea 15%)	55.38	24.38	52.81	71.13	124.86
T <sub>4</sub> ( Ethrel 500 ppm)	54.25	18.38	44.43	75.37	125.38
T <sub>5</sub> ( Cycocel 50 ppm)	51.75	23.13	44.25	85.50	122.88
S.Em±	0.77	1.32	1.75	2.26	2.38
CD at 5%	2.23	3.82	5.06	6.57	6.91
<b>Interactions</b>					
P <sub>1</sub> T <sub>1</sub>	51.00	14.50	33.26	65.00	115.50
P <sub>1</sub> T <sub>2</sub>	52.25	17.00	44.25	81.25	130.21
P <sub>1</sub> T <sub>3</sub>	50.25	26.50	48.75	66.50	126.52
P <sub>1</sub> T <sub>4</sub>	51.50	17.00	43.50	73.25	128.23
P <sub>1</sub> T <sub>5</sub>	50.50	22.25	43.75	83.75	125.50
P <sub>2</sub> T <sub>1</sub>	58.25	23.00	44.00	60.25	110.75
P <sub>2</sub> T <sub>2</sub>	53.75	20.25	53.87	89.75	124.53
P <sub>2</sub> T <sub>3</sub>	60.50	22.25	56.86	75.75	123.22
P <sub>2</sub> T <sub>4</sub>	57.00	19.75	45.37	77.50	122.51
P <sub>2</sub> T <sub>5</sub>	53.00	24.00	44.75	87.25	120.25
S.Em±	1.09	1.86	2.47	3.20	3.37
CD at 5%	3.15	5.41	7.16	9.29	NS
CV (%)	4.04	18.05	8.37	6.24	5.49

- Pruning followed at 10-20 cm of shoot length
- NS – Non-significant

Table 2: Effect of pruning and bio regulators on yield parameters of guava

Treatments	Number of fruits/plant	Fruit yield /plant (kg)	Fruit yield /ha (tonnes)
<b>Pruning</b>			
P <sub>1</sub> (No pruning )	31.00	4.56	1.34
P <sub>2</sub> (Pruning)	37.60	5.51	1.52
S.Em±	0.90	0.10	0.03
CD at 5%	2.60	0.29	0.08
<b>Bio regulator treatments</b>			
T <sub>1</sub> ( Control)	22.00	2.75	0.80
T <sub>2</sub> ( NAA 250 ppm)	41.75	6.31	1.83
T <sub>3</sub> ( Urea 15%)	37.88	5.76	1.62
T <sub>4</sub> ( Ethrel 500 ppm)	33.50	5.06	1.40
T <sub>5</sub> ( Cycocel 50 ppm)	36.38	5.29	1.47
S.Em±	1.42	0.16	0.05
CD at 5%	4.12	0.46	0.13
<b>Interactions</b>			
P <sub>1</sub> T <sub>1</sub>	21.00	2.58	0.74
P <sub>1</sub> T <sub>2</sub>	35.50	5.75	1.74
P <sub>1</sub> T <sub>3</sub>	32.50	4.93	1.40
P <sub>1</sub> T <sub>4</sub>	32.00	4.50	1.38
P <sub>1</sub> T <sub>5</sub>	34.00	5.07	1.41
P <sub>2</sub> T <sub>1</sub>	23.00	2.93	0.87
P <sub>2</sub> T <sub>2</sub>	48.00	6.88	1.92
P <sub>2</sub> T <sub>3</sub>	43.25	6.60	1.83
P <sub>2</sub> T <sub>4</sub>	35.00	5.60	1.42
P <sub>2</sub> T <sub>5</sub>	38.75	5.53	1.54
S.Em±	2.01	0.23	0.06
CD at 5%	5.83	0.65	0.19
CV(%)	11.72	8.97	8.97

- Pruning followed at 10-20 cm of shoot length

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