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Effect of Pruning Severity and Spraying Some Chemical Substances on Growth and Fruiting of Guava Trees

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Abstract: An experiment was carried out on 25 years old guava trees hybrid I grown at the nursery of the faculty of Agriculture, Cairo University, Giza, Egypt during the two successive seasons, 2005 and 2006. Trees were subjected to the following pruning treatments, pinching, moderate or severe pruning and sprayed on 15th February after pruning with potassium nitrate (1, 2 and 4%) or ethephon (200, 400 and 600 ppm) or dormex (0.5, 1 and 1.5%) compared with the control(sprayed with water only), to study their effect on inducing growth and yield of guava trees. Results showed a significant increase in average index number of bud burst and shoot length with severe pruning plus spraying potassium nitrate at 4% concentration compared to the other treatments. Moderate pruning plus spraying ethephon at 600 ppm produced the highest number of new shoots in both seasons. Dormex at 1.5% with moderate pruning gave the highest average index number of flower bud burst in the first season. Meanwhile, ethephon at 600 ppm with severe pruning produced the highest average index number of flower bud burst in the second season. A pronounced and significant increase in initial fruit set was found with moderate pruning and application of potassium nitrate at 4%. Also, pruning treatments with spraying chemicals substances improved tree yield.

Key words: Guava % Pruning % Potassium nitrate % Ethephon % Dormex % Growth % Fruit set % Yield

INTRODUCTION

Guava (*Psidium gujava* L.) belongs to family Myrtaceae, the apple of tropics and it is one of the 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 is practiced in temperate and sub-tropical fruit crops to bring a balance between vegetative and reproductive growth of the plant. In guava the flowers and fruits are borne on current season growth. A light annual pruning is considered necessary to encourage new shoots after the harvest. A better understanding of the effect of pruning is the need of an hour. The pruning of guava has not received much attention, when we see its economic importance, it can be justified. Lal [1] indicated that the yield of guava cv Sardar was improved by pruning. Also, Salah [2] produced the highest bud emergence of guava by using severe and moderate pruning. The time and intensity of pruning affected guava cv. Paluma tree sprout and yield [3]. Moreover, Serrano *et al.* [4] reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma. Pruning and hydrogen cyanamide were found to modify the production curve of guava [5].

Moreover, Vazquez *et al*. [6] promoted cropping of guava by pruning and ethephone at 600 ppm. Urea or NAA or Ethephon has been applied to guava trees in a vigorous vegetative state of growth to change yield patterns [7,8]. Singh *et al.* [9] indicated an increase in yield of guava by using potassium nitrate. Also, Rabelo *et al*. [10] used Ethrel for improving fruit set of mango cv. Haden.

This study aimed to investigate the influence of pruning severity and spraying potassium nitrate, ethephon or dormex on inducing vegetative growth and fruiting of guava trees.

MATERIALS AND METHODS

The experiment was carried out during two successive seasons, 2005 and 2006 on guava trees hybrid I produced by Bakr and Selim [11] and budded on seedlings of guava and grown at the nursery of the

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faculty of Agriculture, Cairo University, Giza, Egypt. The trees were about 25 years old and spaced at 5X5 m apart in clay loamy soil. Pruning treatments were carried out on 15th of February in both seasons. Three levels of pruning were used as follows: (I) Pinching: removing the apical bud of one year old shoot. (II) Moderate pruning: Removing 25% from length of one year old shoot. (III) Severe pruning: Removing 50% from length of one year old shoot. Beside the control trees which left without pruning.

Application of foliar spray was done on 15th February after pruning treatments in both seasons with potassium nitrate (KNO_3) at 1, 2 or 4% concentrations, ethephon (2-chloroethyl-phosphonic acid) at 200, 400 or 600 ppm and dormex (Hydrogen cyanamide) at 0.5, 1 or 1.5%. Control trees were sprayed with tap water. The completely randomized block design was used, where each treatment was replicated three times with one tree for each replicate. A sufficient numbers of one year old shoots (15 shoots), spread over all the direction of the experimented trees, were chosen randomly and labeled before the beginning of growing season (1st week of March) to investigate the following:

- Bud Burst Activity: Six steps of bud burst) was recorded as mentioned by Bakr [12]. These steps were: Dormant bud, swelling bud, bud burst, folded leaf, starting of growth and developed growth. These successive steps were characterized by index number from 1 up to 6 and they were used to refer to these stages. Individual buds were examined every 7 days from March till May.
- Shoot length (cm), length of the new shoots was measured at the end of growing season in September in both seasons.
- Number of the new shoots per one year old shoot was counted at the end of growing season in September in both seasons.
- Flower bud activity, the different stages of flower burst as mentioned by Bakr [12] were followed up on the different nodes of one year old shoots. These stages were also characterized by index number. The index number used in this part of work ranged between 1 up to 7 (starting from emergence of flowers from the axils of leaves till the appearance of the opening flowers by the bursting of the petals).
- Initial fruit set, at full bloom (80% opened flowers), the total number of opened flowers were counted then the number of set fruits were counted two weeks later. Fruit set percentage was calculated according to the following equation:

$$\text{Fruit set \%} = \frac{\text{Number of set fruits}}{\text{Total number of opened flowers}} \times 100$$

- Tree yield (Kg), harvesting time was achieved at the last two weeks of August and September according to Bakr [12] and El-Shrief [13]. Tree yield in kg was estimated by multiplying number of fruits per tree x average fruit weight at harvest time.

Data were tabulated and statistically analyzed according to Snedecor and Cochran [14] and mean values were compared by Duncans multiple range test at 5% [15].

RESULTS AND DISCUSSION

Bud Burst Activity: Data in Table 1 showed a significant increase in bud burst for all tested treatments in the first season. Respecting to the effect of substances, the highest average index number (2.28) was obtained with spraying potassium nitrate followed by ethephon (2.07) and dormex (2.05). Regarding the concentrations of substances, it was clearly noticed that the highest concentration of potassium nitrate (4%) recorded the highest average index number (2.42) and the lowest significant values (1.89) was obtained with the control. The same trend was also found in the second season. Results presented in Table 1 showed a significant increase in average index number of bud burst with increasing severity of pruning in both seasons of study. Severely pruned shoots, produced the significant highest average of index number (2.49 and 2.16) followed by moderate pruning (2.16 and 1.87) , pinching (2.03 and 1.73) then the control trees (1.76 and 1.54) in the first and second seasons, respectively. These results are in line with those obtained by Salah [2] who cleared that severe pruning of guava trees gave the highest percentage of bud emergence followed by moderate pruning. Meanwhile the control trees had the lowest bud emergence percentage. Concerning the interaction between chemical substances, concentrations and pruning severity, it is quite clear that, there were significant differences between all treatments through out the two seasons. Severe pruning combined with potassium nitrate at 4% produced the highest average index number of bud burst (2.77 and 2.40 in the first and second seasons, respectively) comparing with the other interactions used. These results go in parallel with the finding of Vazquez *et al*. [6] as they reported that 50% pruning (severe) resulted in the highest rate of budding of guava cv. Media china trees when budding was forced by using 12% urea, 8% NH_4NO_3, 600 ppm of ethephon and pruning 50% to promote earlier cropping.

Table 1: Effect of pruning Severity and spraying some chemical substances on bud burst activity of guava trees during 2005 and 2006 seasons

		2005 Season Pruning severity						2006 Season Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	2.01j-n	2.02i-n	2.35c-g	2.35c-g	2.18BC	2.28A	1.50fgh	1.80c-f	1.80c-f	2.20ab	1.82AB	1.90A
nitrate	2%	1.94k-n	2.31d-i	2.16e-k	2.59bcd	2.25B		1.50fgh	2.00bcd	2.00bcd	2.200ab	1.92A	
	4%	2.16e-k	2.33d-g	2.42cde	2.77ab	2.42A		1.60e-h	1.80c-f	2.10abc	2.40a	1.97A	
Ethephon	200 ppm	1.77l-o	2.01j-n	2.28e-j	2.43cde	2.12BC	2.07B	1.50fgh	1.90b-e	2.00bcd	2.10abc	1.87A	1.76BC
	400 ppm	1.77l-o	2.01j-n	2.28e-j	2.42cde	2.12BC		1.60e-h	1.60e-h	1.70d-g	2.40a	1.82AB	
	600 ppm	1.49o-p	1.93k-n	2.15e-k	2.31d-h	1.97DE		1.50fgh	1.26h	1.70d-g	1.90b-e	1.59C	
Dormex	0.5%	1.57op	1.73no	1.76mno	2.4cde	1.86E	2.05B	1.60e-h	1.70d-g	1.90b-e	2.10abc	1.82AB	1.85AB
	1%	1.40p	2.03h-m	2.06g-l	2.90a	2.09CD		1.70d-g	1.80c-f	1.80c-f	2.00bcd	1.82AB	
	1.5%	1.93k-n	2.00j-n	2.20e-k	2.63abc	2.19BC		1.50fgh	1.90b-e	2.10abc	2.20ab	1.92A	
Control		1.60op	1.93k-n	1.95k-n	2.10f-k	1.89E	1.89C	1.40gh	1.60e-h	1.60e-h	2.10abc	1.67BC	1.67C
Mean		1.76D	2.03C	2.16B	2.49A			1.54D	1.73C	1.87B	2.16A		

Values followed by the same letter(s) are not significantly different at 5% level

Table 2: Effect of pruning Severity and spraying some chemical substances on shoot length (cm) of guava trees during 2005 and 2006 seasons

		2005 Season Pruning severity						2006 Season Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	18.8h-m	17.6k-o	17.7 k-o	16.4 l-p	17.63 FG	22.28 A	15.3 rs	25.5 h-k	26.3 hij	27.4 fgh	23.63 E	27.94 A
nitrate	2%	22.9b-f	18.5i-n	21.7 c-i	25.1 bc	22.05 C		18.8 pq	29.3 ef	28.7 efg	30.7 e	26.88 C	
	4%	23.1b-f	20.3f-k	32.3 a	33 a	27.17 A		23.4 klm	35.9 cd	34.2 d	39.8 b	33.33 B	
Ethephon	200 ppm	12 q	18.9 h-l	24.5 bcd	26.2 b	20.4 CD	18.78 C	26.6 ghi	19.8 op	29.8 e	35.1 d	27.82 C	21.22 C
	400 ppm	20.3f-k	13.3 pq	24.6 bcd	20.9 e-k	19.77 DE		22.3 mn	17 qr	15.1 rst	24.8 i-l	19.8 F	
	600 ppm	17.7k-o	19.4 g-l	12.2 q	15.4 m-q	16.17 G		19.1 pq	12.9 tu	15.3 rs	16.8 qr	16.02 H	
Dormex	0.50%	14.7 opq	17.7 k-o	18.2 j-n	21.4 d-j	18 F	20.99 B	20.3 nop	13 stu	12.2 u	24 j-m	17.38 G	26.63 B
	1%	18.8 h-m	16.4 l-p	20.5 f-k	24.5 bcd	20.05 DE		27.1 f-i	22.6 lmn	24.2 j-m	26.8 ghi	25.17 D	
	1.50%	34 a	20.8 e-k	22.2 c-h	22.7 c-g	24.92 B		38.1 bc	26.3 hij	30.5 e	54.4 a	37.33 A	
Control		15.3 n-q	21 e-k	13.3 pq	24 b-e	18.4 EF	18.4 C	20.4 nop	14.3 stu	22 mno	24.1 j-m	20.2 F	20.2 D
Mean		19.76 B	18.39 C	20.72 B	22.96 A			23.14 B	21.66 C	23.83 B	30.39 A		

Values followed by the same letter (s) are not significantly different at 5% level

Shoot Length (cm) Data presented in Table 2 clearly indicated that the different treatments significantly improved vegetative growth expressed as final shoot length. Concerning to the effect of substances, the highest average of shoot length (22.28 cm) was recorded with potassium nitrate followed by dormex, ethephon and control (20.99, 18.78 and 18.40 cm) respectively with significant differences in the first season. The same trend was also found in the second season. Regarding the concentration of substances, potassium nitrate at 4% gave the highest average value of shoot length in the first season (27.17 cm) while dormex at 1.5% was the best at the second season (37.33 cm). Meanwhile, 600 ppm of ethephon produced the lowest average value of shoot length in both seasons (16.17 and 16.02 cm in the first and second seasons, respectively). Respecting to the effect of pruning severity data in Table 2 indicated that the shoot length of new shoots on severely pruned shoots was found to be longer than moderate or pinching or the control with significant differences, this was noticed in both seasons of the study. Similarly Bajapai *et al.* [16] found an increase in shoot length by severe pruning in

Table 3: Effect of pruning Severity and spraying some chemical substances on number of new shoots per one year old shoot of guava trees during 2005 and 2006 seasons

		2005 Season						2006 Season					
		Pruning severity						Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	1.70ij	2.30d-g	2.80bc	2.30d-g	2.27CD	2.10B	1.80f-j	2.50bcd	3.00ab	2.00d-h	2.32BC	2.06B
nitrate	2%	1.20kl	1.70ij	3.00ab	2.50c-f	2.10DE		1.80f-j	2.00d-h	2.30c-f	2.00d-h	2.02DE	
	4%	1.00l	2.00ghi	2.10f-i	2.60b-e	1.92E		1.30j	1.83e-i	2.30c-f	2.00d-h	1.85EF	
Ethephon	200 ppm	1.80hij	2.20e-h	2.30d-g	2.00ghi	2.07DE	2.45A	1.30j	1.83e-i	2.30c-f	2.00d-h	1.85EF	2.23A
	400 ppm	1.80hij	3.00ab	3.30a	2.30d-g	2.60AB		1.40ij	2.30c-f	2.60bc	2.30c-f	2.15CD	
	600 ppm	2.00ghi	3.00ab	3.300a	2.50c-f	2.70A		1.80f-j	2.60bc	3.20a	3.23a	2.70A	
Dormex	0.5%	1.00l	2.60b-e	3.30a	2.70bcd	2.40BC	2.37A	1.70g-j	1.40ij	2.00d-h	2.00d-h	1.77EF	2.16AB
	1%	1.50jk	2.00ghi	2.50c-f	2.30d-g	2.07DE		2.00d-h	2.00d-h	2.40cd	2.33cde	2.18CD	
	1.5%	2.30d-g	2.30d-g	3.00ab	3.00ab	2.65A		2.50bcd	2.20c-g	3.00ab	2.50bcd	2.55AB	
Control		2.00ghi	2.10f-i	2.20e-h	2.50c-f	2.20CD	2.20B	1.40ij	1.60hij	2.50bcd	1.50hij	1.75F	1.75C
Mean		1.63D	2.32C	2.78A	2.47B			1.70C	2.02B	2.56A	2.18B		

Values followed by the same letter(s) are not significantly different at 5% level

guava. On the other hand, Gopalkrishna [17] reported that both levels of pruning (severe and moderate pruning) failed to increase the length of the new shoots significantly. Moreover, the moderate pruning had a favorable effect on the production of new shoots with the passage of time [18]. In addition, the interaction between the concentration of chemical substances and severity of pruning indicated that potassium nitrate at 4% with severe pruning gave the highest value of shoot length in the first season (33 cm), meanwhile, dormex at 1.5% and severe pruning was the best in the second season (54.4 cm) compared to the other treatments. On the other hand, the lowest shoot length (12 cm) was recorded with ethephon at 200 ppm without pruning in the first season. Concerning the second season, dormex at 0.5% with moderate pruning produced the lowest shoot length (12.2 cm).

Number of New Shoots: Data in Table 3 revealed that in the first season, ethephon and dormex produced the significant higher average number of new shoots (2.45 and 2.37) followed by the control and potassium nitrate (2.20 and 2.10, respectively). The same trend was observed for ethephon and dormex in the second season but potassium nitrate was better than control. Regarding the concentration of substances, it was clearly noticed that ethephon at 600 ppm gave the highest number of new shoots (2.70) in both seasons (Table 3). However, in the first season the lowest number (1.92) was recorded from the trees sprayed with potassium nitrate at 4%. Also the control recorded the lowest number of new shoots (1.75) in the second season. Concerning the effect of pruning severity, the moderate pruning produced the highest average number of new shoots in both seasons (2.78 and 2.56). Meanwhile, control trees recorded the lowest average number of new shoots in both seasons (1.63 and 1.70). In addition, the interaction between concentration of chemical substances and severity of pruning indicated that moderate pruning with ethephon at 600 ppm produced the highest number of new shoots in both seasons (3.30 and 3.20, in the first and second seasons, respectively). Meanwhile, potassium nitrate at 4% without pruning gave the lowest number of new shoots in both studied seasons (1.00 and 1.30 in the first and second seasons, respectively). Dhaliwal and Gurdarshan [19] found that the vegetative growth of guava cv. Sardar was improved by using pruning.

Flower Bud Activity: Data for flower bud burst are presented in Table 4 indicated that the highest significant average index number of flower bud burst was recorded with spraying ethephon in both seasons (3.73 and 4.57 in the first and second seasons, respectively) followed by potassium nitrate (3.22 and 4.19) in both seasons. Meanwhile, the lowest value was recorded with the control in both studied seasons.

Concerning the concentration of substances, ethephon at 600 ppm produced the highest average index number of flower bud burst in both seasons (4.02 and 4.90 in the first and second season, respectively).

Table 4:Effect of pruning Severity and spraying some chemical substances on flower bud burst of guava trees during 2005 and 2006 seasons

		2005 Season Pruning severity						2006 Season Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	2..90g-j	3.03f-j	3.00f-j	3.30e-h	3.05D	3.22B	3.00st	3.60nop	4.00kl	4.90fg	3.87E	4.19B
nitrate	2%	2.00k	3.10f-i	3.20e-i	4.00c-d	3.07D		3.30qr	3.80lmn	3.96klm	5.00ef	4.01D	
	4%	3.00f-j	3.20e-i	4.00cd	4.00cd	3.55BC		3.30qr	4.20jk	5.50c	5.80b	4.70B	
Ethephon	200 ppm	2.50jk	3.10f-i	4.00cd	4.30bc	3.47C	3.73A	3.60nop	4.30j	4.40ij	5.30cd	4.40C	4.57A
	400 ppm	3.30e-h	3.33e-h	3.40efg	4.80ab	3.70BC		3.10rs	4.60hi	4.70gh	5.30cd	4.42C	
	600 ppm	3.30e-h	3.70de	4.30bc	4.80ab	4.02A		3.40pq	4.90fg	5.00ef	6.30a	4.90A	
Dormex	0.5%	2.00k	3.00f-j	2.70ij	4.00cd	2.92D	3.22B	2.00v	2.80t	3.30qr	3.70mno	2.95H	3.50C
	1%	2.70ij	2.80hij	3.30e-h	3.06f-i	2.96D		3.00st	3.30qr	3.60nop	4.80fgh	3.67F	
	1.5%	2.70ij	3.50def	5.00a	4.00cd	3.80AB		2.50u	3.50opq	4.30j	5.20de	3.87E	
Control		2.00k	2.50jk	3.50def	4.50abc	3.12D	3.12B	3.00st	3.00st	3.60nop	4.00kl	3.40G	3.40D
Mean		2.64D	3.12C	3.64B	4.07A			3.02D	3.80C	4.23B	5.03A		

Values followed by the same letter(s) are not significantly different at 5% level

Table 5: Effect of pruning Severity and spraying some chemical substances on initial fruit set of guava trees during 2005 and 2006 seasons

		2005 Season Pruning severity						2006 Season Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	33.00k	50.00fgh	48.00f-i	49.63fgh	45.16CDE	54.03A	16.70rs	23.40nop	24.60l-o	25.10l-o	22.45	29.21B
	2%	49.70fgh	50.00fgh	69.30bc	50.00fgh	54.75B		18.40qr	22.97op	22.90op	32.20hi	24.12E	
	4%	50.00fgh	60.10de	83.30a	55.30ef	62.17A		44.40bc	37.60ef	55.63a	26.60k-n	41.06A	
Ethephon	200ppm	33.00k	42.87hij	55.30ef	37.60jk	42.19EF	49.78B	17.30r	20.97pq	22.60op	30.00ij	22.7EF	25.61C
	400 ppm	40.00jk	50.00fgh	66.70cd	37.57jk	48.57C		13.80s	22.30op	22.90op	35fgh	23.50EF	
	600 ppm	42.90hij	66.37cd	75.00b	50.00fgh	58.57AB		13.90s	33.20ghi	33.30gh	42.10cd	30.63C	
Dormex	0.5%	33.00k	42.90hij	44.30ghij	33.00k	38.30F	42.49D	21.20pq	21.20pq	23.60m-p	39.90de	26.48D	31.30A
	1%	33.00k	50.00fgh	49.80fgh	41.30ij	43.53DE		16.80rs	26.80j-m	36.10fg	46.40b	31.52C	
	1.5%	42.87hij	40.00jk	66.70cd	33.00k	45.64CDE		32.80hi	33.80gh	35.30fgh	41.70cd	35.90B	
Control		24.80l	51.20fg	64.50cd	44.80ghij	46.33CD	46.33C	10.20t	22.60op	27.70Jkl	28.60jk	22.27F	22.27D
Mean		38.23D	50.34B	62.29A	43.22C			20.55D	26.48C	30.46B	34.76A		

Values followed by the same letter(s) are not significantly different at 5% level

Meanwhile, the lowest average index number of flower bud burst was obtained with 0.5% dormex in both seasons (2.92 and 2.95 in the first and second seasons, respectively). Regarding pruning severity, data presented in Table 4 showed that sever pruning gave the highest significant average index number of flower bud burst in both seasons (4.07 and 5.03) comparing with the other treatment. However control trees recorded the lowest average index number of flower bud burst in both seasons (2.64 and 3.02 in the first and second seasons, respectively). Regarding the interaction between concentration of chemical substances and pruning severity, results indicated that 1.5% dormex with moderate pruning as well as ethephon at 600 or 400 ppm with sever pruning gave the higher average index numbers of flower bud burst (5 and 4.8, respectively) in the first season. Meanwhile, ethephon at 600 ppm with sever pruning produced the highest average index number of flower bud burst (6.30) in the second season. Dhaliwal and Gurdarshan [19] reported that, the start of flowering of guava cv. Sardar was delayed with increasing pruning intensity during rainy and winter seasons also, severe pruning shortened flowering duration.

Initial Fruit Set: From data presented in Table 5, it was noticed that all pruning treatments significantly increased initial fruit set over the control. The highest initial fruit set (62.29) was recorded with moderate pruning in the first

Table 6: Effect of pruning Severity and spraying some chemical substances on yield (Kg) of guava trees during 2005 and 2006 seasons

		2005 Season Pruning severity						2006 Season Pruning severity					
Chemical Substances	Conc.	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean	Control	Pinching	Moderate pruning	Severe pruning	Mean	Mean
Potassium	1%	49.00rs	66.00jk	64.00m	64.23lm	60.81F	69.51A	46.23q	53.47lmn	66.03de	55.10kl	55.21E	59.96B
nitrate	2%	69.23i	67.00j	77.07e	65.67jkl	69.74C		48.13p	53.00mn	62.07h	53.00mn	54.05F	
	4%	66.00jk	75.17f	100a	70.77hi	77.98A		74.13a	67.20d	66.00de	75.20a	70.63A	
Ethephon	200 ppm	48.20s	59.00o	72.00gh	54.07q	58.32H	65.02B	47.10pq	50.67o	60.00i	52.20no	52.49G	55.48C
	400 ppm	56.00p	66.00jk	82.23c	54.33q	64.64D		43.60rs	52.10no	65.00ef	53.00mn	53.42F	
	600 ppm	59.03o	73.00g	91.33b	65.00klm	72.09B		44.00r	63.07gh	72.03b	63.00gh	60.53C	
Dormex	0.5%	49.00rs	59.00o	61.10n	49.17rs	54.57I	58.64D	51.00o	52.00no	69.30c	54.07lm	56.59D	61.05A
	1%	50.20r	66.00jk	65.27klm	57.10p	59.64G		46.27q	56.23jk	75.47a	66.03de	61.00C	
	1.5%	59.13o	56.27p	81.57cd	49.87r	61.71E		62.00h	64.10fg	71.13b	65.00ef	65.56B	
Control		40.27t	66.10jk	80.17d	60.27no	61.70E	61.70C	40.07t	42.27s	59.00i	57.23j	49.64H	49.64D
Mean		52.22D	65.48B	77.92A	59.25C			48.56D	53.22C	65.34A	59.03B		

Values followed by the same letter(s) are not significantly different at 5% level

season and sever pruning (34.76) in the second one. Meanwhile, the lowest initial fruit set (38.23 and 20.55) was recorded with the control in both seasons. All chemical substances significantly increased initial fruit set compared to the control except dormex in the first season which decreased it. A direct relationship was found between concentration of chemical substances and initial fruit set as the highest initial fruit set was recorded with the highest concentrations (4% potassium nitrate, 600 ppm ethephon and 1.5% dormex). Generally, potassium nitrate at 4% significantly increased initial fruit set compared to the other treatments in the first season and this result was confirmed in the second one. A pronounced and significant increase in initial fruit set was recorded with moderate pruning and application of potassium nitrate at 4%, this was noticed in both seasons of study. Meanwhile, the lowest initial fruit set was recorded with the control. These results go in parallel with the finding of Gopalkrishna [17] who reported that sever pruning of branches in guava cv. Sardar adversely affected the production of flowers. However, the degree of adversity was less in moderate pruning as compared to severe pruning. Moderately pruned branches produced higher number of flowers than severely pruned branches. Also, Dhaliwal *et al*. [20] reported that the highest fruit set was observed in trees sprayed with urea (10 and 15%) in winter season. Moreover, the findings of Rabelo *et al*. [10] supported these results as they improved fruit set of mango cv. Haden with ethrel.

Tree Yield (Kg): Concerning the effect of pruning severity on tree yield data in Table 6 showed that all pruning levels significantly increased the yield compared to the control; this result was confirmed in both seasons. Moderate pruning gave the highest significant increase in the yield for the two seasons. Sever pruning and pinching gave a significant intermediate effect between moderate pruning and the control. Regarding the effect of chemical substances the highest tree yield (69.51 kg) was recorded with potassium nitrate in the first season meanwhile, dormex gave the highest tree yield in the second one (61.05). A positive relationship was found between concentration of chemical substances and tree yield where the highest values were recorded with potassium nitrate at 4% or ethehpon at 600 ppm or dormex at 1.5%. Interaction between chemical substances and pruning severity cleared that moderate pruning gave the highest yield (100 kg) with application of potassium nitrate at 4% in the first season and dormex at 1% (75.47 kg) in the second one. Meanwhile, the lowest yield was recorded with the control. These results are in accordance with the findings of Dasarathy [21] who demonstrated that severe pruning produced minimum number of fruits and reduction in yield. Also, Gopalkrishna [17] reported adverse effects of severe pruning in guava cv. Sardar. The findings of Tiwari *et al*. [22] have given support to this view. They reported that a significant 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). On the other hand, the yield was lowest (2.1 Kg) in the control. Lal [1] recorded higher yield in winter as a results of shoot pruning in guava cv. Sardar. Fruit yields in the winter season of guava cv. Sardar were significantly increased following treatment with 6% KNO_3 [23]. Moreover, Dutta [24] reported that foliar spraying of K significantly enhanced the yield and quality of Sardar guava. However, fruit yield of guava cv. Sardar was decreased with increasing pruning intensity [19]. Singh and Bal [25] found that the fruit weight of guava cv. Allahabad Sufeda was improved by using pruning.

Thus it can be generally concluded that the application of potassium nitrate at 4% after moderate pruning is preferable for improving vegetative growth, fruit set and yield of guava trees.

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