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Effect of plant growth regulator (NAA) in guava

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Abstract
An experiment was conducted at selected farmers during 2010-11, to determine the effect of NAA application at 200, 400 and 600 ppm for avoiding fruit set in rainy season and encouraging it during winter through deblossoming of flower bud in Allahabadi safeda guava. It was observed that application of 600 ppm NAA resulted in significant deblossoming of spring bloom and increase in yield during winter season. Considerable reduction in yield was noticed in rainy season. Fruit quality was also superior in this treatment.

Keywords: Plant growth, NAA, guava

Introduction
It is common experience that rainy season crop is insipid, watery, poor in quality, less nutritive and also subjected to attack of many diseases and fruit fly. On the other hand, winter season crop is superior in quality, free from insect pest and diseases and gives more price to growers. Therefore, there is need to regulate guava crop in such a way that only quality crop is harvested in winter season. The research work carried out in the past indicates that various concentrations of NAA could be beneficial for better quality of fruit and higher production during winter. Batjer [3, 4] could successfully regulate cropping in apple by application of NAA. NAA is also being used on a commercial scale for flower thinning in many temperate fruits (Murneek and Bukovac) [7, 5]. In India Chundawat *et al.* [6]; Ratore [10]; Agnihotri and Bhullar [1] and Pandey *et al.* [8] have reported a possibility of deblossoming of the rainy season crop of Allahabad Safeda by spraying of NAA. However, results reported are not similar because of various factor like cultivar, free conditions, environment and soil type. This emphasizes the need to standardize the dose of chemicals and cultural practices for deblossoming of guava plants growing under different climate condition and soil type. In this paper results of an experiment conducted at selected farmers' field of Ghazipur on effect of NAA sprays on guava crop regulation are presented.

Material and Methods
The present investigation was conducted at selected farmers of Ghazipur during the year 2010-11. About twenty-year-old trees of guava cv. Allahabad safeda were selected for experimentation. Five guava plants were sprayed NAA at a concentration of 200, 400 and 600 ppm with teepol 0.1% as surfactants on 5th April. For control, guava plants were sprayed with water. The experiment was laid out in the randomized block design with five replications. Main branches of a tree were taken as a unit for this experimentation. All the flower buds were marked and counted branch wise of the selected tree before spraying. Later, the flower bud abscission and opening of flower bud was counted on the same branches. Observation on the day taken for flower budabscission percentage, opening of flower bud, 50% bloom weight of fruit from each selected branch and yield was taken under each treatment. Specific gravity of the fruits was calculated by the water displacement method at room temperature. Total soluble solid were measured by Erma hard refract meter and reading were corrected to 20^{o}C. Acidity and vitamin C of the fruit juice were analyzed according to A.O.A.C. (1975) and Mehta *et al.* (2012) [1].

Results and Discussion
It is obvious from table 1 that increasing concentrations of NAA significantly reduced the time taken for abscission of flower bud and increased the percentage of abscission. NAA at a concentration of 600 ppm effectively abscised flower bud in 12 days. On the other hand, increase in concentration delayed the flower bud opening but early opening of the flower bud was observed at a lower concentration. With the increase in concentration of NAA there was a delay in 50% blooming of flower.

Heavy abscission of flowers and fruits observed in guava by 800 ppm of NAA has been reported by Pandey et al. (1980) [10]. However, Chundawat *et al*. (1975) [8] had observed that NAA 400 ppm spray effectively deblossomed the spring bloom of Banarasi Surkha guava. In the present experiment 600 ppm NAA proved most effective. These varying results about the most effective NAA concentration may be due to difference in environmental factors and tree conditions. The mean fruit yield of control trees during rainy season was 64.1 kg per tree whereas in treated plants there was effective control of fruiting. The maximum yield per plant during winter season was recorded in 600 ppm NAA (95.6 kg) followed by 400 ppm NAA (88.7 kg). The yield was drastically reduced during winter in control trees. However, the present findings are not I conformity with Pandey *et al*. (1980) [10] who found 800 ppm NAA to be the best treatment for maximum yield of fruit in winter season.

It can be clearly seen form table 2 that the weight of the fruit was greatly influenced with 600 ppm NAA spray compared to rest of the concentrations. The physiological basis for the increase in fruit size appears to be due to an increase in growth rate and an alternation in the maturity of fruit. With regard to the quality of the fruits, the application of NAA 600 ppm (Dhaliwal *et al*. 2004) [2] increased the T.S.S. and reduced the acidity of the fruit while vitamin C content of fruits was decreased. NAA at 200 ppm markedly increased the Vitamin C content of the fruits. The increased T.S.S. and reduce acidity might be owing to high conversion of starch due to the rapid ripening process into reducing and non-reducing sugar. The increase in sugar and acid ratio is bound to improve the quality due to increased sweetness of fruit pulp. Rajput *et al*. (1977) [11] also reported that increasing concentration of NAA reduced the vitamin C content and improved the T.S>S> of the guava fruits.

Since in the present investigation maximum yield has been recorded in 600 ppm NAA, it is suggested that in order to get maximum price for guava, winter season crop should be taken by deblossoming the rainy season crop with the help of 600 ppm spray of NAA under the Ghazipur conditions.

Table 1: Effect of foliar sprays of aqueous solution of NAA on flower bud abscission, opening of flower bud and yield of guava

Concentrations of NAA spray (ppm)	Days taken for flower bud abscission	Flower bud abscised (%)	Days taken for opening of flower bud	Days taken for 50% bloom	Yield (kg/tree)	
					Rainy season fruit yield	Winter season fruit yield
200	20.6	84.2	56.6	28.8	11.3	77.2
400	15.4	92.2	67.0	31.6	10.6	88.7
600	12.4	98.6	69.0	33.0	5.8	95.5
Control	-	-	-	36.2	64.1	17.0
C.D. at 1%	0.61	2.21	0.91	1.41	5.7	4.7

Table 2: Effect of foliar sprays of aqueous solution of NAA physio-chemical composition of guava

Concentration as of NAA spray (ppm)	Weight (g)	Specific gravity	Total soluble solids (%)	Acidity (%)	Ascorbic acid content mg/100g
200	164.0	0.96	8.6	0.69	237.8
400	167.6	0.96	9.6	0.57	234.2
600	173.2	0.94	12.4	0.54	225.6
Control	93.0	0.97	7.4	0.71	170.6
C.D. at 1%	2.96	NS	1.0	0.01	1.28

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