Optimizing Guava Crop yield and quality through various regulation methods

Abstract: Guava is an important fruit crop grown in subtropical region of India. It belongs to family Myrtaceae. The demand for this fruit is increasing day by day due to its good nutritional value and its different processed products. It is also known as poor man's apple. An on-farm trial was conducted in guava orchards of different farmers field in different villages of Nalanda district during 2020-2021 and 2021-2022 consecutively. The main objective of this trail is to force the tree for rest during undesirable season crop and shift that crop to desirable season with quality fruit by regulating the crop. The main theme of this is to enhance yield and quality of fruit by suppressing rainy season crop and promoting winter season crop by pruning or spray of 10 percent urea as compared to farmer's practice. The practice of farmers is usually taking major crop in rainy season fruit with poor quality, insipid taste with poor shelf life in most part of the Bihar. For crop regulation different methods such as withholding irrigation, pruning of current season shoots in different ways, spraying of different chemicals is used according to different agro climatic regions. In our trial we have done 50 percent pruning of current season shoots in the month of April in ten trees and spray of 10 percent urea solution on ten trees at the time of blossoming at different locations. We got the best result in pruning of 50 percent current season shoot with 27.69 kg/plant yield with 11.4^0 Brix T.S.S during 2020-2021 and 28.06 kg/plant with 11.6^0 Brix T.S.S during 2021-2022.The best treatment is pruning of 50 percent current season shoots in the month of April is best for getting higher yield and getting maximum quality fruit for guava grower . Although the T.S.S. of fruits harvested in case of urea spray during winter season is at par with pruning of current season shoot.

Key Words: Guava, Crop regulation, Quality, T.S.S, Pruning, Yield.

Introduction:

Guava (*Psidium guajava L*.) is an important commercial fruit crop grown in subtropical region of India and belongs to family Myrtaceae.It is originated in Tropical America [1]. It has gained popularity these days due to its high nutritive value, availability at lesser prices, pleasant aroma and good flavor. It is one of the commonest fruits liked by poor as well as rich popularly known as poor man's apple. It is also known as apple of tropics. Its growth habit is hardiest as compared to other fruit crop due to its adaptability to diverse range of soil and climatic conditions. In some countries it is grown as weeds. The total area of guava crop in India is increasing as 276 thousand hectares in year 2018-19 to 287 thousand hectarsin year 2020. The production is also increased from 4253 thousand MT in year 2018-19 to 4304 thousand MT in year 2019-2020[2].

It is a very rich source of vitamin C and contains a fair amount of calcium. The jelly of this fruit is best because of rich pectin content. The fruits also contain phosphorus, iron and small quantities of thiamine, riboflavin and niacin. Fruit slices can be canned in sugar syrup. Juice of this fruits is usually used in preparation of sherbets and ice creams. The iron is also present in trace amount in seeds. The leaves of this plant have medicinal values used for curingdiarrhoea. It contains dye and tannins. On commercial basis the guava is classified as white or red depending on the color of the pulp [3]. By some researchers' guava is considered as super food due to rich number of phenols and other antioxidant substances [4]. The export of fresh guava is limited but different processed products such as drinks, preserves,candies,etc. are increasing in many countries [5]. In processing industries guava is commonly used for making different products such as jams, jellies, syrups, nectars and pulp [6]. The byproducts of different fruit and vegetable used in processing are most studied substrates for extraction of different types of dietary fibers and antioxidants [7].

There are three types of bahar in three distinct season such as spring (Ambe Bahar), rainy (Mrig Bahar) and autumn (Hasta Bahar) for flowering with harvesting as rainy, winter and spring seasons [8]. The fruit of rainy season crop is poor in quality, insipid, rough, less nutritive and attacked by several insect pests and diseases [9]. The fruits harvested during winter season are superior in quality and good shelf life thus can be transported to distant market and fetch good price [10]. To reduce the undesirable season crop and take the best quality crop various techniques such as withholding irrigation, debloosoming of flower bud, shoot pruning and spray of different types of chemicals have been recommended [11]. The reduction of crop load in rainy season by foliar application of different chemicals such as urea [12-15]. 2,4-D [16], potassium iodide [17] and NAA [18] is standardized to increase the yield and improvement of yield of winter season crop.

So, this trial was conducted for shifting of major guava crop from rainy season to winter season. The farmers got good quality product and got higher return by selling it in market.

Materials and methods:

This trail was conducted two years consecutively 2020-2021 and 2021-2022 in different farmers orchard at Nalanda district. The eight farmers are selected in both the years from village Chainpur, Mokimpur and Dwarikabigha. From each guava orchard five guava trees are selected for each treatment. The variety chosen for the trail was Allahabad Safeda.Technology option one was farmers practice in this method farmers are getting maximum crop during rainy season. The fruit obtained in this season is insipid in taste, poor in quality and some fruits are infested with fruit fly. In technology option two 50% pruning of current season shoot in the month of April. In this technology we get some fruit in remaining portion of current season shoot and some fruits are shifted in winter season. In this method grower got the yield in both the season. In technology option three we sprayed 10% Urea solution during debloosoming of flowers in the month of April. Most of the flowers and leaves are drop down. The farmers are getting very few

fruits in rainy season and most of the fruits in winter season. The taste and quality of rainy season fruit is watery with lower T.S.S and quality of winter guava is better.

Results and Discussion:

The regulation of guava crop by 50% pruning of current season shoots and 10% spray of urea is also effective as compared to farmer's practice. Both the methods are used to reduce the crop during glut period (rainy season) and shifting some quality crop during winterseason. In pruning of 50%current season shoot in the month of April we got the average fruit weight 81.73 gm during rainy season and 96.35 gm during winter season in year 2020-2021. In year 2021-2022 we got the 81.85 gm during rainy season and 96.51 gm during winter season. The total yield of plants was 27.69 kg was recorded during 2020-2021 and 28.06 kg during 2021-2022 in this treatment. The total soluble solid was 10.40-degree brix in rainy season fruit and 11.40-degree brix in winter season fruit during 2020-2021 and during 2021-2022 10.60-degree brix from rainy season crop and 11.60-degree brix from winter season crop.

The similar findings were also recorded by [19] the pruning of 20 or 30 cm length between 20th to 30th April reduces the rainy season crop and increases the winter season crop.[20] also recorded the reduction in fruit set in rainy season by 15 and 20% urea spray. Similarly,[21] recorded maximum fruit set during winter season with 10 and 15 % urea spray by [22]. In earlier days for regulating guava crop removal of excess fruit set as per [23]. As per findings of [24] the maximum fruit set was recorded by 30 cm shoot pruning. By [25] full shoot pruning during summer was effective method of reducing fruit set during rainy season. Total soluble solids are used for measuring the sweetness of fruits. As per findings of [26-28] TSS content of rainy and winter season guava crops is improved by different thinning treatments. [22]Also recorded appreciable improvement in TSS content by application of different chemicals like urea, NAA, 2-4-D, etc. as compared to control. All the thinning treatments used by [26] improve the TSS content of guava fruits. As per findings of [12] the best TSS content was found with 15% urea spray during both rainy and winter season. Similar result was found by [20] in sardar guava. [29]Recorded the enhancement in TSS with 10% urea spray at full bloom stage during both rainy and winter season crops.Similar findings were observed by [30]. As per findings of [31-32] the better-quality fruits are obtained by pruning. Similar findings were also recorded by [33] in 5 Navelguava cultivars.

Conclusion: For shifting the rainy season fruits pruning of 50% shoot length (current season) in the month of April is best method as compared to urea spray and farmer'spractice.Although the result of single spray of 10 % urea is also good as compared to farmer's practice. The yield of the fruits per plant is highest in pruning of 50% shoot length and total soluble solid of winter season fruit is higher than rainy season fruit. The fruits of winter season are free from infestation of fruit fly. By selling the quality produce farmers are getting higherreturn. It reduces the glut of the fruit during rainy season in the market.

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Table No:1 Yield and quality parameters of Guava after crop regulation methods FY2020-2021

Parameters / Treatments	Average Fruit Weight(gm)		TSS^0 Brix		Yield(Kg/Plant)		Total Yield Kg/Plant
	Rainy	Winter	Rainy	Winter	Rainy	Winter	
TO1-Farmers practice	75.47	83.28	10.2	11.2	11.67	8.18	19.85
TO2-Pruning	81.73	96.35	10.4	11.4	8.93	18.76	27.69

of 50% shoot length(current season)							
TO3-Single spray of urea (10%) in bloom stage (April month)	82.60	101.41	10.4	11.4	5.28	15.05	20.33
SE(d) CD	1.614 3.462	2.200 4.720	0.033 0.072	0.026 0.056	0.720 1.544	1.174 2.519	0.999 2.144

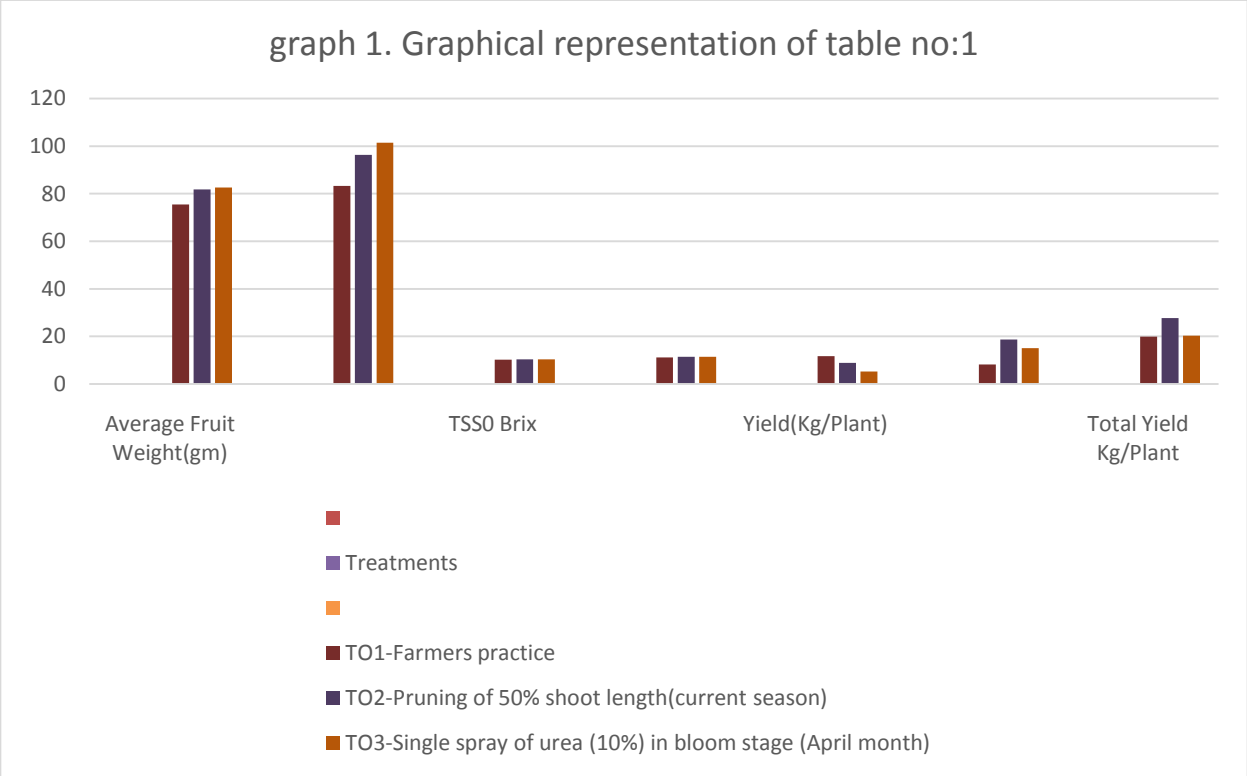
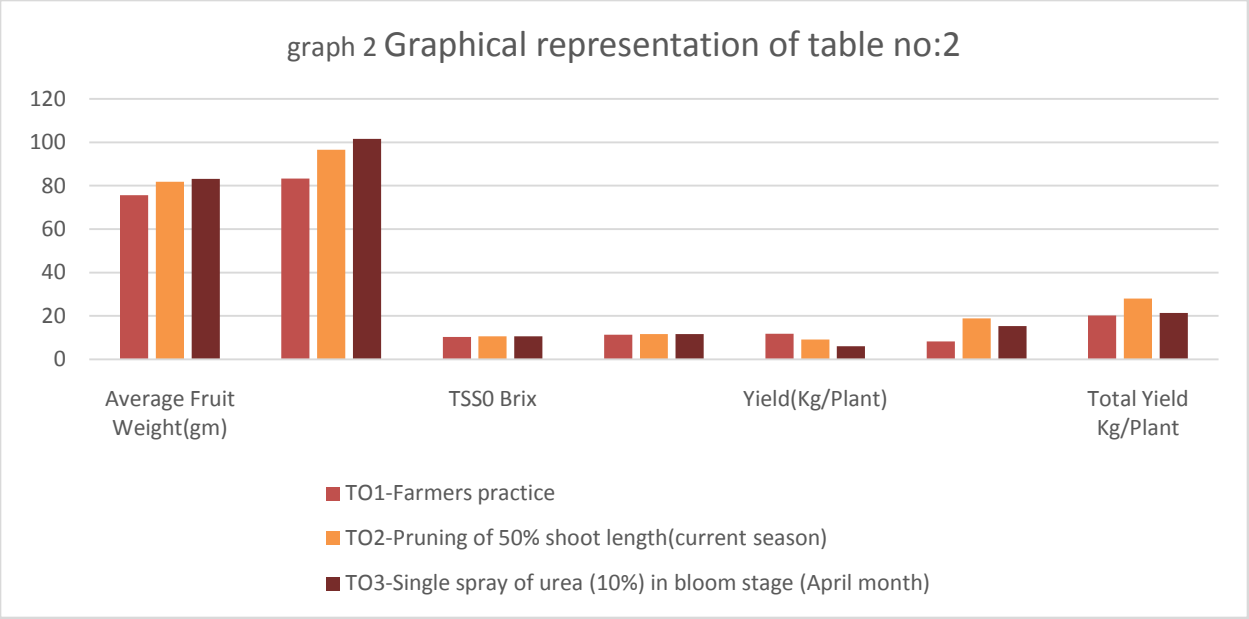


Table No:2 Yield and quality parameters of Guava after crop regulation methods FY2021-2022

Parameters / Treatments	Average Fruit Weight(gm)		TSS^0 Brix		Yield(Kg/Plant)		Total Yield Kg/Plant
	Rainy	Winter	Rainy	Winter	Rainy	Winter	
TO1-Farmers practice	75.61	83.33	10.30	11.30	11.83	8.32	20.15
TO2-Pruning of 50% shoot length(current season)	81.85	96.51	10.60	11.60	9.12	18.94	28.06
TO3-Single spray of urea (10%) in bloom stage (April month)	83.10	101.64	10.60	11.60	6.10	15.32	21.43
SE(d)	1.593	2.197	0.069	0.055	0.627	1.171	0.931
CD	3.417	4.713	0.149	0.119	1.346	2.513	1.997



Photographs 1: Photographs of the trail