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Research Article

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Eefect of urea and zinc treatments on biochemical components of guava fruits cv. BHAVNAGAR RED

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ABSTRACT : A field experiment was conducted during 2012-2013 to study the effect of foliar application of Zn and Urea on guava fruits to see the biochemical changes in guava fruits and found that the TSS, was significantly increased (11.85^{O} Brix) with treatment U_2 (1.5% urea). Acidity was significantly affected by Zn and urea treatments. It was noted that foliar spray of urea decreased the acidity. The minimum acidity of 0.48 per cent was observed where 1.5 per cent urea was sprayed. The ascorbic acid was significantly increased (220.79 mg/100ml) and the pectin content was also significantly affected by various levels of urea. Significantly the highest pectin content (0.67%) was observed with treatment U_2 (1.5% urea). The reducing sugar was significantly increased with urea @ 1.5% and same treatments recorded significantly the maximum non-reducing sugar (4.66%). The total sugar was significantly increased (7.03%) with treatment U_2 (1.5% urea). Over all result showed that foliar spray of urea and zinc sulfate can altered the biochemical parameters such as TSS, acidity, reducing sugar, pectin content, ascorbic acid , non-reducing sugar and total sugar in guava fruits.

KEY WORDS : Urea, Zinc tretements, Biochemical components, Guava fruits

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INTRODUCTION

The guava is one of the most common and important fruit crop cultivated all over India. It is fourth most important fruit crop in area and production after mango, banana and citrus. Guava (*Psidium guajava* L.), one of the most important fruits of India, is a good source of energy (51 calories/100 g edible portions), vitamins, and minerals (Mitra and Sanyal, 2004). In eastern and southern India, the guava tree flowers thrice in a year, *i.e.* February, June-July and October. The respective bahars are called "Ambe", "Mrig" and "Hasta" bahar. Thus, guava in this part seems to bear fruits almost throughout the year. Among all of these three bahars "Mrig bahar" crop gives fruits during winter *i.e.* November-January, which are better in quality, taste and higher vitamin C content. There are Scientific evidence had shown the effect of nutrient in on Guava tree. However, there is limited work has done on effect of foliar nutrient spray on this culitivars and saurashtra region In this fruits, therefore, the work has been done on quality aspects of Guava and the Guava have ability to catch the market when there was no fruit availability in market. Therefore, it is necessary to evaluate the response of nutrient application on guava trees.

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EXPERIMENTAL METHODS

The present study was conducted on eighteen years old

guava plants of variety 'Bhavnagar Red' planted at the Fruit Research Station, Junagadh Agricultural University, Junagadh. The plants having uniform vigour and size with the age of 18 years old were selected for the study. The NPK were supplied to the trees as per recommendation given by recommended doses of university of 25 kg of FYM/plant and 500:250:250(g) N:P:K(g)/plant N in two split doses first 50 per cent at first week of July and remaining 50 per cent at second week of October. Micro nutrients *i.e.*, zinc as $ZnSO_4$,$7H_2O$ and urea were sprayed combinations with two sprayed. First spray was done at the time of flowering and second was done three weeks after first spray. The details of the treatment composition were as U_1= 1.0 % Urea, U_2= 1.0 % Urea,U_3= 1.0 % Urea, Z_1= 0.2% $ZnSO_4$, $7H_2O$, Z_2= 0.4% $ZnSO_4$, $7H_2O$, Z_3= 0.6 % $ZnSO_4$, $7H_2O$, Treatments were replicated thrice in a Randomized Block Design (RBD), each replicate consisted of two trees. The observations we rerecorded for TSS, Acidity, reducing sugar, pectin content, ascorbic acid, non-reducing sugar and total sugar and analyzed according to standard procedures described in Sadasivam and Manickam (1992) Total soluble solids were determined by hand refractometer (0-32 °Brix). Acidity was determined by alkali titration method and results were expressed in terms of citric acid/100g of fresh sample. And total sugars were estimated by standard AOAC methods (AOAC, 1970) and the statistical analyses were carried out as per the method prescribed by Panse and Sukhatme (1985).

EXPERIMENTAL RESULTS AND ANALYSIS

The results were discussed on the basis of average data (Table 1). Total soluble solids (TSS) TSS ranged between 10.83 to 11.85 per cent. This variation might be due to difference in soil and climatic conditions as well as the cultivars and effect of treatments *i.e.* Urea and Zn.

Effect of urea tretment on quality parameters of guava :

The effect of urea treatment on TSS, ascorbic acid, pectin content, reducing sugar, non-reducing sugar and total sugar were depicted in Table 1. The results revealed that the TSS was significantly increased (11.85 ^{0}Brix) with treatment U_2 (1.5% urea). This is due to its action on converting complex substances into simple ones, which enhances the metabolic activity in fruits and it results in increased TSS of fruit. Acidity was significantly affected by various treatments. It was noted that foliar spray of urea decreased the acidity. The minimum acidity of 0.48 per cent was observed where 1.5 per cent urea was sprayed. The ascorbic acid was significantly increased (220.79 mg/100ml) with treatment U_2 (1.5% urea). The present result on ascorbic acid is in conformity with the results achieved by Singh and Rajput (1977). The pectin content was significantly affected by various levels of urea. Significantly the highest pectin content (0.67%) was observed with treatment U_2 (1.5% urea). The reducing sugar was significantly increased with urea @ 1.5%. This might be due to that the nitrogen promotes hydrolysis of starch into sugars. The treatment U_2 (urea 1.5%) recorded significantly the maximum non-reducing sugar (4.66%). This is due to either speedily converted into sugars and their derivatives by reactions involving reverse glycolytic pathways or might have been used in respiration or both. The total sugar was significantly increased (7.03%) with treatment U_2 (1.5% urea). This is due to its action on converting complex substances into simple ones, which enhances the metabolic activity in fruits and it results in increased total sugar of fruit. Similar findings also shown by Dasberg *et al*. (1984). Reported with application N caused increased number fruit and quality. And similar result reported by Lolaei *et al.* (2011)

Table 1 : The effect of urea and zinc sulfate on biochemical contents of guava fruits

Sr. No.	Treatments	TSS (^{O}Brix)	Acidity (%)	Ascorbic acid (mg/100g)	Pectin content (%)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)
U_1	1.0% Urea	10.83	0.58	205.58	0.57	2.09	4.13	6.23
U_2	1.5% Urea	11.85	0.48	220.79	0.67	2.37	4.66	7.03
U_3	2.0% Urea	11.68	0.52	215.73	0.65	2.30	4.53	6.83
	S.E.±	0.16	0.01	2.72	0.01	0.04	0.08	0.12
	C.D. (P=0.05)	0.48	0.04	8.15	0.04	0.12	0.23	0.35
Z_1	0.2% Zinc sulphate	10.87	0.59	206.66	0.58	2.14	4.21	6.35
Z_2	0.4% Zinc sulphate	11.63	0.52	216.22	0.64	2.28	4.51	6.79
Z_3	0.6% Zinc sulphate	11.85	0.47	219.21	0.67	2.34	4.61	6.95
	S.E.±	0.16	0.01	2.72	0.01	0.04	0.08	0.12
	C.D. (P=0.05)	0.48	0.04	8.15	0.04	0.12	0.23	0.35
	C.V. %	4.22	7.59	3.81	7.03	5.30	5.11	5.17
	Interaction U X Z	NS	NS	NS	NS	NS	NS	NS

NS=Non-significant

and Amanullah (2010). The most evident effect of Fe deficiency is a decreased content of photosynthetic pigments, which results in the relative enrichment of carotenoids over chlorophylls (Chl) and leads to the yellow colour that is characteristic of chlorotic leaves and decreased of vegetative growth (Abadia *et al*., 2011). Singh (2002) reported micro-nutrient rate had effect on fruit quality of grapes. Adequate availability of N during the critical stages of fruit initiation and development is important to support optimal good quality citrus fruits.

Effect of zinc sulphate treatment on quality parameters of guava :

The foliar application of Zn on guava trees directly influence the quality parameters of guava *viz.*, TSS, ascorbic acid, pectin content, reducing sugar, non-reducing sugar and total sugar were depicted in Table 1. The results revealed that the TSS was significantly increased with treatment of zinc sulphate at any concentration. This is due to its action on converting complex substances into simple ones, which enhances the metabolic activity in fruits and it results in increased TSS of fruit. Acidity was significantly affected by Zn. It was noted that foliar spray of Zn decreased the acidity and increase ascorbic acids content. The present result on ascorbic acid is in conformity with the results achieved by Singh and Rajput (1977). The pectin, reducing sugar, non-reducing sugar and total sugar content was significantly affected by various levels of zinc sulphate. The reducing sugar was significantly increased. This might be due to that the nitrogen promotes hydrolysis of starch into sugars. For non-reducing content is due to either speedily converted into sugars and their derivatives by reactions involving reverse glycolytic pathways or might have been used in respiration or both. The total sugar was significantly increased with treatment. This is due to its action on converting complex substances into simple ones, which enhances the metabolic activity in fruits and it results in increased total sugar of fruit. Overall similar trends of effect of zinc sufate on guava fruits were observed but there was none significant effects of both the treatments were observed in all quality parameters. This might be due to Zn is closely associated with the many co-factors in enzymes, so this effect may leads to non - significant effect on all quality parameters as analyzed here. But other also shown effects are in line with Koo (1988) reported the effects of individual mineral nutrients on the external fruit quality and juice quality parameters. Dobroluybsikii *et al.* (1982) reported application of zinc sulfate can increase TSS in fruit of guava. This result is also matched to other persons like Singh (2002) reported micro- nutrient rate had effect on fruit quality of grapes. Adequate availability of N during the critical stages of fruit initiation and development is important to support optimal good quality citrus fruits (Davies and Albrigo, 1994; Syvertsen and Smith, 1996). Dixi and Gamdagin (1978) reported that a foliar spray application of $ZnSO_4$ on March and April increased size, TSS and juice of oranges.The results shown gain purpose iron fertilizer application improves yield and fruit quality in several crops (Alvarez- Fernandez *et al*., 2006). Lolaei *et al*. (2012) reported that a foliar spray application of $ZnSO_4$ increased size, TSS and juice of strawberry.

Conclusion :

The foliar application of Zn and urea treatment on guava trees directly influence the quality parameters of guava *viz.*, TSS, ascorbic acid, pectin content, reducing sugar, non-reducing sugar and total sugar.

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