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Studies on the Nutrient Status of Guava Orchards in Haryana

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ABSTRACT: *The present investigation entitled '' Studies on the Nutrient status of guava orchards in Haryana" was carried out in the blocks of Hisar, Sirsa and Fatehabad districts during the year 2011-12. A total number of 20 farmers were selected for purpose of this research. An interview schedule was developed on the basis of recommended package of practices for guava production. The nutrient status in soil and plant had positive but non significant effect with adoption of package of practices. The farmers, who had higher adoption level of package of practices, were able to get maximum gross income, benefit and benefit cost ratio. The most serious constraint threatening the guava cultivation was guava wilt and fruit fly. Other serious constraints are non availibility and high cost of planting material. The adoption level of practices like fertilizer application, irrigation schedule and plant protection is at medium level, it leaves a scope for increase in productivity.*

Key words: *Nutrient, Status, Guava, Orchards, Haryana.*

Horticulture is one of the most important activities as a means for diversification of agriculture to raise additional income per unit area as well as generate more employment opportunities. Fruits have great nutritive value as they contain many of the essential nutrients i.e. vitamins, minerals and other elements but the consumption of fruits in India is very low. Per capita per day consumption of fruits in our country is only 70-80 gram as against recommended consumption of 120 grams per head per day Maitry *et al*., 2011, (6)**.** Guava fruits are commercially grown throughout the country. Production of guava in India is 2.27 MT with area coverage of 0.20 million hectares and India ranks second in the world and accounts for 12.5 per cent of the total world fruit production Kumar *et al*., 2010, (4). Bihar is the leading state in guava production. It is also grown in Andhra Pradesh, Punjab, Haryana, Gujarat, Karnataka, Bihar, Uttar Pradesh and Maharashtra. In Haryana, production of guava is 0.053 MT with an area coverage of 0.007 million hectares Anonymous 2010 (2). Guava belongs to family Myrtaceae commonly known as apple of tropics. It is believed to have originated in an area extending from southern Mexico through parts of Central America. It is an important fruit in many parts of the world, including Mexico, India and Southeast Asia. Guava cultivation in India commenced from 17th century and at present ranks fourth in position after mango, banana and citrus in terms of area and production Radha and Mathew, 2007 (8). Its fruits are rich source of vit.C (200-400 mg), pectin and other nutrients like-dietary fibers (2.8-5.5g), protein (0.9-1.0 g), fat (0.1-0.5 g), carbohydrates (9.5-10 g), Ca (9.1–17 mg), Fe (0.3-0.7 mg) per 100 g of edible portion Anonymous, 2008 (1). The possible cause of low guava productivity in Haryana may be due to low adoption of improved technology. The existing plantation of guava in Haryana do not produce an optimum yield due to neglect of orchards by the farmers and lack of proper scientific knowledge on its management. Researchers have amply established that adoptions of the recommended production technology are pre-requisite for obtaining higher productivity of any crop Singh 1998 (10).

In general, the bearing capacity of guava trees declines after 8-15 years depending on the maintenance of orchards and application of manure and fertilizers. Most of the guava growers in Haryana don't apply required quantities of fertilizers as per ecommendations. The nutrients, if not applied in required quantity and proportion, may lead to their deficiency in plants. Therefore, the present investigation was undertaken to nutrient status of both soil and leaves of guava plants from the orchards of Haryana in order to correct their deficiencies in standing crops.

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MATERIAL AND METHODS

The study was conducted in Haryana. Out of 21 districts, Sirsa, Hisar and Fatehabad districts were selected for this research work because they are the major growing area of guava in the haryana. Thus,ten farmers were selected randomly from Daulatpur, Chamarkheda , Kinnala, Sahoo, Kirmara, Sandol, Knoh, Paatan and Aryanagar village of Hisar district, six farmers from Dhani chanan, Ahlisadar, karnoli, Mujrahkhurd, Haripur and Dariyapur villages from Fatehabad district and four farmers from Rassulpur, Sikanderpur, Dadbi and Sanghar sadha village from Sirsa district. Thus, a total number of 20 farmers were selected for the purpose of research. The soil samples were collected from the farmer fields from various soil depths (0-30 cm, 30-60 cm, 60-90 cm, and more than 90 cm depths) in the month of June-July, 2011. The available nitrogen (ppm) in soil samples determined by the method of Subbiah and Asija, (1956 (11). The available phosphorus (ppm) in soil samples determined by following the procedure of Olsen *et al.* 1954, (7). The available potassium (ppm) of the soil samples was determined from the soil saturation on flame photometer. The DTPA (Diethylene triamine pentaacetic acid) extract of soil prepared Lindsay and Norvell, 1978, (5) and the concentration (ppm) of Zn micronutrient was determined with the help of atomic absorption spectrophotometer (ASS). For determining leaf nutrient status, four to six month old healthy leaf samples from non-fruiting terminals were collected in the month of June-July 2011. The leaf nitrogen content was determined by the method described by Jackson 1973,(3). The phosphorus content was determined by vando-molybdophosphoric acid yellow colour method described by Jackson 1973, (3). Potassium content was determined from the digested extract on flame photometer. The content was calculated and expressed in per cent on dry weight basis. The digested leaf samples were analyzed for determining zinc concentrations on atomic absorption spectrophotometer and their contents were expressed in ppm.

RESULTS AND DISCUSSION

The data showed that nitrogen, phosphorus, potassium and zinc level decreased with the soil depth in Table 1. The average values of the nitrogen, phosphorus, potassium and zinc were found highest i.e126.34, 24.47, 268.76 and 6.83 kg/ha at 0-30 cm depth of the soil for the selected farmers while the values for 30-60 cm soil profile were found to be 44.83, 12.26, 160.79 and 3.11 kg/ha for N, P, K, Zn. Soil profile of 60-90 cm showed the values of 21.46, 7.50, 75.56 and 1.83 kg/ha for N, P, K and Zn. The values of N, P, K and Zn for soil depth more than 90cm were found to be 9.52, 4.49, 33.30, and 1.55 kg/ha. It reveals that as the adoption level of farmers increase, there is increase in nitrogen, phosphorus, potassium and zinc level in soil. Since soil is very huge mass, it will take huge time for to have any significant relationship with the adoption level. Sindhu ,1978 (9) find out similar results that soil had lot of variation in nutrient levels in grape vineyards.

Table 1
Nutrient status of the soil of guava orchards

Sr.	*Soil depths*	*Adoption category of farmer*			
No.	*(cm)*	*Low*	*Medium*	*High*	*Average*
		Nitrogen (kg/ha)			
1.	0-30	104.23	128.56	145.79	**126.34**
	30-60	35.81	45.16	53.88	**44.83**
	60-90	13.90	22.60	29.03	**21.46**
	>90	7.23	9.89	12.03	**9.52**
		Phosphorus (kg/ha)			
2.	0-30	20.04	24.72	29.18	**24.47**
	30-60	9.86	12.50	15.33	**12.26**
	60-90	6.15	7.56	8.87	**7.50**
	>90	3.51	4.74	5.81	**4.49**
		Potassium (kg/ha)			
3.	0-30	226.87	264.83	302.79	**268.76**
	30-60	139.87	161.50	181.72	**160.79**
	60-90	62.04	75.59	89.20	**75.56**
	>90	27.19	34.56	39.41	**33.30**
		Zinc (kg/ha)			
4.	0-30	5.81	6.84	7.87	**6.83**
	30-60	2.19	3.45	3.71	**3.11**
	60-90	1.83	1.90	2.07	**1.83**
	>90	1.63	1.22	1.83	**1.55**

The data in the Table 2 shows that the average or mean values of nutrient N, P, K, and Zn irrespective of adoption level were 202.70,49.42.5 and 35.19 kg/ha. The N, P, K, and Zn were obtained more in orchard soil where the level of adoption was higher. The N level were 240.73, 206.21 and 161.17 kg/ha for high, medium and low adopter respectively. Similar trend was observed in case of P, K and Zn also.

Table 2
Overall effect of adoption level of package of practices on nutrient status of the soil (kg/ha)

Category of farmers	*N*	*P*	*K*	*Zn*
Low	161.17	39.56	455.97	11.46
Medium	206.21	49.52	536.48	13.41
High	240.73	59.19	613.12	15.48
Average	202.70	49.42	535.19	13.45

The data in the Table 3 reveal that the correlation coefficient was calculated to know the associations between amount of nitrogen, phosphorus, potassium and zinc in the soil and the adoption levels package of practices of guava production technology. The correlation coefficient (r) was maximum for the K (0.15) followed by Zn (0.12), N (0.07) and Zn (0.02). Corelation cofficient among nitrogen, phosphorus, potassium and zinc were found to have non significant relationship with adoption. Because soil is very huge mass so it will take time for any significant relationship with the adoption level.

Table 3
Association of nutrient status of soil with adoption level of guava cultivation

Sr. No.	*Soil nutrient*	*Correlation coefficient (r)*
1.	N	0.02
2.	P	0.07
3.	K	0.15
4.	Zn	0.12

The data in the Table 4 shows that the regression coefficients ('b' value) of all the non significant independent variables were worked out with adoption of package of practices of the farmers. The data revealed that the regression coefficients of the nitrogen, phosphorus, potassium and zinc status in soil were 0.21, 0.08, 0.87 and 0.04 respectively. Respective the 't' values 0.23, 0.36, 0.42 and 0.39 for N, P, K and Zn were found non- significant in soil nutrient status with the adoption level.

Table 4
Regression analysis of nutrient status in soil with adoption of package of practices

Sr. No.	*Soil nutrient*	*'a' value*	*Regression coefficient (b value)*	*'t' value*
1.	N	32.30	0.24	0.23 NS
2.	P	6.25	0.08	0.36 NS
3.	K	73.45	0.87	0.42 NS
4.	Zn	4.32	0.04	0.39 NS

The data in the Table 5 revealed that the nitrogen, phosphorus, potassium and zinc were highest with values of 0.64%, 2.55%, 1.79% and 78 ppm in orchard of Mor Singh who had high adoption level (85.0%) in Table 4.2.8. The nitrogen, phosphorus and potassium were low with values of 0.18%, 1.40% and 1.91 % in the high adoption level of Umesh (55%). The Zn values were minimum (28 ppm) in the guava orchard of Ram Singh who had adoption level (47.5%). The overall average value of nitrogen, phosphorus, potassium and zinc were observed to be 0.31%, 1.84%, 1.40% and 46.1 ppm respectively. It has been observed that the farmers having higher adoption level of fertilizer application applied recommended doses of fertilizer resulting better uptake by the plants. It was also found that plant nutrients status in guava orchards of few farmers practicing low adoption level of package of practices was high. It may be due to the good fertility status of these orchards which was affected in high nutrient status in plant. Similar finding by Sindhu, 1978 (9) reported in grape vine with the respect of adoption level of package of practices for the N, P and K.

Table 5
Nutrient status of leaf analysis of guava orchards

Name of the farmers	*Adoption level (%)*	*N (%)*	*P (%)*	*K (%)*	*Zn (ppm)*
Sunni singh	62.5	0.39	1.95	1.11	36.0
Mangeram	47.5	0.30	1.95	1.66	35.0
Kapoor singh	40.0	0.28	1.50	1.59	38.0
Hanuman singh	67.5	0.33	2.10	1.47	40.0
Satbir	57.5	0.30	1.80	1.38	69.0
Morsingh	85.0	0.64	2.55	1.79	78.0
Subhash	60.0	0.22	1.80	1.46	41.0
Ram singh	47.5	0.25	1.25	1.01	28.0
Jaggatpal	77.0	0.39	2.10	1.56	41.0
Krishan	55.0	0.39	2.35	1.56	47.0
Deshraj	42.5	0.25	1.80	1.40	33.0
Lekhraj	30.0	0.22	1.40	1.03	37.0
Rajeev	40.0	0.18	1.95	1.19	52.0
Ramesh	37.5	0.25	1.80	1.36	37.0
Rakesh	52.5	0.33	1.95	1.73	43.0
Darshan singh	45.0	0.30	1.65	1.65	63.0
Harpal singh	72.5	0.35	1.95	1.68	65.0
Surjeet singh	70.0	0.41	2.10	1.69	53.0
Jaibir	60.0	0.25	1.65	1.51	41.0
Umesh	55.0	0.18	1.40	1.91	44.0
Average	55.22	0.31	1.84	1.44	46.1

The data in the Table 6 shows that the average or mean values of nutrient N, P, K, and Zn irrespective of adoption level were 0.32%, 2.48%, 1.54% and 47.94 ppm. The N, P, K, and Zn were obtained more in plants where the level of adoption was high. The N levels were 0.34, 0.31, and 0.30 percent for high, medium and low adopter respectively. Similar trend was observed in case of P, K and Zn also.

Table 6
Overall effect of adoption level of package of practices on nutrient status of leaf analysis

Category of farmers	*N (%)*	*P (%)*	*K (%)*	*Zn (ppm)*
Low	0.30	2.07	1.52	44.00
Medium	0.31	2.44	1.53	46.64
High	0.34	2.95	1.58	53.20
Average	0.32	2.48	1.54	47.94

The data in the Table 7 shows that the correlation coefficient was calculated to know the associations between amount of nitrogen, phosphorus, potassium and zinc in the plants and the adoption levels of package of practices of guava production technology.

All variables namely nitrogen, phosphorus, potassium and zinc have a positive but non significant relationship with adoption of package of practices. It implies that level of nitrogen, phosphorus, potassium and zinc increase with the increase in adoption level of package of practices. The correlation coefficient (r) was highest for the Zn (0.13) followed by K (0.07).

Table 7
Association of nutrient status of leaf with adoption levels of package of practices

Sr. No.	*Leaf nutrient*	*Correlation coefficient (r)*
1.	N	0.05
2.	P	0.03
3.	K	0.07
4.	Zn	0.13

The data in the Table 7 found that the regression coefficient ('b' value) of all the non significant independent variables was find out with adoption of package of practices of the farmers ..The data in table revealed that the regression coefficient of the nitrogen, phosphorus, potassium and zinc status in plants were 1.52, 1.44, 1.32 and 0.14 respectively. The 't' values viz. 0.27, 0.13, 0.71 and 0.54 for N, P, K and Zn were found non significant in leaf nutrient status with the adoption level. The nutrient status of nitrogen, phosphorus, potassium and zinc were found to have a positive but non significant relationship with adoption of package of practices of leaf of guava. It reveals that as the adoption level of farmers increase, there is increase in nitrogen, phosphorus, potassium and zinc level.

Table 7
Regression analysis of nutrients status of leaf with adoption of package of practices of guava

Sr. No.	*Leaf nutrient*	*'a' value*	*Regression coefficient (b value)*	*'t' value*
1.	N	58.5	1.52	0.27NS
2.	P	52.6	1.44	0.13NS
3.	K	67.9	1.32	0.71NS
4.	Zn	48.8	0.14	0.54NS

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