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Studies on Foliar Spray of Phosphorus on Nutrient Composition of Guava Leaf

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Abstract

Present experiment was conducted in order to examine the nutrient content of Guava leaf as influenced by foliar spray of phosphorus. In this regards two spray (Single and Double) and four levels each of orthophosphoric acid and single super phosphate (0.00%, 0.25%, 0.50% and 0.75%) were done in guava orchard, during 2001 to 2002. The number of sprays, sources and levels of phosphorus failed to influence the leaf nitrogen content. Higher leaf phosphorus content was recorded with double spray of orthophosphoric acid at 0.75% concentration over other treatments. Application of orthophosphoric acid significantly increased the leaf potassium content. A highly significant and negative correlation was also found between leaf phosphorus and zinc content.

Key words: Plant nutrients, leaf sampling.

Introduction

The guava (*Psidium guajava* L.) is one of the most common and nutritious fruits of India. It has adopted so well in India that it is often called poor man's apple, since it is very nutritive and have good commercial value. It riginated along with a number of other important fruits from Tropical America and was found to be cultivated in Mexico and Peru. It is now being cultivated throughout the whole tropics and subtropics. Supply of the nutrients to the plants through foliar route has become an established practice in developed countries and is gaining popularity in India also. In such application, much of the applied Nutrients result in quick absorption and utilization, avoiding losses due to fixation and leaching at the same time, there is much economy in the amount of nutrients used.

The foliar application of phosphorus is absorbed by the plants in the oxidized state in the plants and occurs in organic and inorganic forms as a central atom of the phosphate group. Leaf bronzing in guava is reported to be associated with the nutrition disorder of nitrogen, phosphorus, Potassium and Zinc [4, 7, and 9]. Phosphorus plays direct role in transfer of energy in respiration and photosynthesis [8]. Chemical tests showed that phosphorus deficient tissue contains abundance of nitrate yet starve for nitrogen indicating the necessity of

phosphorus for the assimilation of nitrate. Here an experiment was conducted to find out the nutrient content of guava leaf as influenced by the foliar spray of phosphorus.

Material and Methods

Present Experiment was conducted in guava orchard of Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University Varanasi, during 2001 to 2002, with 16 treatment combinations consisting of single and double sprays, two sources and four levels of phosphorus i.e. S1P1L1 [single spray of water (control)], S1P1L2 (Single spray of 0.25% orthophosphoric acid), S1P1L3 (Single spray of 0.50% orthophosphoric acid), S1P1L4 (Single spray of 0.75% orthophosphoric acid), S1P2L1 [single spray o water (control)], S1P2L2 [single spray of 0.25% single super phosphate], S1P2L3 [singlesprayof0.50% single super phosphate], $S_1P_2L_4$ [single spray of 0.75% single super phosphate], $S_2P_1L_2$ [Double spray of water(control)], $S_2P_1L_2$ (Double spray of 0.25% orthophosphoric acid), $S_2P_1L_3$ [Double spray of 0.50% orthophosphoric acid), $S_2P_1L_4$ [Double spray of 0.75% orthophosphoric acid), $S_2P_2L_1$ [Double spray of water (control)], $S_2P_2L_2$ (Double spray of 0.25% single super phosphate), $S_2P_2L_3$ [Double spray of 0.50% single super phosphate], $S_2P_2L_4$ [Double spray of 0.75% single super phosphate] and three replications in factorial Randomized Design.For 20 pairs of five-month-old leaves from fourth position of shoot (from base) were sampled for each sample at 10days interval between 8-10am and starting from December 2001 to February 2002. Total nitrogen was estimated by the micro-Kseldehl distillation method (1) using 0.2 g leaf sample and the values so obtained were expressed on dry weight basis where as for the analysis of the other nutrients (P, K, Ca, Mg and Zn),one gram of dried, powered plant material was digested with 15 ml of tri acid mixture containing concentration nitric acid sulphuric acid 60 per cent perloricacial in the ratio of 10:1:3 by volume as described by Jackson [6].

Results and Discussion

The data from Table 1 reveal that the interaction between numbers of spray x source x level of phosphorus was significant at all dates of sampling. The higher leaf phosphorus content was noted with $S_2P_1L_4$ while $S_1P_2L_2$ show higher phosphorus content for first date of sampling. The minimum leaf phosphorus content was invariably noted with $S_1P_1L_1$ on all dates sampling. Nitrogen content was not significantly affected by folior spraying of phosphorus.

Analyzed data showed that the interaction between numbers of spray x source x level of phosphorus was also found significant on first, third and fourth dates of sampling. $S_2P_1L_1$ accumulated significantly higher leaf potassium content on second and fourth dates of sampling while $S_2P_1L_3$ on first and $S_1P_1L_1$ on third date of sampling, respectively. These results are in support by the finding of earier workers [11] who reported increased leaf potassium content with higher rate of phosphorus in guava.Statistically calculated data revealed that the interaction between number of spray x source x level of phosphorus were found significant on last three where $S_2P_2L_2$ accumulated significantly higher leaf calcium in first there dates of sampling, while minimum leaf calcium content was

recorded with $S_1P_1L_4$ on first and fourth dates dates of sampling, of sampling (Table 1). These results are in agreement with the findings of Embleton *et al.* (3), Hiroce (7) in citrus, Verma *et al.* (13) in guava who reported that phosphorus application increased the leaf calcium content.

The data presented in Table 2 indicated that interaction between numbers of spray, source and level of phosphorus were found significant in all dates of sampling. $S_1P_1L_1$ accumulated higher leaf magnesium content on second and fourth dates of sampling while $S_2P_1L_3$ on first and $S_1P_1L_2$ on third dates of sampling. These results are in-conformity with the findings of Embleton *et al.* (3) and Hiroce (7) in citrus and Wagh and Mahajan (14) in guava. Data on zinc content revealed that the interaction between number of spray, source and level of phosphorus were found significant on last three dates of sampling. $S_1P_2L_1$ gave significantly higher zinc content of leaves on first two dates of sampling, whereas, $S_2P_2L_4$ produced lower zinc content on first and last date of sampling. These results are in conformity with the findings of Embleton *et al.* (3) who found that an increase in leaf phosphorus decreased the zinc concentration in orange leaves. El-Gazzer *etal.*(2)

Table 1: Effect of interaction (number of spray x source x level) on leaf phosphorus, potassium and calcium content in guava leaves (per cent dry weight basis)

Treatment	Leaf phosphorus content (%)				Leaf potassium content (%)				Leaf calcium content (%)			
	Date of sampling				Date of sampling				Date of sampling			
	18.01.2001	28.01.2001	07.02.2001-02	17.02.2001-02	18.01.2001	28.01.2001	07.02.2001-02	17.02.2001-02	18.01.2001	28.01.2001	07.02.2001-02	17.02.2001-02
$S_1P_1L_1$	0.150	0.146	0.150	0.155	1.115	1.109	1.193	1.083	1.928	1.914	1.990	2.015
$S_1P_1L_2$	0.266	0.273	0.273	0.281	1.138	1.155	1.156	1.159	1.866	1.910	1.840	1.905
$S_1P_1L_3$	0.264	0.270	0.280	0.290	1.140	1.144	1.141	1.145	2.049	2.133	2.135	2.200
$S_1P_1L_4$	0.289	0.297	0.315	0.316	1.130	1.144	1.139	1.141	1.853	1.835	1.905	1.895
$S_1P_2L_1$	0.197	0.194	0.200	0.285	1.123	1.193	1.090	1.079	2.115	2.115	2.170	2.165

$S_1P_2L_2$	0.307	0.310	0.306	0.312	1.123	1.120	1.123	1.121	1.952	1.960	1.970	1.960
$S_1P_2L_3$	0.257	0.261	0.271	0.280	1.151	1.156	1.123	1.160	1.885	1.920	1.920	2.025
$S_1P_2L_4$	0.260	0.265	0.273	0.283	1.126	1.134	1.132	1.147	1.905	1.960	2.030	2.180
$S_2P_1L_1$	0.154	0.150	0.148	0.153	1.121	1.197	1.098	1.186	1.970	1.970	1.985	1.995
$S_2P_1L_2$	0.283	0.386	0.400	0.403	1.116	1.117	1.117	1.119	2.045	2.175	2.240	2.375
$S_2P_1L_3$	0.285	0.406	0.413	0.424	1.189	1.119	1.132	1.128	1.915	1.975	2.000	1.975
$S_2P_1L_4$	0.305	0.423	0.439	0.443	1.111	1.126	1.138	1.142	1.925	1.895	1.910	1.910
$S_2P_1L_1$	0.180	0.175	0.174	0.184	1.108	1.098	1.186	1.079	1.868	1.905	1.910	1.945
$S_2P_2L_2$	0.266	0.370	0.378	0.376	1.139	1.148	1.147	1.151	1.870	1.845	1.905	1.940
$S_2P_2L_3$	0.263	0.374	0.380	0.398	1.123	1.196	1.144	1.157	1.940	1.940	2.060	2.075
$S_2P_2L_4$	0.282	0.407	0.420	0.429	1.132	1.155	1.159	1.167	2.203	2.295	2.295	2.320
CD(P=0.05)	0.048	0.023	0.024	0. 025	0.040	NS	0.039	0.038	NS	0.359	0.154	0.156

Table 2: Effect of interaction (number of spray x source x level) on leaf magnesium and zinc content in guava leaves (per cent dry weight basis)

Treatment	Leaf magnesium content				Leaf zinc content			
	Date of sampling				Date of sampling			
	18.01.2001	28.01.2001	07.02.2001-02	17.02.2001-02	18.01.2001	28.01.2001	07.02.2001-02	17.02.2001-02
$S_1P_1L_1$	0.154	0.176	0.157	0.178	96.5	98.3	99.3	97.8
$S_1P_1L_2$	0.166	0.156	0.179	0.159	96.3	96.8	95.7	94.8
$S_1P_1L_3$	0.170	0.171	0.174	0.174	94.8	95.8	94.8	94.0
$S_1P_1L_4$	0.163	0.159	0.167	0.162	91.5	90.3	90.5	92.0
$S_1P_2L_1$	0.161	0.165	0.163	0.167	99.0	98.8	97.7	96.0
$S_1P_2L_2$	0.159	0.159	0.172	0.161	98.2	96.2	97.8	97.0
$S_1P_2L_3$	0.168	0.169	0.171	0.171	94.2	94.3	92.7	90.8
$S_1P_2L_4$	0.158	0.159	0.162	0.162	89.3	86.5	84.5	84.5
$S_2P_1L_1$	0.166	0.168	0.169	0.170	97.3	91.7	91.5	91.0
$S_2P_1L_2$	0.163	0.164	0.176	0.165	92.3	92.0	89.8	87.7
$S_2P_1L_3$	0.171	0.174	0.175	0.176	92.2	91.8	90.0	88.7
$S_2P_1L_4$	0.161	0.165	0.165	0.167	88.0	79.5	79.3	78.8
$S_2P_1L_1$	0.164	0.166	0.166	0.167	98.7	96.7	95.3	93.3
$S_2P_2L_2$	0.160	0.162	0.173	0.164	95.3	96.0	95.7	93.0
$S_2P_2L_3$	0.169	0.172	0.172	0.174	92.5	94.3	92.7	91.8
$S_2P_2L_4$	0.159	0.162	0.163	0.165	87.8	87.7	85.0	82.5
CD(P=0.05)	0.006	0.006	0.006	0.006	16.74	3.18	3.14	3.09

also reported that leaf zinc content decreased with increasing phosphorus rates. A highly significant negative correlation between leaf zinc and leaf phosphorus was found in this study, which also confirm these results.

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