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RESEARCH ARTICLE :

Effect of growth regulator and chemicals on leaf nutrient status in Tamarind plantation at Dharmapuri district of Tamil Nadu

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SUMMARY : In order to assess the influence of growth regulators and chemicals on leaf nutrient status of tamarind in 15 year old plantation was treated with different combination of growth regulators and chemicals through foliar application. The treatments namely $ZnSO_4$ 0.5 per cent + Boric acid 0.3 per cent, Planofix, Paclobutrazol and Ethephon were applied in tamarind plantation at Chinnakupam village, Harur taluk, Dharmapuri district, Tamil Nadu. Nutritional status of tamarind leaves were significantly improved by the application of growth regulators and chemicals. The total nitrogen (3.72 % and 3.14 %), total phosphorus (0.345 % and 0.338 %) total potassium (0.203 % and 0.191 %) were recorded maximum by the foliar application of Paclobutrazol and Planofix. The lowest nutrient status (Total nitrogen – 1.90 %, total phosphorus - 0.184 % and total potassium - 0.119 %) was observed in control (no floreign application). To conclude the study, the Paclobutrazol and Planofix in tamarind tree enhanced the nutrient status in the tamarind leaves and hence it can contribute to fruit yield in tamarind plantations.

KEY WORDS :
Tamarind leaves, Growth regulator, Chemicals, Nutrient status, Total nitrogen, Fruit yield

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BACKGROUND AND OBJECTIVES

Bio regulator and chemical mediated biochemical changes have been shown to play a vital role during drought stress. Growth regulators such as hormones, chemicals and micronutrients play an important role in improving the growth, yield and quality of the many fruit crops (Rajan, 2013). Agricultural development over centuries and especially its acceleration in modem times through irrigation, pruning, breeding, pest control, hormonal treatments and better control of environment constantly improved the ability to regulate cropping, thereby minimising the effects of internal and external triggers of alteration (Padhiar, 2000). Rath *et al.* (1986) studied the effect of growth substances on nutrient status of mango leaves in relation to flowering and found that the N content gradually increased initially with application of growth substances followed by a decline indicating that the N was utilized for the initiation of flower buds and the treated trees

Table A : Standard procedure followed for leaf nutrient analysis

Sr. No.	Parameter	Method adopted	References
1.	Nitrogen	Microkjeldahl method	Humphries (1973)
2.	Phosphorus	Vanadomolybdate yellow colour method	Jackson (1973)
3.	Potassium	Flame photometry	Piper (1973)

had high N content compared to the control.

Tamarind, a suitable species for wasteland and other afforestation programme, planted extensively in Tamil Nadu by forest department, farmers and other agencies suffers from irregular bearing associated with shy bearing which results in poor fruit yield. It is documented by earlier workers that due to profuse flowering in *Tamarindus indica*, the fruit set was very poor, resulting in large scale abscission of flowers as well as fruits during various stages of development (Laxmi, 2011). Having the above understanding, the study is focused to study the influence of growth regulators and chemicals on leaf nutrient status of tamarind trees for enhancing the flowering and fruit yield.

RESOURCES AND METHODS

The study was carried out in the Chinnakupam village, Harur Taluk, Dharmapuri district, Tamil Nadu, India (12º01'00''N 78º27'38.7'' E). The plant material consisted of tamarind trees, planted in 2000 with the spacing of 5 × 5 m were employed for increasing the leaf nutrients through the treatment of floreign application. The trees were selected on the basis of uniform vigor and development. The trees were given complete wetting with growth regulators and chemicals spray fluid of 20 litres tree. The crop was irrigated for one month after growth regulator and chemical application.

The growth regulator and chemicals sprayed are T_1 ($ZnSO_4$ 0.5 % + Boric acid 0.3 %), T_2 (Planofix), T_3 (Paclobutrazol), T_4 (Ethephon) and T_5 (Control). The leaf samples were taken for evaluation at different stages during new flush formation, peak flowering, pod maturation or fruiting and harvesting. The processed and ground leaf samples were analyzed for macronutrients using appropriate methodology as furnished in Table A and expressed in percentage.

The data obtained were subjected for statistical analysis to evaluate the possible relationship between the different parameters and analysis of variance employing statistical methods described by Panse and Sukhatme (1995).

OBSERVATIONS AND ANALYSIS

Plant growth regulators (PGRs) due to their multiple growth and physiological functions, they are gaining recognition as an emerging agricultural and horticultural practice. The leaf macro nutrients and micro nutrients as well as the flowering are highly influenced by the different plant growth regulator. However, some risk factors associated with the applications of PGRs have also been observed in certain agricultural practices in the form of volatilization, chemical degradation, leaching and oxidation. Therefore, in order to gain increased efficiency in targeted crops, the effective use of appropriate doses of PGRs is recommended (Mustafa and El-Shazly, 2013).

Total nitrogen :

Optimum level of nutrition is highly correlated to fruit yield. In the present investigation, higher nitrogen content was observed in leaves of tamarind, when treated with Paclobutrazol application in the tamarind plantation. This shows that the above results are in agreement with the observations made in tamarind by Illango (2000).

In present study, the mean total nitrogen content in four growth stages, the maximum was accounted in T_3 (Paclobutrazol) with the value of 3.52 per cent followed by T_2-Planofix (3.14 %), T_1- $ZnSO_4$ 0.5 per cent + Boric acid 0.3 per cent (2.82 %), T_4-Ethephon (2.26 %) and minimum in T_5-Control (1.90 %). The present study helps to conclude that application of growth regulators and chemicals (Paclobutrazol and Planofix) had greatly influence on total nitrogen content in the tamarind tree leaves (Table 1).

Total phosphorus :

The phosphorus content was enhanced by Paclobutrazol with the content of 0.345 per cent and lowest of 0.184 per cent was obtained in control (Table 2). On supporting the present result, Illango (2000) documented that phosphorus content was highest in urea 1.5 per cent spray, soil application of micronutrients $ZnSO_4$ 175 g $tree^{-1}$ + foliar spray of $ZnSO_4$ 0.5 per cent

+ boric acid 0.3 per cent. Highest P content in peak flowering followed by a decrease with advancement in pod maturation might be due to utilization of P for pod development and maturation.

Total potassium:

In the current study, the highest total potassium was obtained in Paclobutrazol with the value of 0.203 per cent and lowest of 0.119 per cent was accounted in control treatment, where no growth regulators and chemicals were treated. As growth progress, total potassium content was increased from new flush formation to peak flowering stage and gradually declined at harvesting stage, with significant variation between each other (Fig. 1). The present result was supported by Durga Devi (1995) and Illango (2000).

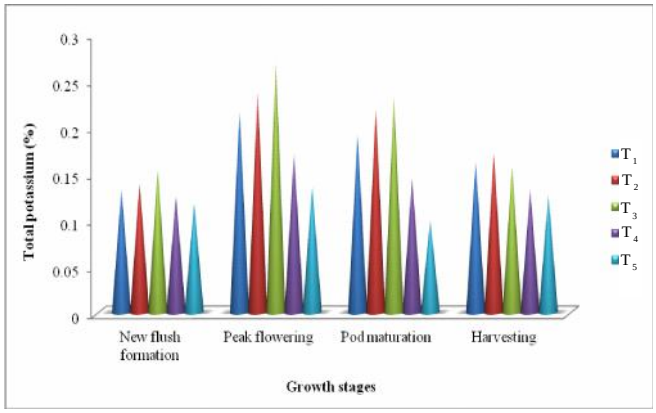

Fig. 1: Effect of growth regulator and chemicals on total potassium content in tamarind leaves

Conclusion :

Nutritional status of treated leaves was significantly improved by the application of growth regulators and chemicals in tamarind plantation. The total nitrogen content, total phosphorus content and total potassium were enhanced by the foliar application of Paclobutrazol and Planofix, when compared to T_5 (Control). The optimum level of nutrition is highly correlated with fruit yield. Hence, the application of growth regulator and chemicals not only improves the nutrient status, but also fruit yield.

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Table 1 : Effect of growth regulator and chemicals on total nitrogen content in tamarind leaves

Treatments		Total nitrogen (%)				Mean
		New flush formation	Peak flowering	Pod maturation	Harvesting	
T_1	$ZnSO_4$ (0.5 %) + Boric acid (0.3 %)	1.97	3.75	3.68	1.89	2.82
T_2	Planofix	2.27	4.22	3.95	2.14	3.14
T_3	Paclobutrazol	2.33	4.65	4.59	2.54	3.52
T_4	Ethephon	1.67	2.45	2.97	1.98	2.26
T_5	Control	1.37	2.22	2.19	1.82	1.90
	S.E.±	0.103	0.318	0.445	0.177	
	C.D. (P=0.05)	0.219	0.664	0.943	0.375	

Table 2 : Effect of growth regulator and chemicals on total phosphorus content in tamarind leaves

Treatments		Total phosphorus (%)				Mean
		New flush formation	Peak flowering	Pod maturation	Harvesting	
T_1	$ZnSO_4$ (0.5 %) + Boric acid (0.3 %)	0.225	0.421	0.313	0.258	0.304
T_2	Planofix	0.242	0.445	0.379	0.286	0.338
T_3	Paclobutrazol	0.247	0.458	0.374	0.301	0.345
T_4	Ethephon	0.192	0.394	0.303	0.194	0.270
T_5	Control	0.122	0.245	0.205	0.165	0.184
	S.E.±	0.040	0.065	0.055	0.044	
	C.D. (P=0.05)	0.086	0.139	0.117	0.094	

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