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EFFECT OF SIMPLE AND COMPOUND FERTILIZER APPLICATION ON FLUSHING AND MALFORMATION OF INFLORESCENCE IN MANGO

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Abstract

Different doses of simple and compound fertilizers were applied from 2003 (April and July) to 2004 (February and May) through traditional way to study the effect of these on vegetative growth and reducing malformation of inflorescence. Early shoot emergence was recorded with all fertilizer applications and more vigorous shoots were observed with high dose of compound fertilizers. Nitrogen level in leaves was increased from April to June and decreased up to September regardless of type and dose of fertilizer. More nitrate level was recorded in leaves of shoot, carrying malformed panicles as compared to healthy ones. Higher nitrogen contents were analyzed in malformed panicles as compared to healthy panicles. Carryover effect of malformation was inconsistent with high dose fertilizer regardless of its type.

Key words: Mango, simple & compound fertilizer vegetative growth, malformation

INTRODUCTION

Deformation of panicles, suppression of apical dominance, shortened primary and secondary axis, thickened panicles characterize to floral malformation. The complex nature of problem became cause of diversity of claims about its possible causes i.e. fungi, mites and various physiological factors. Although there is a list of measures in scientific literature to control the malady but the phenomenon is yet least understood due to much complicated vegetative and reproductive growth systems in mango tree. Nutrient status of the mango tree is considered as a key factor affecting vegetative growth, flowering and bearing of mango. Nutrient imbalance has also been recognized as the cause of malformation and irregular bearing (Jagirdar and Jafri, 1966).

Therefore, present studies will be aimed to investigate possible control of floral malformation by modifying growth pattern through soil application of simple and compound fertilizers.

MATERIALS AND METHOD

Research work reported in this manuscript was conducted in the Experimental Fruit Orchard (Square 9), Institute of Horticultural Sciences, University of Agriculture, Faisalabad, during the year 2003-2004. Experiment was conducted on sixteen OFF year mango trees of 25-30 years old. There were four treatments repeated four times and each treatment had four experimental trees as experimental unit. Experimental trees were supplied with simple [urea, SSP, K_2SO_4]and compound fertilizers [NPK, 17:17:17] during the month of April & July 2003 (OFF year) and February and September 2004 (ON year) to test most effective dose and type of fertilizer against floral malformation of inflorescence in mango. Randomly ten terminals were tagged on each selected tree to record month-wise emergence of shoots.

Flow chart of fertilizers application is as under;

	NPK fertilizer kg/plant (17:17:17)	Urea	SSP	K_2SO_4	Standard doses (kg tree^{-1})		
					N	P_2O_5	K_2O
T_1	6.410	0.540	0.000	0.000	1.340	1.090	1.090
T_2	4.940	0.760	0.000	0.000	1.190	0.840	0.840
T_3	0.000	2.913	6.055	2.180	1.340	1.090	1.090
T_4	0.000	2.586	4.666	1.680	1.190	0.840	0.840

RESULTS AND DISCUSSION

Effect of fertilizer application on juvenile and reproductive physiology of mango was investigated and results are as under.

Vegetative growth behavior

Significant number of shoots emerged in April followed by May, June and July respectively as shown in Figure 1. Maximum number of shoots emerged on T_1 treated trees followed by T_3 in each month of the year while minimum number of shoots emerged on T_2 and T_4 (Figure 1). From above results, it is clear that higher the dose of fertilizer applied, higher was the induction of shoots. Moreover, application of compound fertilizer is better for the induction of more shoots as compared to simple fertilizer application. These results support the finding of Syamal and Mishra (1989) who reported that higher dose of NPK resulted in more emergences of shoots.

Effect of fertilizer application on vigor of shoots

Vigor of shoots was more in April flushes followed by May and June flushes. Length of shoots was more in T_1 followed by T_3 and T_2 as shown in Figure 2.This shows that optimum nutrient application resulted in the emergence of more vigorous shoots. Moreover, vigor was increased with compound fertilizer application as compared to simple fertilizers.

Nitrogen level in leaves

There was an increase in nitrogen level from April to June and decrease in September. Results coincides with the finding of Sen et al. (1963) who proved that nutrient status of mango plant was greatly affected by time of the year and stage of growth. Maximum nitrogen level was recorded T_2 followed by T_3 and T_1, respectively. This result is against the finding of Sen et al. (1963). He stated that there is high C:N ratio in the bark of mango during initiation and differentiation period.

Blooming potential of tagged shoots

In our results there was not 100% blooming in any type of fertilizer-supplied trees as shown in Figure 4. This result is against the finding of Reddy (1983) who proved that every shoot produced blossoms irrespective of the time of its emergence and cessation of growth in the

previous years. Maximum blooming percentage was recorded in T_1 followed by T_2 and T_4 as shown in Figure 4. Blooming potential of compound fertilizer supplied trees was more as compared to simple fertilizer supplied trees. This shows that, type of fertilizer play very important role in blooming intensity of mango.

Floral malformation on whole tree basis

All malformed panicles were pruned from selected trees and counted. Maximum malformed panicles were recorded on T_4 followed by T_2 and T_3, respectively. Minimum number of malformed panicles was counted in high dose compound fertilizer supplied trees followed by high dose simple fertilizer supplied trees as shown in Figure 5. Results coincide with the findings of Shawkey et al. (1978). He reported that spraying with urea in mid-November delayed flower bud opening and reduced the incidence of flower malformation. It also correlate with the findings of Azzouz and Dahshan (1981) who stated that best reduction of flower malformation was obtained with the higher N rate.

Emergence of malformed panicles on shoots

Shoots emerged in April, May, June, July and August in first year of experiment was observed for their reproductive behavior in second year. April shoots have minimum intensity of floral malformation followed by May and June shoots (respectively) regard less to dose and type of fertilizer applicaton. Maximum malformation of inflorescence was recorded on July & August shoots as shown in Figure 6. From above results, it is clear that early emerged shoots have less intensity of malformation of inflorescence as compared to late. These results concide with the statement that late emerged flushes increased percentage of malformed panicles in blooming season (Tahir et al., 1999).

Nitrogen level in malformed and healthy panicles

Nitrogen level was highly significant in malformed panicles as compared to healthy regardless to dose and type of fertilizers applied. Nitrogen level was more in both types of panicles in T_2 followed by T_3 and T_4 treatments as shown in Figure 7. More nitrogen level in malformed panicles determines that there might be more accumulation of nitrogen instead of utilization. This abnormality in nitrogen metabolism might be one cause of malformation of inflorescence

CONCLUSION

Optimum dose of compound fertilizer application was recommended to improve plant health and to reduce malformation of inflorescence in mango. Moreover, general trees health and malformation of inflorescence of mango can be improved through cultural practices like fertilizer application especially optimum dose of compound fertilizer.

REFERENCES

Azzouz, S. and M.A. Dahshan 1981. The combined effect of micro-nutrients and N on floral malformation of mango. Agri. Res. Rev., 59(3):53-62.

Jagirdar, S.A.P. and N.R. Jafri. 1966. Malformation of inflorescence. Agri. Pak., 17:357.

Reddy, K.S. 1983. The relationship between vegetative growth and flowering in mango (*Mangifera indica* L.) cv. Banganapalli. Thesis Abst. Haryana Agri. Uni. of Agri. Sci. Bangalore, India. 9(3):277-278 (Hort. Absts., 54:5883).

Sen, P.K., S.K. Maiti and S.C. Maiti. 1963. Studies on induction of axillary flowering in *Mangifera indica* L. Acta Horticulturae. 24:185-188.

Shawky, I., Zidan Z, EI-tomi, A. and Dahshan D. 1978.Effect of urea sprays on blooming, flowering malformation and productivity of Taimour mago trees.Egypt. J. Horti. Sci. 133-142.

Syamal, M.M. and K.A. Mishra. 1989. Effect of NPK on growth, flowering and quality of mango. Acta Horticulturae. 231:276-281.

Tahir, M.F., M. Ibrahim and M.A. Pervez. 1999. Vegetative and reproductive growth pattern of mango (*Mangifera indica* L.). Int. J. Agric. Biol. 1560-8530

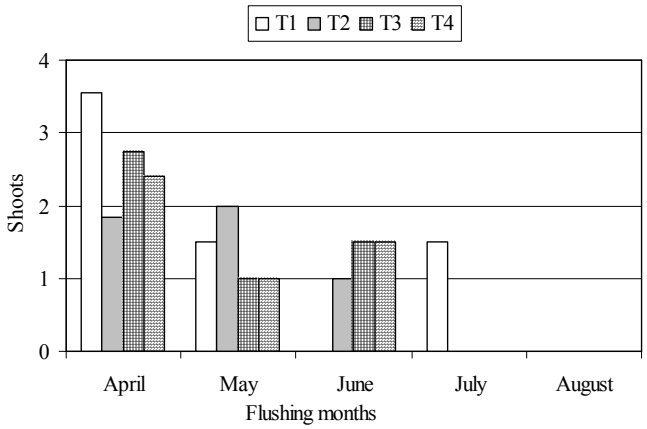

Figure 1: Effect of fertilizer application on the emergence of shoots

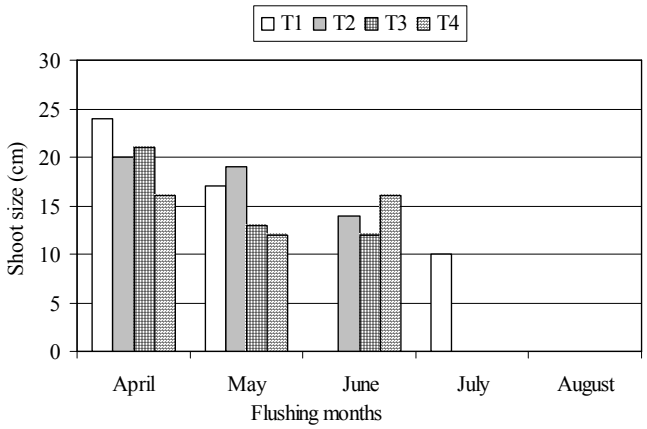

Figure 2: Effect of fertilizer application on shoot vigor

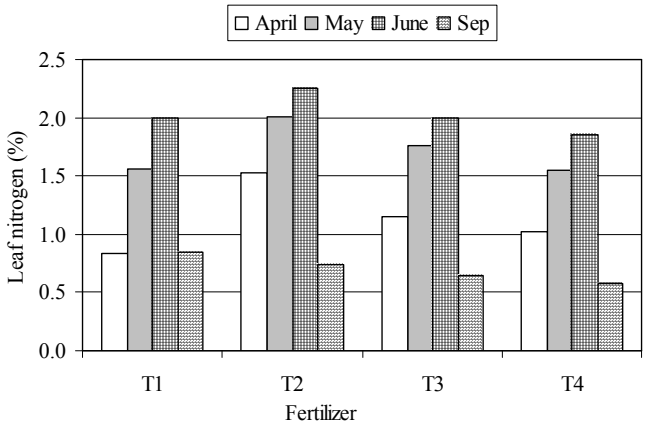

Figure 3: Leaf nitrogen level increment in response to fertilizer application

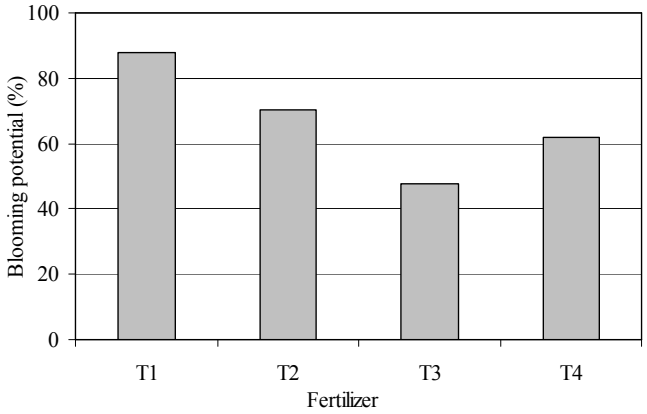

Figure 4: Effect of fertilizer application on blooming of trees

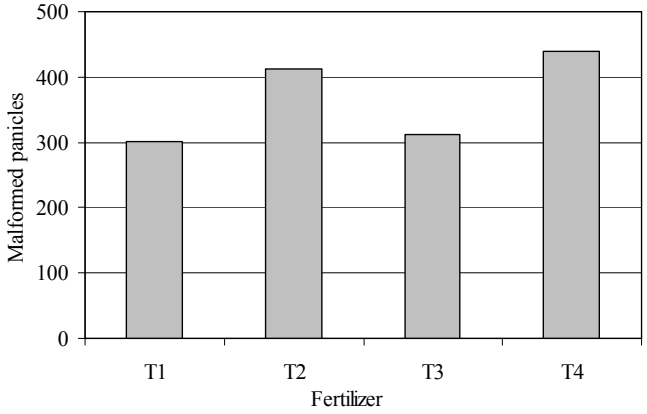

Figure 5: Impact of fertilizer application on malformation of inflorescence on whole tree basis

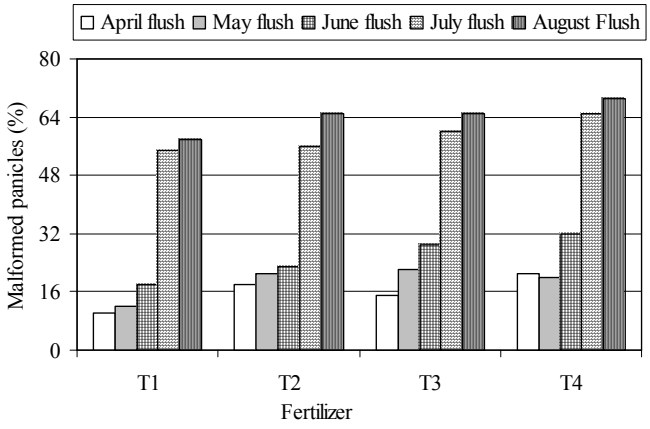

Figure 6: Impact of fertilizer application on malformation of inflorescence

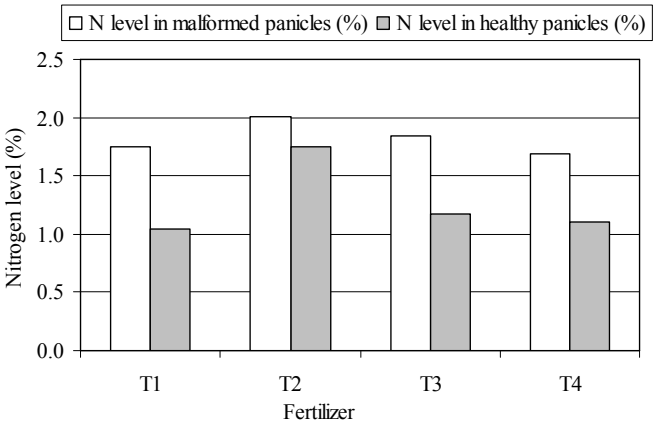

Figure 7: Nitrogen level in malformed and healthy panicles