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EFFECT OF SPLIT FERTILIZER APPLICATION ON VEGETATIVE GROWTH AND MALFORMATION OF INFLORESCENCE IN MANGO

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Abstract

Fertilizer application and pruning practices were carried out to reduce malformation of inflorescence. Bimonthly (two month interval) and quarterly (three month interval) fertilizer application resulted in more and early emergence of shoots. Emergence of vigorous shoots was more in bimonthly as compared with quarterly fertilizer supply trees. Consistency of malformation was less on April shoots. Moreover, fertilizer application resulted inconsistent malformation of inflorescence and leaf nitrogen contents was more in treated trees than in control. In bimonthly fertilizer application practices, significant reduction of malformation was recorded in fertilizer scheduled practice of April, June, August, October and December as compare to the other scheduled fertilizer applications while fertilizer application in February, May and November was proved the best against malformation as compare to the rest of quarterly fertilizer application scheduled practice.

Key words: Nutrition, NPK, production, Chaunsa, Growth physiology

INTRODUCTION

The recurring incidence of malformation is posing a serious threat to mango industry of the world by causing heavy losses in yield. In Pakistan, sixteen thousand tonnes production losses have been estimated due to malformation of inflorescence. Floral malformation is characterized by deformation of panicles, suppression of apical dominance, shortened primary and secondary axis, and thickened rachides of panicles with preponderance of staminate and large flowers, which set no fruits and in severe cases whole tree may be rendered fruitless (Zora & Dhillon, 1993). The complex nature of problem is evident from diversity of claims about its possible causes i.e. fungi, mites, viruses and various physiological factors. The deficiency of some essential elements has also been associated with this disorder, *viz.* nitrogen (Pandey et al., 1977), potassium (Mishra, 1976) and certain micronutrients (Schlosser, 1971). Pruning of malformed panicles or shoots regulate metabolic process. Although there is a list of research work to control the malady but the phenomenon is yet least understood due to much complicated growth systems of the tree. However, physiological and biochemical studies proved that improper mineral nutrition might cause malformation of inflorescence. Therefore present studies were aimed to investigate possible

control of floral malformation by modifying growth pattern by pruning, and soil application of fertilizers.

MATERIALS AND METHOD

These investigations were carried out on Twenty-two experimental trees growing in Fruit garden Faiz Chaman situated at Multan. All experimental trees were supplied with fertilizers (bimonthly or quarterly schedule) to prevent trees from any nutritional stresses through out the year. April, May, June, July and August shoots were tagged to study their vegetative and reproductive growth behavior as a result of two year split dose fertilizer application.

Flow chart of bimonthly application of fertilizers (kg per Plant)

Treat.	February	April	June	August	October	December
T_0	3.0 Urea					
T_1		0.5 Urea	1.0 NPK	1.0 NPK	1.0 NPK	1.0 NPK
T_2	0.5 Urea		1.0 NPK	1.0 NPK	1.0 NPK	1.0 NPK
T_3	0.5 Urea	1.0 NPK		1.0 NPK	1.0 NPK	1.0 NPK
T_4	0.5 Urea	1.0 NPK	1.0 NPK		1.0 NPK	1.0 NPK
T_5	0.5 Urea	1.0 NPK	1.0 NPK	1.0 NPK		1.0 NPK
T_6	0.5 Urea	1.0 NPK	1.0 NPK	1.0 NPK	1.0 NPK	

Flow chart of quarterly fertilizer application (kg per Plant)

Treat.	February	May	August	November
T_0	3.0 Urea			
T_1	2.0 NPK	0.5 Urea	2.0 NPK	
T_2		0.5 Urea	2.0 NPK	2.0 NPK
T_3	2 .0 NPK		0.5 Urea	2.0 NPK
T_4	2.0 NPK	0.5 Urea		2.0 NPK

RESULTS AND DISCUSSION

Vegetative growth behavior of normal (non-blooming) and malformed panicle bearing terminals was studied as a result of fertilizer application. Fruit and malformed panicle bearing terminals were tagged to study their growth behavior. Data were collected to declare the best combination of fertilizer application for juvenile and reproductive growth of mango.

Time of emergence of shoots as a result of bimonthly fertilizer application

Bimonthly fertilizer application resulted in significant emergence of early shoots in all scheduled practices as compare to control trees (Figure 1). Treatment T_1 was proved the best for early emergence of shoots followed by T_5, T_3 and T_2, respectively.

Time of emergence of shoots as a result of quarterly fertilizer application:

Maximum early emergence of shoots (April flushes) were recorded on T_2 followed by T_3 which was at par with treatment T_4. Maximum number of late flushes emerged on control trees followed by T_1 as shown in Figure 2. More number of shoots emerged in the month of May on T_4 followed by T_3 and T_1.

Vegetative phase of lateral shoots:

More number of lateral shoots emerged on previous year tagged shoots of bimonthly and quarterly fertilizer-supplied trees as compared to control trees in next year of research studies (Figure 3 & 4). We had recorded early emerged shoots which were expected to bloom next year but it was OFF year and again there was emerge of shoots on previous year tagged shoots. These shoots were early and more vigorous than previous year shoots. From these results we come to know that early emerged mature shoot may not be considered to bloom in next blooming season.

Induction of lateral shoots on malformed panicle pruned terminals

More early emerged lateral shoots recorded on quarterly than bimonthly treatment. Early emergence of lateral shoots (April) was maximum in T_4 followed by T_3 as shown in Figure 6. Late emergence of shoots was higher in control trees as compared to all other fertilizer supplied trees as shown in Figure 5 & 6. This result shows that continuous fertilizer application improves tree health and pruning practices initiate early emergence of lateral shoots.

Effect of bimonthly treatments on floral malformation

More reduction of floral malformation recorded in T_1 followed by T_3 & T_5 treatment Figure 7. There was 56% reduction of floral malformation in T_1 followed by 48% & 43% in T_3 & T_2, respectively. From this result, it is clear that split fertilizer application is very important factor in reducing malformation of inflorescence.

Effect of quarterly fertilizer application on floral malformation

Reduction of malformation was more in T_4 treatment followed by T_1 as shown in Figure 8. In T_4 fertilizer supplied trees, 50% reduction of floral malformation occurred followed by T_1 with 40% reduction. Reduction compared to T_2 & T_3.

CONCLUSION

Bimonthly and quarterly fertilizer applications have significant effect on vegetative growth i.e. these cultural practices initiate early emergence of shoots which results in reduction of malformation of inflorescence.

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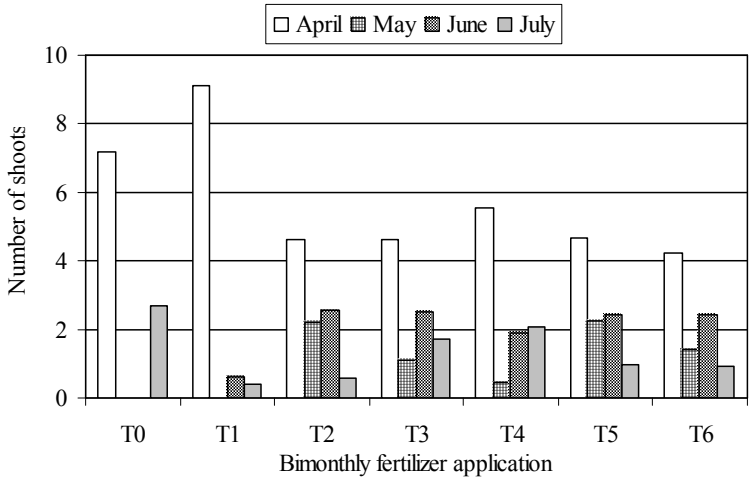

Figure 1: Month-wise emergence of shoots

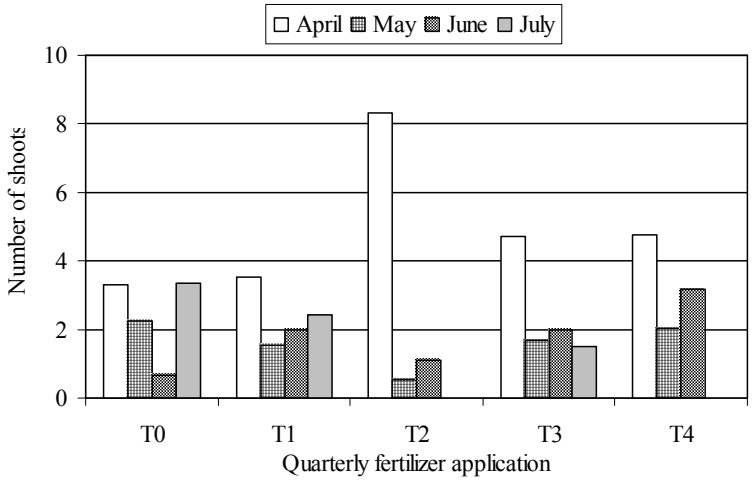

Figure 2: Month-wise emergence of shoots

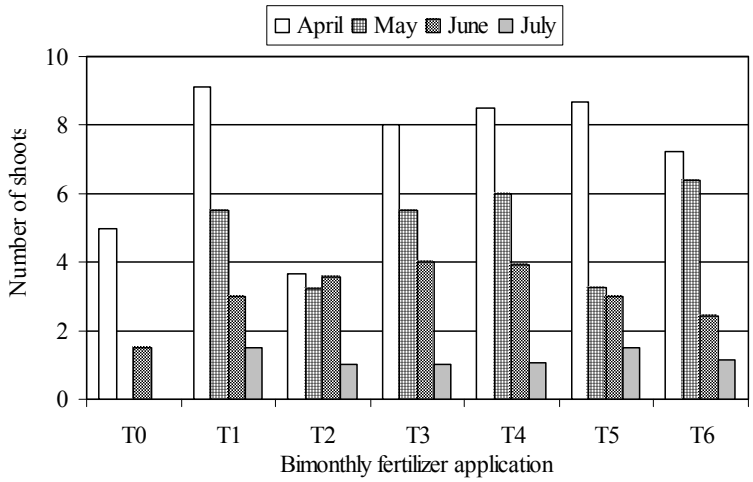

Figure 3: Continuous fertilizer application and vegetative growth in mango

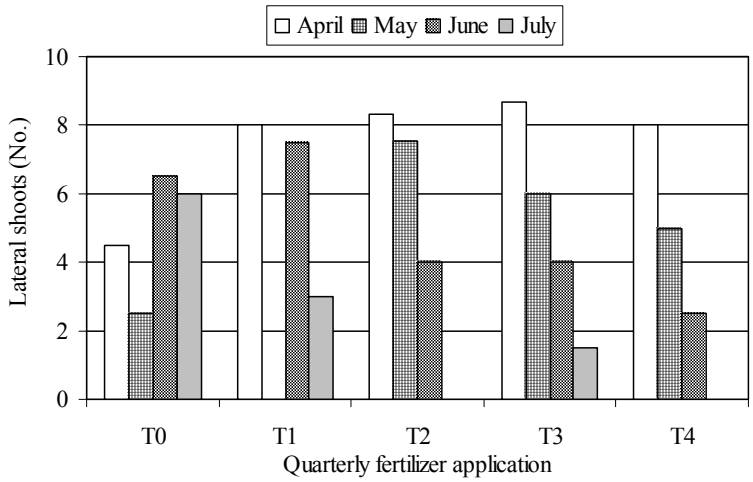

Figure 4: Shoots on non-blooming terminals

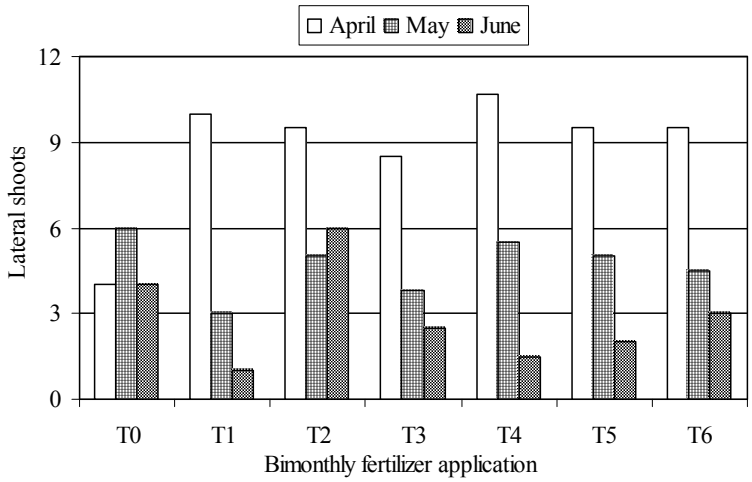

Figure 5: Lateral shoots on malformed panicle pruned terminals

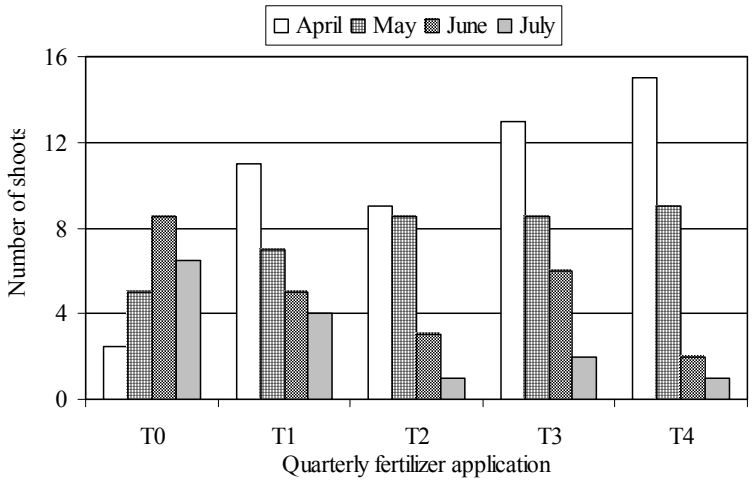

Figure 6: Emergence of lateral shoots

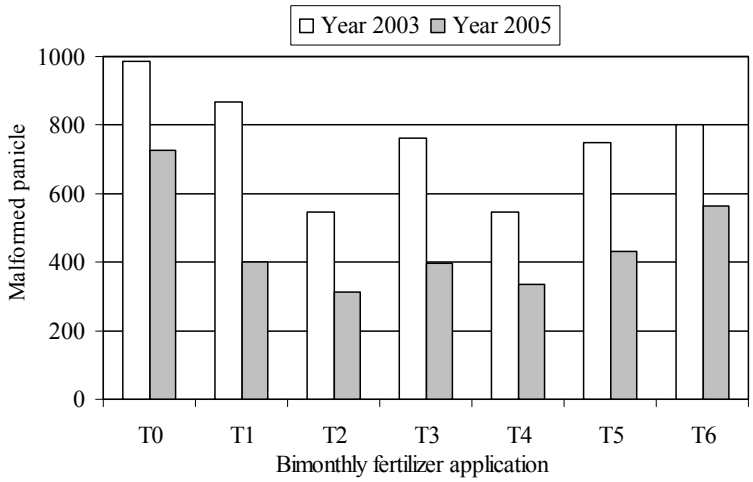

Figure 7: Carryover effect of malformation in bimonthly practices

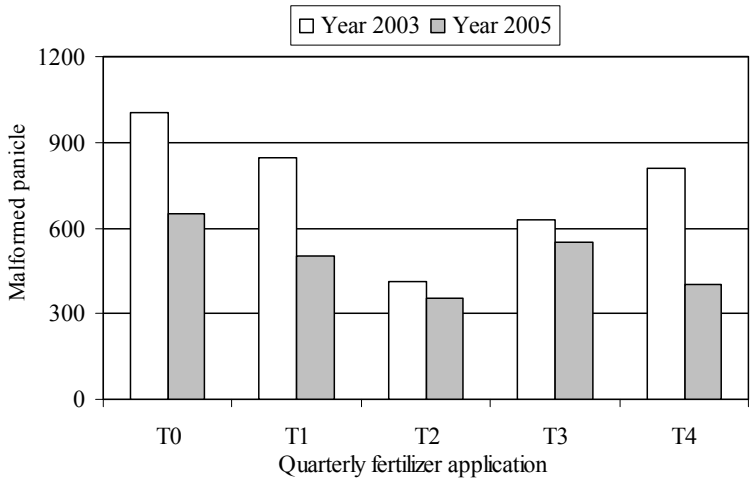

Figure 8: Carryover effect of malformation in bimonthly practices