

GROWTH AND FLOWERING OF MANGO (*MANGIFERA INDICA* L.) AS AFFECTED BY PRUNING OF MALFORMED PANICLES

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ABSTRACT

A study was conducted at Horticultural Research Sub-Station, Dera Ghazi Khan, Pakistan during 2005-07. Branches having malformed panicles of mango (cv. Malda) were pruned upto 6, 9, 12 and 18 inches beneath the malformed panicles (T₁-T₄), while each of four treatments was followed by spray of Topsin-M fungicide (T₅-T₈). These treatments were compared with control (T₉= unpruned and non-sprayed plants) for time taken to first sprout, survival of branches (%), number of new flushes and normal panicles (%). The results revealed that pruning upto 18 inches seemed to be unsuitable where survival of treated branches decreased to 42 percent or more having a fewer number of new flushes (1.2-1.25) and normal panicles (11-27%). Pruning upto 9 inches was the most optimum level where first sprout took 13 days and branches survived upto 83-100 percent, with maximum number of new flushes (2.5-2.65) and normal panicles (34-38%). The branches under control took 30 days for first sprout, having 100 percent survival but had minimum number of new flushes (0.5) with zero normal panicles. Pruning followed by spray of Topsin-M showed better effect than that of pruning alone.

KEYWORDS: *Mangifera indica*; malformation; shoot pruning; fungicide; Pakistan.

INTRODUCTION

Mango (*Mangifera indica* L.) is the second major fruit crop of Pakistan and ranks 5th in world production (3). It is mainly produced in Sindh province and southern part of Punjab province. The total area is over 170 thousand hectares with annual production of about 1728 thousand tons (2).

Malformation is the most important disease of mango all over the world which is of great concern because of its widespread and destructive nature,

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unknown etiology and control (8, 10). The range of susceptibility varies with respect to cultivar, plant age and agro-climatic conditions (5). The highest malformed panicles (53-72%) were recorded in cv. Samar Bahisht, followed by cv. Malda (43-45%) (1). Control measures like clipping practices, spray of chemicals and growth regulators may reduce the damage caused by malformation. Clipping at 18 inches behind the panicles + spray of benomyl reduced disease severity by about 70 percent in mango cv. Anwar Retaul (5). Reduction in malformation was observed by pruning the shoots 9 inches below the malformed inflorescence during flowering season (12). Floral malformation in mango (cvs. Taimour and Mabrouka) was reduced better by removal of all affected panicles with three additional nodes behind the panicles and spray of one of the chemicals i.e. 200 ppm NAA, 500 ppm IBA, 500 ppm phosphoric acid, 50 ppm GA3, 5% zinc sulphate and 0.4% cuprous oxide as compared to untreated trees (9). Fortnightly pruning of healthy, malformed, barren and lately barren panicles promoted the growth of lateral shoots that bore fruit, minimized alternate bearing and proved useful to reduce inflorescence malformation (4).

The present study was conducted to explore the optimum pruning level for affected shoot beneath the malformed panicles in flowering season and to compare pruning alone and followed by fungicidal spray to minimize the malformation hazard.

MATERIALS AND METHODS

This study was carried out at Horticultural Research Sub-Station, Dera Ghazi Khan, Pakistan during 2005-07. Uniform (15-18 year old) mango plants (cv. Malda) affected by floral malformation were selected. Four branches having malformed panicles from each plant were tagged for one treatment application as well as the other affected panicles if present on the same plant were treated equally. Following nine treatments were applied during the month of April each year.

- T₁ = Pruning of branch 6 inches beneath the malformed panicles
- T₂ = Pruning of branch 9 inches beneath the malformed panicles
- T₃ = Pruning of branch 12 inches beneath the malformed panicles
- T₄ = Pruning of branch 18 inches beneath the malformed panicles
- T₅ = T₁ + spray of Topsin-M @ 150 g per 100 litre water
- T₆ = T₂ + spray of Topsin-M @ 150 g per 100 litre water
- T₇ = T₃ + spray of Topsin-M @ 150 g per 100 litre water
- T₈ = T₄ + spray of Topsin-M @ 150 g per 100 litre water
- T₉ = Control (no pruning and no spray)

The treatments were applied according to RCBD with three replications. Diseased, normal (healthy) and total number of panicles were counted on each branch in following year. The data collected on different parameters are detailed below:-

Number of days taken for first sprout: The treated branches were observed vigilantly during experimental period that lasted over one year. The count of days started from the date of treatment to date of sprouting. The days were averaged over number of branches per treatment per replication.

Survival percentage of treated branches: The survival (%) of treated branches was estimated through given formula and averaged over per treatment per replication.

$$\text{Survival percentage} = \frac{\text{Number of branches survived}}{\text{Number of branches treated}} \times 100$$

Number of flushes from treated branches: The count of flushes appearing from treated branches was recorded and added over experimental period, then averaged over per branch per treatment per replication.

Normal panicles from treated branches (%): The count of normal panicles appearing from treated branches in coming flowering season was recorded and normal panicles percentage was calculated by given formula then averaged over per branch per treatment per replication.

$$\text{Normal panicles (\%)} = \frac{\text{Number of normal panicles}}{\text{Number of total panicles}} \times 100$$

Two years data were pooled and subjected to statistical analysis by using Fisher's analysis of variance technique. The treatment means were compared by LSD test (13).

RESULTS AND DISCUSSION

Number of days taken for first sprout

The data (Table 1) indicated that branches pruned upto 9 inches beneath the malformed panicles plus spray of Topsin-M (T₆) took minimum time for first

sprout (13 days), followed by same level of pruning without spray of Topsin-M i.e. T₂ (14 days). However, both these treatments were statistically at par with T₁, T₃, T₅ and T₇. The data further showed that pruning upto 12-18 inches with or without spray showed similar effect by taking 19 to 22 days for first sprout. The branches under control (T₉) took significantly more days (30 days) for first sprout (Table 1).

Survival percentage of treated branches

The data (Table 1) showed that branches pruned upto 6 or 9 inches beneath the malformed panicles + spray of Topsin-M (T₅ and T₆) had maximum survival (100%) of treated branches. Although the branches under control (T₉) also survived to 100 percent yet these had minimum values for other parameters under study except number of days taken for first sprout (30 days). However, these three treatments remained statistically at par with T₁ (pruning of branches 6 inches beneath the malformed panicles) (92%) and T₂ (pruning of branches 9 inches beneath the malformed panicles) (83%). Pruning upto 18 inches (T₄) decreased the survival of branches to minimum (42%). When same level of pruning was combined with spray of Topsin-M fungicide (T₈), 50 percent survival of treated branches was recorded. Both these treatments were statistically at par with each other. Similarly, prunings from 6 to 12 inches without spray (T₁-T₃) or 12 inches plus spray (T₇) were statistically similar (Table 1).

Number of flushes from treated branches

The result showed that branches pruned upto 9 inches beneath the malformed panicles + spray of Topsin-M (T₆) produced maximum flushes (2.65), followed by same level of pruning without spray of Topsin-M (T₂) (2.50) and 6 inches with spray of Topsin-M (T₅) (2.50 each). However, the pruning upto 6 inches (T₁) combined with spray of Topsin-M (T₅) did not statistically differ to T₂. When pruning level was increased more than 9 inches, a significant decrease in number of flushes i.e. < 2 was noted. Control treatment (T₉) produced minimum flushes (0.5) i.e. < 1 (Table 1).

Normal panicles from treated branches (%)

The data (Table 1) further indicated that branches pruned upto 9 inches beneath the malformed panicles + spray of Topsin-M (T₆) produced maximum normal panicles (38%) from treated branches followed by same level of pruning without spray of Topsin-M (T₂ = 34%). However, both these treatments had statistically the same effect. Increasing level of pruning upto

18 inches (T₄) decreased the normal panicles drastically (11%). The control treatment (T₉) had zero normal panicles indicating that treated branches bore abnormal panicles (Table 1).

The current study revealed that pruning upto 9 inches is the most optimum level as branches took minimum time for first sprout, survived to maximum and bore higher number of new flushes and normal panicles, However, increasing level of pruning more than 9 inches may decrease the survival percentage of treated branches, number of new flushes and normal panicles percentage. Pruning followed by spray of Topsin-M had better effect than that of pruning alone for all levels of pruning. These results partially support the findings of previous research (5, 9). Muhammad *et al.* (11) reported that removal of affected panicles just after their emergence reduced the carry-over effect of malformation to zero, while delaying the removal of malformed panicles increased the carry-over effect. Thus early removal of such panicles helped promote healthy vegetative growth in the season and normal inflorescences on the terminals in next blooming season. Similarly, Khader (6) found that cutting of terminal buds during or just before flowering increased the auxiliary flower bud induction and decreased the incidence of malformation. The present study showed that pruning upto 18 inches is not justified as survival of treated branches decreased to minimum and had a fewer number of new flushes and normal panicles. It may be due to the reason, as stated by Khader *et al.* (7), that trees subjected to shoot excision for bud wood purpose, produced a higher percentage of malformed panicles which was hypothetically attributed to ethylene release from damaged shoots. Zero percent normal panicles from untreated branches has also been observed by Muhammad *et al.* (11).

CONCLUSION

Malda cultivar of mango is very susceptible to floral malformation under D.G. Khan climatic conditions. The incidence of malformation can be reduced by removing the branches upto 6-9 inches beneath the malformed panicles, followed by spray of Topsin-M (150 g/100 litre water). Further increase in pruning level of branches (12-18 inches) may decrease the survival of branches, number of flushes and normal panicles and cause delay in sprouting of flushes from pruned branches.

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