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Studies on the Effect of Foliar Spray of Low Biuret Urea on Induction of Flowering in Mango (*Mangifera indica* L.)

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Abstract

Low biuret urea was applied as foliar spray on mango @ 1 and 2 per cent in August at the time of fruit bud differentiation. Spray of low biuret urea was found effective to increase fruit bud differentiation, which was indicated from enhanced flowering and increased number of fruits/yield in treated over control parts of trees. Two percent spray of low biuret urea was found more effective to increase flowering. Although number of flushes tagged in the previous season was almost same on treated and untreated plants yet more number of panicles emerged on treated plants than control due to the enhanced fruit bud differentiation caused by spray of low biuret urea. In addition to the positive effect on fruit bud differentiation, low biuret urea also helped to decrease the number of malformed panicles hence to improve the productivity of plants.

Introduction

Production of mango tree besides other factors also depends upon successful fruit bud differentiation and if by some means fruit bud differentiation may be induced, the yield can be increased. Foliar spray of low biuret urea at the time of fruit bud differentiation has been reported to enhance fruit bud differentiation in citrus (Ali and Lovatt, 1990). Spray of urea @ 2 per cent and superphosphate (4%) singly or in combination in August, December and April indicated early emergence of panicle, increase in panicle length, duration of flowering and fruit set, and improved all flowering and fruiting characteristics (Singh, 1974). Foliar application of KNO_3 @ 10 g/L increased the yield in mango by producing larger and heavier fruits. Flower formation occurred within four days and blossoms emerged within two weeks after 1 per cent KNO_3 spray (Bhuyan and Irabagon (1992). Similarly it was found that alternate bearing could be controlled during 'off' year in 'Carabao' mango by 1 per cent spray of KNO_3 (Bondad and Linsangan, 1979). Yield and quality of mango fruit cv. Dusehri was improved with soil and foliar application N, P, K, Cu and Zn on 28-year old trees (Singh and Khan, 1990). The project was hence an effort on the similar line to increase the regularity of bearing and yield of mango by supplemented application of ammoniacal nitrogen through foliage.

Materials and Methods

Research studies were carried out in Fruit Experimental Garden, University of Agriculture, Faisalabad during 1996-98. Two doses of low biuret urea (1 and 2%) were sprayed on ten years old mango trees in the last fortnight of August. Each treatment was replicated thrice and average was taken.

Following observations were recorded:

- (i) Total number of flushes from April to September.
- (ii) Number of blooming and un-blooming flushes.
- (iii) Number of malformed panicles.

Data were analysed according to the method described by Steel and Torrie (1980). LSD test was used to compare the

treatment means.

Results and Discussion

Vegetative Flushes: Average number of flushes emerged during 1996 on untreated plant was 93.67 which emerged from April to September. In case of one and two percent spray average number of flushes was 97.75 and 90.67 respectively. These flushes were emerged from April to September in both the treated plants. Similarly during 1997, average number of flushes on control plants was 107.25 and on treated plants they were 111.95 and 100.92 for one and two percent spray respectively (Fig.1 and 2). No statistical difference could be located among treated and untreated plants as it is clear from Table 1. Spray of low biuret urea was made in the end of August and by that time most of the flushes had been completed, thus no effect of urea spray was observed on vegetative growth. However, the effect of low biuret urea spray was noted on the blooming of these flushes during the following season.

Reproductive behaviour: Blooming on treated vegetative flushes was found induced as a result of foliar spray of low biuret urea. Fig. 1 and 2 indicates the effect of low biuret urea on flower induction, along with incidence of malformation. During 1996-97 one per cent urea produced 26.39 bloomed flushes out of 97.75. However, 4.39 panicles were malformed. In case of 2 per cent spray 25.72 out of 90.67 flushes bloomed being 4.72 panicles malformed out of the lot. On untreated tree, 93.67 flushes emerged and 21.00 of them bloomed in the following spring on this tree, 6.75 panicles later turned to be as malformed. Same trend of blooming was observed during 1997-98. The untreated plant produced 22.78 panicles out of 107.25 flushes and 7.42 of them were malformed. When low biuret was sprayed, @ one percent, 29.61 panicles were produced from 111.95 flushes and number of malformed panicles was 5.28 only. In case of two percent spray, the total blooming flushes were 29.00 and 4.95 of them were found malformed from 100.92 flushes of the previous year (Table 1).

Although the number of flushes recorded in the previous season on treated and untreated plants are statistically at

Table 1: Effect of low biuret urea on flowering of mango during 1996-1998.

Treatments	No. of total flushes		No. of bloomed flushes		No. of malformed panicles	
	1996	1997	1997	1998	1997	1998
Control	93.67 a	107.25 a	21.00 b	22.78 b	6.75 a	7.42 a
1% spray	97.75 a	111.95 a	26.39 a	29.61 a	4.39 b	5.28 b
2% spray	90.67 a	100.92 a	25.72 a	29.00 a	4.72 b	4.95 b

Table 2: Impact of different flushes on vegetative and reproductive growth behaviour.

Flushes	No. of total flushes		No. of bloomed flushes		No. of malformed panicles	
	1996	1997	1997	1998	1997	1998
April	104.30 b	98.83 c	41.39 a	39.06 ab	4.83 b	3.44 c
May	90.50 c	135.10 ab	31.45 c	42.83 a	4.56 b	7.78 b
June	129.90 a	117.80 b	36.94 b	36.72 bc	8.00 a	7.00 b
July	104.70 b	153.10 a	22.94 d	33.22 c	7.99 a	12.22 a
August	114.50 b	97.50 c	12.39 e	9.33 d	5.33 b	3.45 c
September	20.25 d	38.00 d	1.11 f	1.61 e	1.00 c	1.39 c

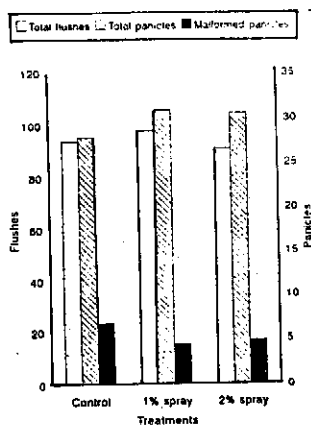


Fig. 1: Effect of low biuret urea on mango flowering during 1996-97.

par yet their blooming has found statistically different which was due to the spray of low biuret urea by enhancing fruit bud differentiation. In addition to the positive effect of low biuret urea on flower induction, it also helped to reduce the problem of mango malformation. When different months/flushes were compared for vegetative and reproductive growth, highly significant results were obtained (Table 2). Same trend was observed during 1996-97 and 1997-98. Number of flushes were found arising alternately i.e., more in one month and less in the succeeding month. Minimum flushes were noted in September in both the years. Bloomed flushes were found maximum in April and observed in descending order upto September. As regards malformed panicles, they were found less on early flushes and more on late flushes on the basis of original number and bloomed flushes. Urea spray has already been found to induce more blooming in citrus cv. Washington navel.

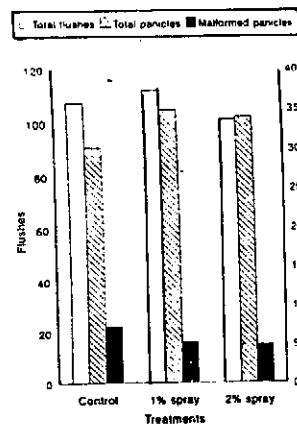


Fig. 2: Effect of low biuret urea on mango flowering during 1997-98.

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