

Effect of Various Growth Regulators on Reducing Fruit Drop in Mango (*Mangifera indica* L.)

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ABSTRACT

Three growth regulators i.e. NAA, 2,4-D and 2,4,5-T were applied at a concentration of 20, 30 or 40 ppm after fruit set to control the fruit drop in mango cv. Samar Behisht Chaunsa. In a 2 years trial, application of 2,4-D at 40 ppm resulted in maximum fruit retention and minimum fruit drop followed by the lower concentration of 30 ppm. Maximum fruit drop was recorded in untreated control trees during both the years.

Key words: Fruit drop; Growth regulators; *Mangifera indica*;

INTRODUCTION

The natural fruit drop in mango (*Mangifera indica* L.) is rather too high, amounting to about 99% at various stages of growth. The fruit drop is heavy during first three weeks of fruit set when the rate of fruit development is rapid and it continues up to the 5th week (Ram, 1983). There are several causes of fruit drop including nutrient deficiency, competition between developing fruitlets, drought or lack of irrigation, unfavourable climatic conditions during fruit development period (winds and hail storms), incidence of serious diseases like powdery mildew and anthracnose and pests like hopper and mealy bug (Majumder & Sharma, 1990). Naturally occurring hormones play a major role in fruit growth and fruit drop of mango (Ram, 1992). Deficiency of auxins, gibberellins and cytokinins coupled with a high level of growth inhibitors i.e. abscisic acid and ethylene cause fruit drop (Ram, 1983). An increase in auxin level corresponds with a period of rapid growth while a high level of inhibitor corresponds with high rate of fruit drop (Prakash & Ram, 1984; Murti & Upreti, 1995). In fact, when the concentrations of abscisic acid and ethylene increase in the panicle, as a result abscission layer is formed at the site of fruit attachment, which ultimately drops down. Exogenous application of etrel has also been found to enhance the fruit drop in mango (Singh *et al.*, 1995). While, application of NAA (Rawash *et al.*, 1983; Singh & Ram, 1983; Sharma *et al.*, 1990), 2,4-D (Kulkarni, 1983; Singh *et al.*, 1986) and GA₃ (Singh *et al.*, 1986) have been found effective in reducing the fruit drop. The exogenous application of these growth regulators increases their concentration in the panicle and antagonise the adverse effects of endogenous inhibitors. Therefore in the present study, an attempt was

made to control the fruit drop in mango through the application of various growth regulators especially the auxins at different concentrations.

MATERIALS AND METHODS

Three growth regulators *viz.* NAA, 2,4-D and 2,4,5-T were sprayed at a concentration of 20, 30 or 40 ppm about six weeks after fruit set (on 20th of April) on 20 years old mango cv. Samar Behisht Chaunsa trees. The trees were healthy and vigorously growing under the uniform conditions of soil fertility, irrigation and other cultural operations. The experiment was arranged in a randomised complete block design with three replications. Before spray, 10 panicles on each experimental tree were selected randomly and number of fruits on each panicle was counted. At least 3 trees were sprayed in each treatment and each tree was considered as a replication. A control (untreated trees) was also included in the experiment. Data on number of fruit was again collected on 14th June and percentage of fruits dropped was calculated. The experiment was repeated following year. The data collected were analysed statistically using Fisher's analysis of variance technique and treatment means were compared using Duncan's multiple range test at 5% probability (Petersen, 1994).

RESULTS AND DISCUSSION

Data indicated that the application of auxins significantly reduced the fruit drop in mango cv. Samar Behisht Chaunsa as compared to untreated control. The significant differences were also recorded among the various treatments. 2,4-D at a concentration of 40 ppm proved the most effective treatment, which stood at par with 2,4-D at 30 ppm and both the treatments behaved

statistically alike. This was followed by NAA at a concentration of 20 ppm and 2,4-D also at 20 ppm (Table I). Maximum fruit drop was recorded in untreated control trees, where no growth regulator was applied. It was also noticed that the fruit drop was more during the first year of study because of heavy flowering as compared to the second year, indicating the phenomenon of alternate bearing. During the first year, natural fruit drop was 84.93%, which was reduced to almost half (42.82%) when 2,4-D was sprayed at a concentration of 40 ppm. During the second year of study the fruit drop recorded in untreated control trees was 71.61% which was limited to 39.175 by this treatment (Table I).

Table I. Effect of different concentrations of various growth regulators on fruit drop in mango

GR	Con. (ppm)	FD (%)		AFD (%)
		1st year	2nd Year	
NAA	20	65.39 e*	42.92 gh	54.16 e
	30	74.90 bcd	45.94 gh	60.42 cd
	40	66.66 e	55.11 f	60.89 cd
2,4-D	20	70.36 cde	45.94 gh	58.15 de
	30	46.25 g	39.49 gh	42.87 f
	40	42.82 gh	39.17 h	40.99 f
2,4,5-T	20	79.52 ab	66.97 e	73.25 b
	30	75.30 bc	68.09 de	71.69 b
	40	74.02 bcd	53.71 f	63.86 c
Control	Nil	84.93 a	71.61 cde	78.27 a
		68.02 a	52.89 b	

* Means sharing similar letters are statistically non-significant at 5% probability (DMR test); GR=growth regulator; Con.=concentration; FD=fruit drop; AFD=average fruit drop

Kulkarni (1983) has reported that application of 2,4-D at 25 ppm to half-grown fruits of mango cv. Alphonso appreciably reduced the fruit drop. Singh *et al.* (1986) also obtained best control of fruit drop with 2,4-D at 10 ppm when applied at pin-head stage, pea stage and again at marble stage to 18 years old trees of cv. Samar Behisht Chaunsa. In the present study, 2,4-D also proved an effective auxin, but at a higher concentration, in reducing the fruit drop by antagonising the adverse

effects of growth inhibitors like abscissic acid and ethylene. The results of the present study also confirm the role of auxins in fruit development and fruit drop when applied exogenously. On the basis of the results, it can be concluded that 2,4-D at a concentration of 40 ppm can effectively reduce the fruit drop in mango when sprayed about six weeks after fruit set.

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