

Management of Black Banded Disease of Mango

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Mango cultivation in Gujarat is mainly concentrated in South Gujarat. The occurrence of black banded disease of mango caused by *Rhinocladium corticolum* Massee in the state has been reported by Vala *et al.*, (1985). Now it occurs in all the mango growing areas of Gujarat. In long term association under humid condition affects vigour and productivity of mango orchard. The Gujarat state department of agriculture does not certify black banded affected grafts for selling. Hence it has become a serious problem for orchard and nursery owners. Earlier Gujarat Agricultural University has recommended yearly six sprays-schedule for its control (Khandar *et al.*, 1998). But it was necessary to modify the same and make it more economic. Present investigation was conducted with the aim to give more practical and economic spray schedule for the management of black banded malady in mango orchards.

A field trial was conducted at government Seed Farm, Talala (Dist. Junagadh) during 1997 - 2000 on 10 yr old mango orchard of cv. Kesar. The experiment was arranged in RBD, considering two trees for each treatment. For every selected tree two branches in opposite direction were selected as two replications so as to make four replications in each treatment. In

each replication (selected branch) three black spots/bands were marked with four small dots of oil paint colour (red) on both the ends of vertical and horizontal directions. Marking of spots was done twice during whole course of experiment i.e. May, 1997 and May, 1999. After second marking, first marking spots/bands were cancelled. Measurement of marked spots was taken before (May, 1997 and May, 1999) and after completion of treatment schedule (December, 1998 and December, 2000). During observation diseased spot colour index was also noted using the following:

Spot Colour	Weightage
Dark black	3
Light dark	2
Sparse light dark	1
No spot	0

The experiment was conducted with 12 treatments, including (1) Bordeaux paste 10% (CuSO_4 100 g + lime + water 11) (2) Carbendazim 0.15% (Bavistin 50 wp 3 g/l) (3) Copper Oxychloride 0.25% (Blue Copper 50 wp 5 g/l) (4) Hexaconazole 0.01% (Contaf 5 EC 2 ml/l) (5) Propiconazole 0.05% (Tilt 25 EC 2 ml/l) and (6) Control (water spray only). All these six treatments were applied by two methods (i) spray or pasting on branches without rubbing marked black bands/spots (A) and (ii) rubbing marked black bands/spot with coir-brush followed by spray of pasting (B) Except Bordeaux paste treatments other treatments were applied as spray. Bordeaux paste treatments was given only on marked spots twice in a year i.e. before monsoon and one month after completion of monsoon. Spraying was done on all the branches of respective tree, thrice in a year i.e. before monsoon (June 1st week), mid

TABLE 1

Fungicidal effect on spot size and colour of black banded disease in mango.

Sr. No.	Treatments	Per cent spot increased			Per cent spot decreased			Spot colour index reduction		
		May-97 to Dec.-98	May-99 to Dec.-00	Mean	May-97 to Dec.-98	May-99 to Dec.-00	Pooled mean	May-97 to Dec.-98	May-99 to Dec.-00	Mean
1.	Bordeaux paste 10 % (A)	-	-	-	90.00 (100.00)	90.00 (100.00)	90.00 (100.00)	2.75	2.83	2.79
2.	Bordeaux paste 10 % (B)	-	-	-	90.00 (100.00)	90.00 (100.00)	90.00 (100.00)	2.42	2.68	2.55
3.	Carbendazim 0.15 % (A)	-	-	-	37.85 (37.75)	35.44 (33.67)	36.64 (35.65)	1.75	1.50	1.63
4.	Carbendazim 0.15 % (B)	-	-	-	30.60 (26.29)	69.60 (78.67)	50.10 (58.85)	1.84	2.42	2.13
5.	Copper oxychloride 0.25 % (A)	-	-	-	42.96 (46.53)	42.12 (45.02)	42.54 (45.75)	1.92	1.67	1.79
6.	Copper oxychloride 0.25 % (B)	-	-	-	90.00 (100.00)	71.08 (81.18)	80.54 (90.59)	2.75	2.17	2.46
7.	Hexaconazole 0.01 % (A)	14.41	10.19	12.30	-	-	-	0.84	0.50	0.67
8.	Hexaconazole 0.01 % (B)	42.54	20.86	31.70	-	-	-	1.34	1.58	1.46
9.	Propiconazole 0.05 % (A)	43.55	25.46	34.51	-	-	-	1.17	0.42	0.80
10.	Propiconazole 0.05 % (B)	75.23	27.01	51.12	-	-	-	1.25	1.50	1.38
11.	Check (A)	62.22	70.02	66.12	-	-	-	0.25	0.17	0.21
12.	Check (B)	39.43	37.46	38.45	-	-	-	1.42	0.83	1.13
	S.E.m. $\pm$	-	-	-	1.91	5.94	9.58	-	-	-
	C.D. at 5 %	-	-	-	5.74	17.91	27.69	-	-	-
	C.V. %	-	-	-	5.99	17.91	13.59	-	-	-

(Figures given in parentheses are retransformed values)

Maximum colour index : 3.0

A = Marked spots not rubbed.

B = Marked spots rubbed before treatment application.

monsoon (August) and one month after completion of monsoon (October). Statistical analysis of only effective treatment was done.

Diseased spot area reduction

The treatment of Bordeaux paste, carbendazim and copper oxychloride significantly reduced black bonds in mango. The triazole fungicides under present investigation failed to control the disease. Among the effective treatments Bordeaux paste treatments were found most effective and treated spots were totally disappeared. Thus four applications of Bordeaux paste during two schedule periods gave 100% control of treated spots on branches. Bordeaux paste 10% treatment was equally effective under both the methods of application. Next effective treatments were copper oxychloride 0.25% and carbendazim 0.15% which gave 90.59 and 58.85 per cent disease reduction respectively when applied after rubbing. Here rubbing has increased the efficacy of fungicides. In case of copper oxychloride application after rubbing, disease reduction is increased almost 100 per cent (90.59%) as compared to application on unrubbed spots (45.75%) (Table 1).

Diseased spot colour reduction

Except Bordeaux paste application, the spot colour index reduction was higher when treatments were followed by rubbing. Maximum colour index reduction was 2.79 in Bordeaux paste treatment on unrubbed spots. Spot colour index reduction was also > 2.0 in rubbed treatments of Bordeaux paste 10% (2.55), copper oxychloride 0.25% (2.46) and carbendazim 0.15% (2.13). Spot

colour reduction in rubbed control was also higher (1.13) as against 0.21 in unrubbed control. This finding showed that only rubbing will not be useful, unless it is followed by spraying of effective fungicides.

In the past Bordeaux paste and Bordeaux mixture has been reported effective against the disease (Reddy *et al.*, 1961). They have mentioned gunny rubbing or ganji treatment after pasting or spraying. This might be suggested to remove paste/spray residue after some period.

Similarly good control was received with bavistin (Narasimhudu *et al.*, 1987). Khandar *et al.*, (1998) also suggested six sprays/year with ziram 0.1% or carbendazim 0.03% or copper oxychloride 0.25% for black banded control. The present findings match with earlier reports, but the efficacy was increased when spraying followed by rubbing. Besides these total number of spray/paste applications are also reduced. Although practically pasting is not feasible for whole tree but combination of pasting and spraying is the better way to combat this disease. It can be recommended from these results that for effective management of black banded disease of mango, the spots on stem and branches up to manageable height should be paint with Bordeaux paste 10% before monsoon and one month after completion of monsoon and spraying of copper oxychloride 0.25% or carbendazim 0.15% on remaining branches of affected trees to be followed before monsoon, mid monsoon and one month after completion of monsoon.

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