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Evaluation of fungicides for management of *Graphiola* leaf spot disease of datepalm

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Datepalm (*Phoenix dactylifera* Linn.) is an important arid fruit plant. Graphiola leaf spot has been observed to be of wide occurrence in the hyper-arid partially irrigated western plain of Rajasthan (India) at Bikaner, Jaisalmer and Jodhpur which have hot arid climate. Graphiola leaf spot is caused by *Graphiola phoenicis* (Moug.) Poit. It is a smut fungus described by Fischer (6) and Killian (7) . The fungus develops sub-epidermally in small spots on both sides of the pinnae and on the rachis. Finally, the fruiting structures emerge as small, black, covered sori on year old, conspicuous on two year old leaves and continue to increase during the third year Sori are most abundant on apical pinnae, less abundant on the middle section and even fewer on the basal section. Spores are produced in the fertile areas of the sori and are interspersed with groups of sterile filaments. At maturity, sori open to liberate masses of yellow spores. Individual spores are spherical to ellipsoidal, 3-6 μm diameters and have a thick, smooth hyaline wall. After the spores disseminate, only the rough black crater of the sori remain. Heavily infected leaves die prematurely. Similar symptoms have been described by various workers Fawcett (5) in Egypt, El. Baker (3), Sinha *et al*. (11) from Punjab (Indian), Carpenter and Ream (2) in Egypt, Lima (8) in Brazil and Abbas & Abdulla (1) in Qatar, Sharif and Wajih (10) in Pakistan. Thus, it causes great damage to the plant growth and reduces yield of fruit crop. Attempts were made to select a suitable fungicide to reduce the disease economically.

An experiment was conducted at the Datepalm Research Centre, Rajasthan Agricultural University, Bikaner for four years (2001-2004) using variety Halawy. The trial was laid down in RBD with three replications. The fungicide viz., carbendazim (Bavistin) 0.1 per cent, thiophenate methyl (Topsin-M) 0.1 per cent, Mancozeb (Dithane M-45) 0.2 per cent, copper oxychloride (Biltox-50) 0.5 per cent and chlorothalonil (Kavach) 0.2 per cent were used (Table 1). Check plots received water spray only. All fungicides were sprayed by power sprayer twice at an interval of 20 days. First spray was given with the appearance of first sign on the leaves. Twenty days after the second spray, the data on percent disease severity of four years were recorded and analyzed statistically is presented in Table 1. The results revealed that all the fungicides were found to be significantly superior over control. It was observed that two round of sprays with copper oxychloride 0.4 per cent or carbendazim 0.1 per cent one at the initiation of disease and another at 20 days after the first spray was effective in reducing the disease intensity, the per cent disease severity in these treatments were 21.9 and 26.4 respectively. In the control 61.4 per cent disease severity was recorded. The maximum per cent disease control was achieved with copper oxychloride 0.4 per cent (64.4%) followed by carbendazim 0.1 per cent (57.7%).

It was concluded that two spray of copper oxychloride 0.4 per cent was effective in minimizing the disease and gave 64.4 per cent control over check, followed by carbendazim 0.1 per cent where 57.7 per cent disease control was achieved over check. The present findings were in agreement with finding of Wood and Mortensen (12) where light to moderate infection could satisfactorily be controlled by Bordeaux mixture spray. Similarly Mehta *et al.*

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Table 1. Comparative efficacy of different fungicides on *Graphiola* leaf spot of date palm

S.No.	Treatment & dose (%)		*Percent disease severity *					Percent disease control				
			2001	2002	2003	2004	Average	2001	2002	2003	2004	Average
1	Bavistin	0.1	28.2 (32.1)	30.3 (33.4)	24.2 (29.4)	22.8 (28.5)	26.4 (30.9)	56.5	54.5	59.7	6.00	57.7
2	Topsin-M	0.1	33.8 (35.6)	36.8 (37.3)	31.5 (34.1)	29.3 (32.7)	32.8 (34.9)	47.8	44.7	47.5	46.1	46.5
3	Mancozeb	0.2	38.7 (38.4)	43.2 (41.1)	39.1 (38.7)	37.4 (37.7)	39.6 (39.00)	40.4	35.0	34.9	31.0	35.3
4	Blitox-50	0.4	26.2 (30.8)	22.8 (28.5)	20.3 (26.8)	18.5 (25.5)	21.9 (27.9)	59.6	65.8	66.2	65.9	64.4
5	Kavach	0.2	32.8 (34.9)	33.5 (35.4)	28.5 (32.3)	26.1 (30.7)	30.2 (33.3)	49.4	49.6	52.5	52.00	50.9
6	Control (Untreated)		64.8 (53.6)	66.5 (54.6)	60.0 (50.7)	54.3 (47.4)	61.4 (51.6)	-	-	-	-	-
CD at 5% level			2.3	2.1	2.9	3.00	2.6					

* = Mean of three replications

Figures in parentheses are angular transformed values.

(9) reported the effective control with copper fungicides. Elliott (4) in Florida revealed that fungicide containing active ingredients of Thiophenate methyl, copper hydroxide and copper oxychloride were effective when applied as foliar spray.

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