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IDM practices for the management of foliar diseases of sesame (*Sesamum indicum* L.)

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ABSTRACT

Sesame (*Sesamum indicum* L.) is the most ancient and important oilseed crop, with rich source of protein, high quality seed oil and many antioxidant properties is extensively grown in India. Occurrence of foliar diseases are *Alternaria* leaf spot and powdery mildew become a major constraint in recent years for successful and profitable cultivation of sesame. Field experiment was conducted on integrated disease management practices to combat foliar diseases and to increase the seed yield of sesame during two consecutive years (2015 and 2016) at Regional Research Station, Vridhachalam, Tamil Nadu Agricultural University, Tamil Nadu. Integrated management of *Alternaria* leaf spot and powdery mildew of sesame were conducted with eight treatments. Among the different treatments tested in field condition, the minimum incidence of *Alternaria* leaf spot (15.14 % and 13.72%) with higher yield of 642 kg/ha and 657 kg/ha were recorded in seed treatment with *T. viride* @ 10 g/kg + furrow application of *T. viride* (2.5 kg/ha enriched in 100 kg of FYM) @ 250 kg/ha + foliar spray of myclobutanil @ 1 g/l during *Kharif* 2015 and 2016.The reduction of *Alternaria* leaf spot was also directly associated with an increase in seed yield. In case of powdery mildew, the minimum incidence 5.83 and 9.65 PDI with higher yield of 642 kg/ha and 657 kg/ha were recorded in *Kharif* - 2015 and 2016 with spray of myclobutanil 10% WP @ 1 g/l.

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INTRODUCTION

Sesame is one of the most ancient and important oilseed crops grown and used by mankind. It was cultivated and domesticated in the Indian subcontinent during Harappan and Anatolian eras over 4,000 years (Bedigian and Van der Mesen, 2003). Due to stability of its healthy oil, easiness of extraction and resistance to drought, sesame was popular in the ancient world. Sesame is considered as a nutritious oilseed crop being rich source of protein (18-25%), carbohydrate (13.5%), minerals and healthy polyunsaturated fatty acid (Bedigian, 1985). India is the fifth largest vegetable oil economy in the world, next only to USA, China, Brazil

and Argentina and has an annual turnover of about Rs. 80,000 crore. India accounts for 1215 per cent of oilseeds area, 7-8 per cent of oilseeds production, 6-7 per cent of vegetable oils production, 9–12 per cent of vegetable oils import and 9-10 per cent of edible oils consumption (Jha *et al.*, 2014). The area and production of sesame crop is declining in the traditional areas. Despite the potential for increasing the production and productivity of sesame, there are a number of challenges inhibiting sesame production and productivity. The main reason for low productivity of this crop is the attack of various fungal, bacterial and viral diseases. About 72 fungi, 7 bacteria, 1 phytoplasmal and 1 viral disease have been reported from India (Vyas *et al.,* 1984). Out of these, about 32 diseases (14 major and 18 minor) occur in India. Sesame cultivated in *Kharif, Rabi* and summer seasons in Tamil Nadu is affected by *Alternaria* leaf blight and powdery mildew diseases resulting in low productivity. At present chemical fungicides are the first choice for the farmers to combat diseases because of their easy adaptability and immediate therapy. Due to health risk and pollution hazards by use of chemical fungicides in plant disease control, it is considered appropriate to minimize their use. Since sesame seed and oil are in high demand for export due to their high unsaturated fat and methionine content, focus has been shifted to safer alternatives of chemical fungicides in recent years. Biological control had attained importance in modern agriculture to restrain the hazards of intensive use of chemicals for disease control. Since the efficacy of bio control agents in disease management has been inconsistent due to their inability to maintain Integrated Disease Management (IDM) has emerged as the promising approach for management of foliar diseases of sesame.

Hence, the present investigation was carried out to find out the potential of integrated management to manage the foliar diseases in sesame.

MATERIAL AND METHODS

Two consecutive *Kharif* trials of 2015 -2016 were laid down at Regional Research Station, Vridhachalam, Tamil Nadu Agricultural University, Tamil Nadu with eight treatments integrated manner *viz.,* T_1: Spray of myclobutanil 10% WP @ 1 g/l; T_2: Spray of hexaconazole 4% + zineb 68% @ 2 g/l; T_3: Spray of cymoxanil 8% + mancozeb 64% @ 2g/l; T_4: Spray of trifloxistrobin 25% + tebuconazole 50% @ 0.4 g/l; T_5: Spray of hexaconazole 5% + captan 70% @ 2 g/l ; T_6: Spray of *T. viride* @ 0.4%; T_7: Spray of carbendazim 12% + mancozeb 63% @ 2 g/l and T_8: Untreated check (control) in Randomized Block Design with three replications using the variety, VRI 1. Per cent disease incidence (PDI) was worked out for *Alternaria* leaf spot and powdery mildew of sesame. All the foliar sprays were applied first as blanket spray at 30 days after sowing (DAS) or at the initial appearance of the disease in the field and second at 15 days after first spray. The grain yield was recorded for each plot following standard protocols. The statistical analysis of the experimental data was carried out by adopting the standard method as described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

The effective fungicides and bio control agent were found promising against foliar diseases of sesame under field condition. The data presented in Table 1 and 2 revealed that the effects of all the treatments were found significantly superior over control in reducing the disease incidence and increasing grain yield. Of which, the minimum disease incidence of *Alternaria* leaf spot (15.1 and 13.72 PDI) were in seed treatment with *T. viride* @ 10 g/kg + furrow application of *T. viride* (2.5 kg/ha enriched in 100 kg of FYM) @ 250 kg/ha + foliar spray of myclobutanil @ 1 g/l with higher yield (642 and 657 kg/ha) during *Kharif* 2015 and 2016 followed by foliar spray of cymoxanil 8%+ mancozeb 64%@ 2g/l which recorded 17.5 and 16.07PDI with yield of 631 and 632 kg/ha. The present investigation is in line with the report of Mathivanan and Prabavathy (2007). Who has stated that the combination of carbendazim 12% + mancozeb 63% was found to be highly effective in reducing the leaf blight/spot disease of sunflower. The reduction of *Alternaria* leaf spot was also directly associated with an increase in seed yield. On the other hand, the minimum incidence of powdery mildew (5.34 and 7.43 PDI) and 652 and 662 kg seed yield/ha was recorded with spray of carbendazim 12% + mancozeb 63% 75WP@ 2g/l during *Kharif* 2015-2016 followed by foliar spray of Myclobutanil @ 1 g/l which recorded (5.83 and 9.65%) PDI with 642 and 657 kg/ha seed yield during *Kharif* 2015-2016 (Table 1 and 2). It is evident from Table 1 and 2 that, all integrated management practices were found to be superior over untreated check (T_8) in

Table 1 : Integrated management of foliar diseases of sesame during *Kharif* 2015

Tr.No.	Treatments	*Alternaria* leaf spot (PDI)	Powdery mildew (PDI)	Yield (kg/ha)	C:B ratio
T_1	Spray of myclobutanil @ 1 g/l	15.14 (22.89)	5.83 (13.97)	642	1.44
T_2	Spray of hexaconazole 4% + zineb 68% 2 g/l	28.11 (32.01)	11.1 (19.46)	575	1.29
T_3	Spray of cymoxanil 8%+ mancozeb 64%@ 2g/l	17.5 (24.72)	9.3 (17.75)	631	1.41
T_4	Spray of trifloxistrobin 25% + tebuconazole 50%@ 0.5 g/l	21.4 (27.55)	7.81 (16.22)	512	1.15
T_5	Spray of hexaconazole 5%+ captan 70% @ 2g/l	34..43 (35.92)	12.14 (20.39)	482	1.08
T_6	Spray of *T. viride* @ 0.4%	25.42 (30.27)	9.89 (18.33)	621	1.39
T_7	Spray of carbendazim 12% + mancozeb 63 % 75WP@ 2g/l	14.8 (22.62)	5.34 (13.36)	652	1.46
T_8	Untreated check	45.28 (42.29)	34.50 (35.57)	447	
	S.E.±	1.55	0.61	7.50	
	C.D. (P=0.05)	3.34	1.31	15.21	
	CV (%)	6.42	3.88	1.68	

Table 2 : Integrated management of foliar diseases of sesame during *Kharif*, 2016

Tr. No	Treatments	*Alternaria* leaf spot (PDI)	Powdery mildew (PDI)	Yield (kg/ha)
T_1	Spray of myclobutanil @ 1 g/l	13.72 (21.74)	9.65 (18.09)	657
T_2	Spray of hexaconazole 4% + zineb 68% 2 g/l	29.53 (32.91)	17.33 (24.66)	568
T_3	Spray of cymoxanil 8%+ mancozeb 64%@ 2g/l	16.07 (23.63)	14.22 (22.15)	632
T_4	Spray of trifloxistrobin 25% + tebuconazole 50%@ 0.5 g/l	19.42 (26.14)	11.21 (19.56)	593
T_5	Spray of hexaconazole 5%+ captan 70% @ 2g/l	33.11 (35.12)	20.11 (26.64)	488
T_6	Spray of *T. viride* @ 0.4%	27.56 (31.66)	14.54 (22.41)	628
T_7	Spray of carbendazim 12% + mancozeb 63 % 75WP@ 2g/l	13.34 (21.42)	7.43 (15.81)	662
T_8	Untreated check	43.44 (47.23)	25.62 (30.42)	423
	S.E.±	0.74	0.81	9.04
	C.D. (P=0.05)	1.51	1.74	19.40

reducing the disease incidence and increasing the seed yield during 2015-2016. A similar observation was made by Panwar *et al*. (2013). Against leaf spot pathogen, *Alternaria* alternata. The overall analysis of the results during *Kharif* 2015 and 2016 revealed that foliar spray of myclobutanil @ 1 g/l can be used for the management of *Alternaria* leaf spot/blight in agricultural crops. On the other hand, The results of the present investigation clearly indicated the potential use of combination of foliar spray of carbendazim 12% + mancozeb 63 % 75WP@ 2g/l in controlling of powdery mildew in consecutive years (2015 and 2016). This was in agreement with the findings of Subrahmanyam *et al*. (1990). Who have reported that mycobutanil was very effective against late leaf spot of groundnut.

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