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Short Communication

Assessment of Integrated Approaches for the Management of Sesame Diseases

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Field experiments were conducted for three years to manage soil and foliar diseases of sesame by integrated approaches using bioagents and fungicides. The experiment was conducted in different seasons for the management of Macrophomina root rot, stem blight and Alternaria capsule blight. Seed treatment with biocontrol agent *Pseudomonas fluorescens* (Pf1) followed by foliar spray with Difenconazole @ 0.05% on 30 and 45 DAS reduced the root rot from 19.03 to 5.73%, stem blight from 48.67% to 20.68% and capsule blight from 41.33% to 16.41% and increased yield from 376 to 640.05 kg/ha with a B:C ratio of 2.13 in sesame. Thus, seed treatment with *Pseudomonas fluorescens* (Pf1) followed by foliar spray with Difenconazole @ 0.05% on 30 and 45 DAS provided maximum protection from foliar and soil borne diseases in sesame with higher seed yield and B:C ratio, so that this may be recommended for the management of diseases in sesame

Key Words: Biocontrol agents, Blight, Capsule, Fungicides, Macrophomina, Root Rot, Stem Blight.

INTRODUCTION

Sesame tolerates drought but suffers from poor yield due to susceptibility to many pests and diseases. In Tamil Nadu sesame is grown over an area of 65,118 ha with the production of 30,772 t The average productivity of this crop is 469 kg/ha. However there is a potential of 1000kg/ha under irrigated condition. Though sesame has great potentiality for increasing the productivity, it faces several bottlenecks which hinder the yield potential of the crop. The major bottlenecks in sesame cultivation are 90% of the area under sesame is under rainfed and the area under sole cropping is very limited. The maturity is not uniform and the shattering of the capsules causes higher yield loss. Macrophomina stem blight and root rot, Phyllody and *Alternaria* blight are the major diseases where the yield loss accounts up to 100% depending upon the stage of infection and susceptibility of the crop (Kumaraswamy *et al,* 2015). The literature survey explains the association of *Alternaria sesami* and *A. alternate* to be associated with pod, leaf and stem blight (Rao and Vijayalakshmi, 2000). The other limiting factors include the attack of insect pests like shoot webber and pod bug. However, in recent days the farmers are facing heavy yield loss due to the outbreak of root rot, capsule blight and stem blight.

Integrated disease management plays a vital role in increasing the productivity. Seed treatment with Thiram (0.2%) + Carbendazim (0.1%) was effective for the management of Macrophomina stem and root rot of sesame (Rajpurohit *et al,* 2005). Rajpurohit and Bishnoi, 2006 reported that the integrated disease management module consisting of seed treatment with Thiram (0.2%) + Carbendazim 50WP (0.1%) + spray of Mancozeb (0.2%) + Endosulfan (0.07%) at 30-40 DAS and 45-55 DAS reduced Macrophomina stem and root rot, Alternaria leaf spot, phyllody and leaf curl (Nicotinia virus 10) and increased seed yield.

On the basis of results from the different studies efforts have been made to combine of seed treatment with biocontrol agents and foliar sprays of fungicides as an integrated disease management

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package for the management of Macrophomina root rot, stem blight, and Alternaria capsule blight diseases under field conditions in the present study.

MATERIALS AND METHODS

Field trials were conducted at the Oilseeds Research Station, Tindivanam, Villupuram (Tamil Nadu) to evaluate the efficacy of an integrated disease management strategies with 14 treatments and three replication in randomized block design in sesame cultivar TMV (Sv) 7. The treatment details is as follows: T1:Seed treatment with *Pseudomonas fluorescens* (Pf1) @10g/kg of seed + soil application of *Pseudomonas fluorescens* (Pf1) @2.5kg/ha, T2: Seed treatment with *P. fluorescens* (Pf1) @10g/kg of seed+ foliar spray of *P. fluorescens* (Pf1) @0.2% on 30 and 45DAS, T3: Seed treatment with *P. fluorescens* (Pf1) @10g/kg of seed+ foliar spray of Difenconazole (0.05%) on 30 and 45DAS, T4: Seed treatment with *P. fluorescens* (Pf1) @10g/kg of seed+ foliar spray of Carbendazim+ Mancozeb (SAFF-0.2%) on 30 and 45DAS, T5: Seed treatment with *P. fluorescens* (Pf1) @10g/kg of seed+ foliar spray of Mancozeb (0.2%) on 30 and 45DAS, T6: Seed treatment with *P. fluorescens* (Pf1) @10g/kg of seed+ foliar spray of Propiconazole (0.2%) on 30 and 45DAS, T7: Seed treatment with *Trichoderma viride* (Tv1) @4g/kg of seed + soil application of *T. viride* (Tv1) @2.5kg/ha, T8: Seed treatment with *T. viride* (Tv1) @4g/kg of seed+ foliar spray of *T. viride* (Tv1) @0.2% on 30 and 45DAS, T9: Seed treatment with *T. viride* (Tv1) @4g/kg of seed of seed+ foliar spray of Difenconazole (0.05%) on 30 and 45DAS, T10: Seed treatment with *T. viride* (Tv1) @4g/kg of seed of seed+ foliar spray of Carbendazim+ Mancozeb (SAFF-0.2%) on 30 and 45DAS, T11: Seed treatment with *T. viride* (Tv1) @4g/kg of seed + foliar spray of Mancozeb (0.2%) on 30 and 45DAS, T12: Seed treatment with *T. viride* (Tv1) @4g/kg of seed + foliar spray of Propiconazole (0.2%) on 30 and 45DAS, T13: Seed treatment with Carbendazim 0.2% and T14- Untreated control

Seed treatment with *P. fluorescens, T. viride,* and fungicides were done individually 24 hrs prior to sowing. *P. fluorescens* and *T. viride* (TNAU commercial talc formulation) were applied to the soil individually a week before sowing. The crop was raised as per the agronomic practices given in the Crop Production Guide and observations of disease incidence were recorded one week after the last foliar spray. A 0-5 scale was used for scoring Alternaria Capsule blight and Macrophomina stem blight (Anonymous, 2008) and Percent Disease Index (PDI) was calculated. The incidence of *Macrophomina* root rot was recorded individually by counting the number of affected and healthy plants at random quadrate selection in each plot and the Percent Incidence (PI) was calculated. The grain yield was recorded and C:B ratio was calculated. The experimental data were tabulated and analyzed by ANOVA using Agres statistical software package version 3.01 (Agres, 1994). Least significant differences (LSD) were applied to assess differences between treatments and to identify statistical differences between means , respectively

RESULTS AND DISCUSSION

The experiment was conducted for three years in three different season's and pooled analysis of different season data revealed that seed treatment with *P. fluorescens* Pf1 followed by foliar spray with Difenconazole @ 0.05% (T3) on 30 and 45 DAS recorded the least incidence of Root rot (5.73%), stem blight (20.68%) capsule blight (16.41%) with maximum yield of 640.05kg/ha and BCR of 2.13. This was statistically on par with treatment T9 i.e seed treatment with *T.viride* (Tv1) + foliar spray of Difenconazole (0.05%) on 30 and 45DAS (Table 1). The untreated control (T14) recorded the highest incidence of root rot of 19.03%, stem blight (48.67%) and capsule blight (41.33%) with lowest yield of 495.97kg/ha (Table 1). Rajpurohit (2004) reported that foliar spray of 0.2% Mancozeb in combination with insecticide was effective for the management of Alternaria blight, Phyllody and leaf curl diseases of sesame. Applications of FYM + NPK @ 60:30:30 was found to be significantly reduced incidence of Alternaria leaf spot and Cercospora leaf spot coupled with maximum yield with higher cost benefit (C:B) ratio (Nayankishor and Roy, 2019). Seed treatment with Thiram (0.2%) + Carbendazim (0.1%) was effective for the

Table: 1 Pooled analysis of the effect of biocontrol agents and fungicides on Root rot, stem blight, capsule blight and yield of sesame

Sr.No	Treatment	Root rot (%)	stem blight (PDI)	capsule blight (PDI)	Yield (Kg/ha)	BCR
T1	ST (Pf1) + SA (Pf1)	9.81	36.66	32.67	592.43	1.97
T2	ST (Pf1) + FS (Pf1)	11.07	39.60	24.39	583.50	1.94
T3	ST (Pf1) + FS Difenconazole (0.05%)	5.73	20.68	16.41	640.05	2.13
T4	ST (Pf1) + FS Carbendazim+ Mancozeb (SAFF-0.2%)	8.21	25.21	25.33	600.93	2.00
T5	ST (Pf1) + FS Mancozeb (0.2%) (30 and 45DAS)	13.50	36.27	32.79	570.41	1.90
T6	ST (Pf1) + FS Propiconazole (0.2%)	8.56	29.59	27.06	605.08	2.02
T7	ST (Tv) + SA (Tv)	8.67	31.73	34.93	607.00	2.02
T8	ST (Tv) + FS (Tv)-30 and 45 DAS	10.47	35.61	32.41	596.70	1.99
T9	ST (Tv) + FS Difenconazole (0.05%)	6.27	25.87	17.33	637.08	2.12
T10	ST (Tv) + FS Carbendazim+ Mancozeb (SAFF-0.2%)	8.67	22.79	23.73	609.31	2.03
T11	ST (Tv) + FS Mancozeb (0.2%)	11.79	40.01	35.61	586.15	1.95
T12	ST (Tv) + FS Propiconazole (0.2%)	9.17	34.01	23.53	602.72	2.01
T13	ST - Carbendazim 0.2%	12.73	39.60	33.81	576.01	1.92
T14	Untreated control	19.03	48.67	41.33	495.97	1.65
	SEd	1.13	3.14	2.71	18.97	
	CD(.05%)	2.32	6.46	5.66	39.00	

management of Macrophomina stem and root rot of sesame (Rajpurohit *et al* 2005). *Trichoderma viride* is found to be effective against Macrophomina stem and root rot of sesame (Rajpurohit, 2004). Jeyalakshmi *et al* (2013) observed that soil application of neem cake (250 kg/ha) along with seed treatment and soil application (2.5 kg/ha) of *Trichoderma viride* followed by foliar spray of azadirachtin @ 3 ml/L on 30 and 45 DAS was found to be superior in reducing the root rot, leaf blight and powdery mildew disease of sesame. Meena (2020) reported that stem and root rot disease of sesame can be managed effectively using the integration of bioagent, *T. asperellum* (seed treatment and furrow application) and foliar application of fungicides (Trifloxystrobin + Tebuconazole @ 0.5 g/l at capsule initiation and second spray after 15 days interval. Seed treatment with *T. asperellum* @ 4g/kg + *P. fluorescens* @10g /kg + soil application of *P. fluorescens* @ 2.5kg/ha + 2.5 kg/ha enriched in 100 kg of FYM + neem cake @ 250 kg/ha was found effective in controlling the root rot and it's seem to be promising for practical disease management in farmer's field (Mahalakshmi and Ahila Devi ,2021). Integrated disease management (IDM) has emerged as the promising approach for management of root rot of sesame (Nayankishor and Roy, 2019)

CONCLUSION

From the present study, it was revealed that seed treatment with *Pseudomonas fluorescens* (Pf1) or *Trichoderma viride* followed by foliar spray with Difenconazole @ 0.05% on 30 and 45 DAS provided maximum protection of *Macrophomina* root rot , stem blight and *Alternaria* capsule blight diseases in sesame with higher seed yield and B:C ratio, so that this may be recommended for the integrated management of Macrophomina Root rot, stem blight and Alternaria capsule blight diseases of sesame.

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