Management of Sesame Phyllody: A Destructive Disease of East- Central Rajasthan

Abstract

Sesame (*Sesamum indicum* L.) is one of the important annual oldest oil seed crop grown in tropical to temperate zones in India. It belongs to family Pedaliaceae is native of India and plays an important role in the oilseed economy throughout the world. The sesame crop suffers from phyllody disease caused by phytoplasma. The effect of different treatments on per cent disease incidence. The results obtained revealed that all the treatments reduced the disease significantly compared to unsprayed control. Seed treatment with imidachlorprid 70 % WG + spraying of imidachlorprid 17.8% SL+ spraying of tetracycline hydrochloride recorded the least disease incidence (7.27 %),minimum leaf hopper population and maximum per cent disease control (65.59 per cent) and while seed treatment with imidachlorprid 70 % WG was least effective in which disease incidence of 15.46 per cent and maximum leaf hopper population was recorded. The disease incidence in untreated check was 21.13 per cent was recorded. Out of 22 genotypes/varieties screened against sesame phyllody 1 genotype was susceptible, 10 were moderately susceptible, 7 were moderately resistant and 4 genotypes were found resistant against phyllody of sesame.

Key words: Disease incidence, Treatment, ~~Phyllody~~, Phytoplasma.

Introduction

Sesame (*Sesamum indicum* L.) is an important edible *Kharif* oilseed crop grown in hotter and drier areas. Sesame seed is unique in its composition having appreciable amounts of protein (20%) and edible oil (50%) and contains high amount of saturated fatty acids (47% oleic acid and 39% linolenic acid) (Moazzami*et al.,* 2006; Uzun *et al.,* 2008). Sesame oil contains natural antioxidants sesamoline, sesamin and sesamol which cause an excellent stability (Shyu and Hwang, 2002). In recent years, regular occurrence of Phyllody has been recorded from districts of Rajasthan State. Now it is becoming a serious phytoplasmal disease of sesame. The disease is transmitted in nature by the leaf hopper vector, *Orosiusalbicintus*Distant (Vasudeva and Sahambi, 1955; Prasad and Sahambi, 1982; Choudhary and Prasad, 2007). Please add the losses caused by this disease and the problem statement and objective are not stated.

Materials and Methods

Please describe all the materials and methods clearly

To evaluate *in-vivo* efficacy of Insecticides, Bio-Pesticides and Antibiotics

A field trial was conducted during *kharif* 2019 to evaluate efficacy of insecticides as seed treatment as well as foliar application in combination of insecticides, bio pesticides and antibiotics as a foliar spray for the management of vector-leaf hopper (*Orosiusalbicinctus*)

and phyllody disease of sesame. The experiment was conducted at Agronomy farm of the Department of Plant Pathology, S.K.N. College of Agriculture, Jobner, Jaipur, Rajasthan in randomized block design with three replications using local variety in 2.1m x 2.0 m plot size with row to row spacing at 30 cm and plant to plant spacing of 10 cm. Three sprays of insecticide, biopesticides and antibiotics were given. First spraying was done after first appearance of disease and sub sequently two at 15 days interval. Recommended doses of fertilizers were applied with light irrigation for better seedling germination. Intercultural operations also performed as and when required. Leaf hoppers were recorded early in the morning on top, middle and bottom leaves of randomly selected plants. Observations on Leaf hopper count and Per cent disease incidence were recorded at capsule formation stage and up to the maturity of the crop using the formula given below.

$$\text{Per cent disease incidence (PDI)} = \frac{\text{Number of plants infected}}{\text{Number of plants observed}} \times 100$$

List 1. Treatments details

Tr. No.	**Treatments**	**Dose**
T_1	ST Imidacloprid 70% WG	ST @6gm/kg
T_2	T_1+ Spraying of Imidacloprid 17.8 % SL	FS @0.25ml/lits
T_3	T_1 + Spraying of Azadirechtin	FS @0.03%
T_4	T_1 + Spraying of Tetracycline HCL	FS @500ppm
T_5	T_2+ Spraying of Azadirechtin	FS @0.03%
T_6	T_2 + Spraying of Tetracycline HCL	FS @500ppm
T7	T_3 + Spraying of Tetracycline HCL	FS @500ppm
T8	Control (water spray only)	

To screen sesame genotypes/varieties against Sesame Phyllody

Twenty two germplasms entries and varieties were screened against phyllody disease under field /natural conditions. The seeds of each variety were sown in two rows with three replications. Observations on disease incidence recorded near crop maturity as described above using the following rating scale given by (Vanishree *et al*., 2013).

List 2. Disease rating scale used for scoring sesame phyllody was as under

Scale	Percent Disease Incidence	Reaction
0	0	Immune
1	1-10	Resistant
2	10.1-25	Moderately Resistant
3	25.1-50	Moderately Susceptible
4	More than 50	Susceptible

Results and Discussion

To study the effect of spraying insecticides, bio-pesticides and antibiotics on disease incidence as well as on leaf hopper population were recorded. The data was statistically analyzed and presented in Table 1 and graphically in Fig. 1.In all eight treatments were used for management of phyllody disease including untreated check (T_8) namely seed treatment (ST) with ST Imidacloprid 70% WG (T_1), T_1+ Spraying of imidacloprid 17.8% SL (T_2), T_1+ Spraying of azadirechtin (T_3), T_1 + Spraying of tetracycline HCL (T_4), T_2+ Spraying of azadirechtin(T_5), T_2+ Spraying of tetracycline HCL (T_6), T_3+ Spraying of tetracycline HCL (T_7) and control (T_8) , respectively.Data on disease incidence were recorded after third spray. The results revealed that all the treatments were found significantly superior over untreated check in controlling the disease and reducing the leaf hopper population.Among the treatments, T_6*i.e.* T_2 + Spraying of tetracycline HCL was found the best with 0.70 leaf hopper population per leaf and 7.27% disease incidenceover untreated check (disease incidence 21.13 per cent and leaf hopper 1.15 per leaf). Next best was T_7*i.e.*T_3+ Spraying of tetracycline HCL with followed by T_5*i.e.*T_2+ Spraying of azadirechtin and T_4*i.e.*T_1 + Spraying of tetracycline HCL, with 8.07, 9.20 and 8.67 per cent disease incidence.From the results obtained (Table 2 and Fig. 1) on the sesame phyllody incidence and vector population, it can be concluded that seed treatment of imidacloprid (6 gm/kg) with three spray of imidacloprid (0.25 ml/lits) + three spray of tetracycline hydrochloride (500 ppm) at the interval of 15 days found effective to minimize the disease incidence (7.27 per cent) as compared to control (21.13 per cent) and phyllody disease control up to 65.59 per cent.

To study the effect of spraying Insecticides, bio-pesticides and antibiotics on leaf hopper population were recorded. It was observed that, among all treatments of insecticides significantly decreases leaf hopper population in most of counts than other treatments. All treatment reduced leaf hopper population as compared with control. Minimum leaf hopper

population (0.70 per cent) was observed in seed treatment followed by spray (ST imidacloprid+ spray of imidacloprid + spray of tetracycline HCL) as compared with other treatments. Similarly the effect of spraying insecticides, bio-pesticides and antibiotics on incidence of phyllody disease in sesame. The result revealed that, spraying insecticides, bio-pesticides and antibiotics viz., (ST of imidacloprid + Spraying of tetracycline HCL), (ST imidacloprid + spray of imidacloprid + Spraying of azadirechtin), (ST of imidacloprid + Spraying of imidacloprid 17.8% SL), (ST of imidacloprid + Spraying of azadirechtin), and (ST imidacloprid 70% WG), significantly reduced disease incidence.

All the treatments were found more effective in reducing disease incidence over control. The disease incidence recorded after third treatment ranged from 7.27 to 15.46 per cent as against 21.13 per cent in untreated control. However all the treatments (ST imidacloprid + spray of imidacloprid + Spraying of tetracycline HCL recorded least mean disease incidence (7.27%). From the result obtained on the sesame phyllody incidence and vector population, it can be concluded that seed treatment of imidacloprid (6 gm/kg) with three spray of Imidacloprid0.25ml/lits + three spray of tetracycline hydrochloride (500ppm) at the interval of 15 days found effective to minimize the disease incidence (7.27 percent) as compared to control (21.13 per cent) and phyllody disease control up to 65.59 per cent.

Similar result regarding effectiveness of antibiotics related phyllody disease incidence were reported by Wang (1997); Akhtar *et al.*,(2009a) and Kumhar and Meena (2016) they reported that, for control of phytoplasmal phyllody disease spraying of antibiotics tetracycline was effective. Similarly result regarding effectiveness of insecticides related phyllody disease incidence were reported by Dey *et al.,* (2005); Gupta *et al.,* (2014), Thangjam and Vastrad (2015), Misra (2002), Iqbal *et al.,* (2013), Hosseini *et al.,* (2015), Markad *et al.,* (2018) and Panday *et al.,* (2018) they reported that sesame phyllody vector leaf hopper was successfully managed by spraying insecticides and was effective for management of phyllody disease.

Please correlate and discus your results with the earlier results

Table 1: Effect of spraying Insecticides, bio-pesticides and antibiotics on leaf hopper population and disease incidence of phyllody in sesame

Tr. No.	Treatments	Dose	Number of leaf hopper/ leaf*	Disease incidence (%)	Per cent disease control
T_1	ST Imidacloprid 70% WG	ST @6 gm/kg	1.01	15.46 (23.15)	26.83
T_2	T_1 + Spraying of Imidacloprid 17.8% SL	FS @0.25 ml/lits	0.79	9.91 (18.35)	53.09
T_3	T_1 + Spraying of Azadirechtin	FS @0.03%	0.96	14.99 (22.78)	29.05
T_4	T_1 + Spraying of Tetracycline HCL	FS @500 ppm	0.89	8.67 (17.12)	58.96
T_5	T_2 + Spraying of Azadirechtin	FS @0.03%	0.74	9.20 (17.66)	56.46
T_6	T_2 + Spraying of Tetracycline HCL	FS @500 ppm	0.70	7.27 (15.64)	65.59
T_7	T_3 + Spraying of Tetracycline HCL	FS @500 ppm	0.83	8.07 (16.50)	61.80
T_8	Control (water spray only)	--	1.15	21.13 (27.37)	
	SEm±		0.03	0.44	
	CD (p= 0.05)		0.10	1.33	

* = Mean values of three replications; ST= Seed treatment; FS= Foliar spray

(Angular transformed values given in parenthesis)

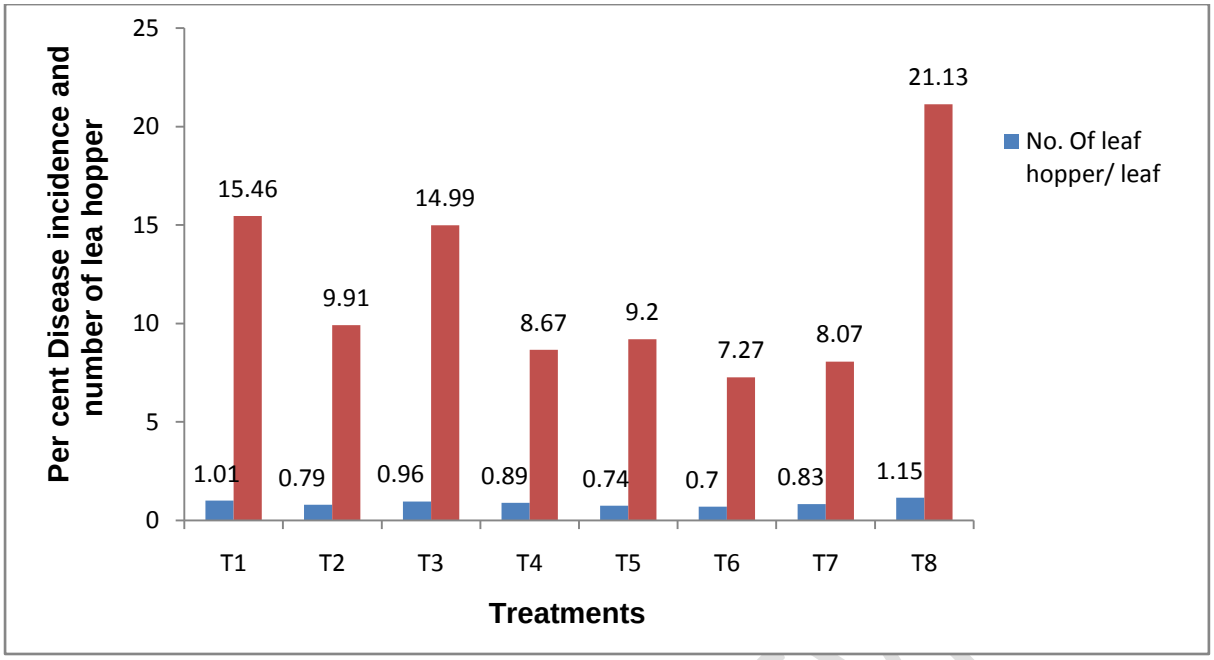

Fig. 1 Effect of spray of insecticides, bio-pesticides and antibiotics on leaf hopper population and disease incidence of phyllody in sesame

To screen sesame genotypes and varieties against sesame phyllody

Twenty two prominent lines/varieties/hybrids/cultivars of sesame were screened under natural epiphytotics for their reaction to leaf hopper and phyllody disease incidence to trace out source of resistance and result obtained were presented in Table 2. Result revealed that, leaf hopper population varies from 0.62 to 1.75 leaf hopper per leaf. Lowest leaf hopper population was reported in RT-127, 0.62 leaf hopper/leaf followed by Pragati, RT-103 and RT-375 reported leaf hopper population 0.81, 0.89 and 1.02 leaf hopper/leaf, respectively. Highest leaf hopper population 1.75, leaf hopper/leaf was reported in TKG-22, respectively, In all the sesame lines the maximum disease incidence was recorded in TKG-22 and RT-346 with the other hand minimum disease incidence was recorded in RT-127, Pragati, RT-103 and RT-46 which showed 7.43%, 8.53%, 9.07% and 9.80% disease incidence, respectively.

Further the sesame entries were characterized on the basis of their reactions to sesame phyllody and presented in Table 3. Among all the lines RT-103, RT-127, RT-46 and Pragati were found resistance to sesame phyllody. GT-10, RT-125, TC-25, RT-54, RT-351, RT-375, G-1 were moderately resistance to sesame phyllody and TKG-22 was found most susceptible to sesame phyllody disease.

Similarly correlate and discus your result with the earlier results.

Table :2 Screening of sesame genotypes/varieties/cultivars evaluated against leaf hopper population & disease incidence.

Sr. No.	Name of Cultivar	No. of Leaf hopper /leaf*	Per cent Disease Incidence*	Reaction
1	GT-10	1.03	13.67	MR
2	RT-125	1.14	18.23	MR
3	TKG-22	1.75	54.02	S
4	RMT-447	1.29	39.94	MS
5	RT-127	0.62	07.43	R
6	TC-25	1.09	16.54	MR
7	RMT-376	1.40	46.75	MS
8	RT-46	1.02	9.80	R
9	RT-54	1.05	13.24	MR
10	RT-351	1.17	23.32	MR
11	RT-346	1.42	47.12	MS
12	RMT-385	1.28	30.43	MS
13	RMT-479	1.39	41.56	MS
14	RT-375	1.02	12.89	MR
15	RT-372	1.21	28.92	MS
16	RT-450	1.32	29.08	MS
17	RMT-486	1.27	34.76	MS
18	Pragati	0.81	08.53	R
19	RMT-505	1.44	45.87	MS
20	RMT-378	1.23	26.34	MS
21	RT-103	0.89	9.07	R
22	GT-1	1.09	18.98	MR

* : Average of five plants

Table :3 Reaction of sesame genotypes/ varieties/ hybrids/ cultivars to sesame phyllody disease under field condition

Scale	Reaction	Genotypes/ Varieties/Cultivars
0	Immune	----
1	Resistant	RT-103, RT-127, RT-46, Pragati
2	Moderately Resistant	GT-10, RT-125, TC-25, RT-54, RT-351, RT-375, GT-1
3	Moderately Susceptible	RT-346, RMT-385, RMT-479, RT-372, RMT-486, RMT-505,RMT-378, RMT-447, RMT-376, RT- 450
4	Susceptible	TKG-22

Conclusion

Sesame phyllody disease can be controlled by seed treatment with insecticide *i.e.* imidacloprid 70% WG with three spray of antibiotic tetracycline hydrochloride 500ppm along with the three spray of insecticides of imidacloprid 17.8% SL effectively control the vector leaf hopper and reduce the incidence phyllody disease. Out of twenty two varieties/genotypes were screened against sesame phyllody, none of the varieties found to be immune and only some varieties are resistant to phyllody, therefore, it need to give more importance on resistance breeding program for find out resistance source to sesame phyllody.

Make it the conclusion part comprehensive.

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