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Dileep Kumar

Assistant Professor, Department of Extension Education, ARSS, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

Jitendar Kumar Sharma

Assistant Professor, Department of Plant Pathology, Agriculture Research Sub-station, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

Suresh Chand Meena

Assistant Professor, Department of Plant Pathology, College of Agriculture, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

Hanuman Prasad Parewa

Assistant Professor, Department of Soil Science & Ag. Chemistry, College of Agriculture, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

SD Ratnoo

Professor, Department of Entomology, College of Agriculture, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

Correspondence**Jitendar Kumar Sharma**

Assistant Professor, Department of Plant Pathology, Agriculture Research Sub-station, Sumerpur, Agriculture University, Jodhpur, Rajasthan, India

Prevalence of yellow vein mosaic virus of okra [*Abelmoschus esculentus* (L.) Moench] in Sheoganj, transitional plain of Luni Basin (Zone IIb) of Rajasthan

Dileep Kumar, Jitendar Kumar Sharma, Suresh Chand Meena, Hanuman Prasad Parewa and SD Ratnoo

Abstract

The incidence of yellow vein mosaic of okra, cultivated in the Transitional Plain of Luni Basin (Zone IIb) of Rajasthan was investigated. During the survey, occurrence of okra yellow vein mosaic was observed in serious proportion, inflicting heavy losses. In Sheoganj region, 15 extensively okra growing villages were surveyed to record the occurrence of yellow vein mosaic disease during summer season of 2017 and 2018. Yellow vein mosaic disease was appeared in all the surveyed areas of Sheoganj regions from initiation of flowering stage to fruiting stage of the crop. The disease was not found up to the vegetative stage (*i.e.* before flowering stage) of the crop. The yellow vein mosaic incidence was ranging from 10 to 30 percent with an average of 20.53 percent in flowering initiation stage during 2017. While, during 2018 the average percent disease incidence was 20.40, with ranging from 12 to 34 percent. The maximum disease incidence was observed at Arathwara (30 and 34%) during both the year, respectively. However, in fruiting stage, the disease incidence was observed in the range of 17.78 to 64 percent with an average of 32.93 percent during 2017. Whereas, during 2018, the average disease incidence was 36.13 with ranging from 16 and 66 percent. The maximum disease incidence was found in Arathwara (64 and 68%) during both the year 2017 and 2018, respectively.

Keywords: Yellow vein mosaic virus, okra, *Abelmoschus esculentus* and percent disease incidence

1. Introduction

Okra [*Abelmoschus esculentus* (L.) Moench], is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. This crop is suitable for cultivation as a garden crop as well as on large commercial farms. Okra is known by many local names in different parts of the world. It is called lady's finger in England, gumbo in the United States of America, guinogombo in Spanish, guibeiro in Portuguese and *bhindi* in India. It is quite popular in India because of easy cultivation, dependable yield and adaptability to varying moisture conditions.

The area under okra cultivation in India is 528.37 (000 ha) with production of 6145.97 (000 MT) & productivity of 11.63 Tonne/ha^[1]. In Rajasthan it occupies an area of 3.40 thousand hectares with a production of 10.50 thousand metric tonnes having average productivity of 3.09 Tonne/ha^[1].

Many factors responsible for yield loss of the crop, one of them is the diseases are major constraints for low yield of okra^[2]. A number of fungal, bacterial, viral diseases have been reported in India. Among the different diseases affecting okra crop, yellow vein mosaic caused by Okra yellow vein mosaic virus is most important disease causes considerable yield losses. Okra yellow vein mosaic disease (OYVMD), first reported in India in 1924^[3] is the major limitation in the production. The disease is characterized by different degrees of chlorosis and yellowing of veins and veinlets, smaller leaves, fewer and smaller fruits, and stunting. Fruit yield is also greatly reduced, by as much as 96% if the crop is infected at an early stage^[4]. Several OYVMD-resistant okra varieties have been released, but none have retained resistance for long^[5]. OYVMD is caused by Okra yellow vein mosaic virus (OYVMV), a distinct monopartite species of the genus Begomovirus, family Geminiviridae^[6] believed to have originated in India^[5], plus a small satellite DNA β component^[7]. The only known method of transmission of OYVMV is through whitefly (*Bemisia tabaci* Gen.) in a persistent manner.

The loss due to yellow vein mosaic is proportionate to the disease incidence and varies considerably depending on the stage of the plant growth at which disease occurs.

2. Materials and methods

An intensive roving survey was conducted during summer in 2017 and 2018 to know the incidence of yellow vein mosaic at the different areas of Sheoganj (Sirohi) for Summer in three different stages of crop *i.e.* vegetative, flowering and fruiting stage. Five fields were selected in a village, which was on the survey route. In each field, Fifty plants were randomly selected and the percent disease incidence was assessed by recording the number of plants showing disease symptoms, out of the total number of plants examined by using the formula mentioned below [8].

$$\text{Percent disease incidence} = \frac{\text{Number of diseased plants}}{\text{Total number of plants examined}} \times 100$$

3. Results

In Sheoganj region, 15 extensively okra growing villages were surveyed to record the occurrence of okra yellow vein mosaic disease during *Summer* season of 2017 and 2018. The villages were surveyed for three times at vegetative (3rd week of March), flower initiation (1st week of April) and fruiting

stages (4th week of April) of the crop. The data depicted in Table 1 revealed that the yellow vein mosaic incidence was ranging from 10 to 30 percent with an average of 20.53 percent in flowering initiation stage during 2017. While, during 2018 the average percent disease incidence was 20.40, with ranging from 12 to 34 percent. The maximum disease incidence was observed at Arathwara (30 and 34%) during both the year with average of 32 percent followed by Devli, Uthman, Badgav, Morli, Bagsin and Bhev with 29, 27, 27, 24, 24 and 21 percent, respectively. However, in fruiting stage, the disease incidence was observed in the range of 17.78 to 64 percent with an average of 32.93 percent during 2017. Whereas, during 2018 the average disease incidence was 36.13 with ranging from 16 and 66 percent. The maximum disease incidence was found in Arathwara (64 and 68%) during both the year 2017 and 2018, respectively with average of 66 percent followed by Devli, Uthman, Bagsin and Bhev with 54, 48, 47 and 47 percent, respectively. There was no infection found in vegetative stage. Overall, yellow vein mosaic incidence was higher in fruiting stage (34.53%) compared to flowering stage (20.47%). The disease was higher (36.13%) in fruiting stage during 2018 as compared to fruiting stage of 2017 (32.93%). The loss due to yellow vein mosaic is proportionate to the disease incidence and varies considerably depending on the stage of the plant growth at which disease occurs.

Table 1: The percent disease incidence in different villages of Sheoganj region in summer 2017 and 2018

Sl. No.	Villages	Flowering stage			Fruiting stage		
		2017	2018	Average	2017	2018	Average
1	Arathwara	30	34	32	64	68	66
2	Uthman	28	26	27	46	48	47
3	Bagsin	22	26	24	44	52	48
4	Bhev	22	20	21	48	46	47
5	Rukhara	18	18	18	22	22	22
6	Khandra	16	16	16	16	28	22
7	Sutharo ka guda	10	12	11	14	18	16
8	Kaldari	14	12	13	22	26	24
9	Chuli	14	14	13	24	22	23
10	Radbar	16	14	15	28	26	27
11	Pasoliya	20	18	19	30	32	31
12	Morli	24	24	24	36	38	37
13	Badgav	28	26	27	30	40	35
14	Devli	30	28	29	56	52	54
15	Joyla	18	18	18	24	24	24
Average PDI		20.53	20.40	20.47	32.93	36.13	34.53

4. Discussion

The results of present investigation are more or less similar to [9] who noticed 12-13% percent incidence of yellow vein mosaic of okra from full flowering to harvesting stage and Similarly [10], conducted extensive survey for incidence of OYVMD in Sargodha, Khushab, Mianwali and Bhakkar districts of Sargodha division. The incidence was in the range of 51% to 88%. Environmental factors had great impact on disease incidence and whitefly population. 16.50-70.10 percent incidence of okra yellow vein mosaic in Samaru (Northern Nigeria) [11].

The okra yellow vein mosaic incidence in different locations of Sheoganj region were ranging from 10 to 68 percent. This difference may be attributed to the effect of different environmental conditions occurring in different locations and microclimate of the field which influenced whitefly population in this area. The villages like Arathwara, Bagsin, Devli and Uthman of Sheoganj region, farmers are practicing

very narrow spacing between the rows and grown under irrigated conditions. This may help in buildup of favourable microclimate for the development of white fly and okra yellow vein mosaic disease.

5. Conclusion

The outcome of this study will serve as a guide to the farmers when planning for their vegetable production and protection strategies. It should be noted from the survey study that Yellow vein mosaic disease was appeared in all the surveyed areas of Sheoganj regions from initiation of flowering stage to fruiting stage of the crop. The disease was not found up to the vegetative stage (*i.e.* before flowering stage) of the crop. The maximum disease incidence *i.e.* 32 and 66 percent was observed at Arathwara during both stage.

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