Biological Forum – An International Journal **15(10): 1582-1585(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Status of Root Rot (*Rhizoctonia solani)* of Okra in Zone-III A of Rajasthan

Ranjana Meena[1*], R.P. Ghasolia[2], Shailesh Godika[3], Kewal Chand[1] and Monika Meena[1]
[1]Ph.D. Research Scholar, Department of Plant Pathology,
SKN College of Agriculture, Jobner (Rajasthan), India.
[2]Associate Professor, Department of Plant Pathology,
SKN College of Agriculture, Jobner (Rajasthan), India.
[3]Professor, Department of Plant Pathology,
SKN College of Agriculture, Jobner (Rajasthan), India.

(Corresponding author: Ranjana Meena)*
(Received: 16 August 2023; Revised: 27 September 2023; Accepted: 09 October 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: Okra or lady's finger [*Abelmoschus esculentus* (L.) Moench] which is known as "*Bhindi*" in Hindi, is one of the most important summer vegetables of Rajasthan as well as India and belongs to the family *Malvaceae.* This crop suffers severely from the vagary of diseases caused by fungi and important one is root rot incited by *Rhizoctonia solani,* which is not only reduces the potency of seed, but also degrades the health beneficial and nutritional quality components of the crop. To know the status of disease incidence, a roving survey was conducted during *Zaid* 2022 in major okra growing districts (*viz.,* Jaipur, Ajmer, Dausa and Tonk) covering Zone III-A of Rajasthan. A total of 48 fields of okra crop were surveyed covering 16 villages in 8 tehsils. Every surveyed field revealed the presence of root rot and it was ranged from 17.00 to 40.74 per cent with all overall mean of 26.71 per cent. The highest mean disease incidence was observed in Jaipur district (31.64%) followed by Tonk (26.69%), Ajmer (24.81%) and lowest was in Dausa district (23.73%). Conclusively, this disease is gaining importance in okra growing areas and may be alarming situation in coming years. Therefore, growers and researchers may take care of, so that it can be managed in time.

Keywords: Okra, root rot, survey, disease incidence.

INTRODUCTION

Lady's finger or okra [*Abelmoschus esculentus* (L.) Moench] which is known as "*Bhindi*" in Hindi, is one of the most important summer as well as rainy season vegetables of Rajasthan as well as India and belongs to the family *Malvaceae* (Tindall, 1983). Earlier, its botanical name was *Hibiscus esculentus* (L.) under the section *Abelmoschus* of *Hibischus*, established by Linnaeus (1737). It was originated in tropical Africa, particularly in Ethiopia and spread widely around the globe in the tropics, subtropical and warm region of the world (Singh *et al*., 2014). The fruits of okra contain carbohydrate (6.4%), protein (1.9%), fat (0.2%), fiber (1.2%), minerals (0.7%) and moisture (89.6%). The fruit is also rich source of β-carotene (53µg), thiamine (0.07mg), riboflavin (0.1mg), vitamin (13mg), calcium (66mg), magnesium (53mg), oxalic acid (8mg), phosphorus (56 mg), iron (0.35 mg), sodium (6.9 mg), potassium (103 mg), copper (0.11mg) and sulfur (30 mg) per100g of edible portion (Anonymous, 2013). Okra seeds contain about 20% proteins and 20% oil and oil has hypo-cholesterolemic effect. The potential for wide cultivation of okra for edible oil as well as for cake is very high (Rao *et al.,* 1991). Martin (1982) has suggested that its roasted and grinded seeds can also be used as a substitute for coffee. In paper industries, the stem of okra plants is used for fiber purposes (Qayyum, 1990; Mithal, 2006).

Okra is attacked by several fungal pathogens, which not only reduces the potency of seed, but also degrades the health beneficial and nutritional quality components of the fruits. The important diseases are root rot (*Rhizoctonia solani)*, powdery mildew (*Oidium* spp.), Fusarium wilt (*Fusarium oxysporum*), charcoal rot (*Macrophomina phaseolina*), Cercospora leaf spot *(Cercospora abelemoschi*), yellow vein mosaic (*Bhindi Yellow Vein Mosaic Virus*) and damping off (*Pythium* spp.) of okra (Anonymous, 2003). Among the fungal diseases, root rot is one of the important diseases caused by *Rhizoctonia solani*. Although, this fungus does not produce any conidial structure, however, ellipsoid to globose, barrel-shaped cells, named monilioid cells, 10-20 µm wide can be produced in chains and can give rise to sclerotia. Sclerotia are irregularly shaped, up to 8-10 mm in diameter and light to dark brown in colour (Parmerter and Whitney 1970; Sneh *et al*., 1996). Concerning its sexual stage, it belongs to the genus *Thanatephorus* which has systematic relationships in the family *Ceratobasidiaceae*, considered by some authors (Roberts, 1999; Rogers, 1935; Weiss and Oberwinkler 2001) as one of the most primitive group of

Holobasidiomycetes, because of their characteristic basidial morphology, with large and sometimes septate sterigmata, close to some Phragmo basidiomycetous groups (Stalpers and Ander-sen 1996). Crop losses by root rot of okra (*Rhizoctonia solani)* is ranged from negligible to 50-60 per cent depending on the extent of severity and different stages of crop (Safiuddin *et al.*, 2014). Therefore, it was imperative to know the status of this disease in major cultivating regions of Rajasthan.

MATERIAL AND METHODS

A roving survey was undertaken in major growing districts of Zone-III A of Rajasthan *viz.*, Jaipur, Ajmer, Dausa and Tonk during summer season to know the incidence of root rot disease. During survey, a total of 48 fields in 16 villages of eight tehsils of four districts were covered and in each village three fields were chosen. The selection of villages from each tehsil were made randomly. To assess the disease incidence, three okra fields were selected in each village and average incidence in each village was calculated. In each field, five spots of one square meter area were marked diagonally at random to cover entire field. Diseased plants showing the typical symptoms of root rot were collected to isolate and verify the pathogen. Diseased and healthy plants were counted in each spot and the per cent disease incidence was calculated as per formula given below

$$\text{Per cent disease incidence} = \frac{\text{Number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

RESULTS AND DISCUSSION

A roving survey was conducted during *Zaid* 2022 in okra growing districts of Rajasthan to assess the extent of root rot incidence. A total of 48 fields from four districts (Zone-III A) covering 8 tehsils in 16 villages of Rajasthan were surveyed. The survey revealed that the root rot caused by the *Rhizoctonia solani* is an important pathological problem. Root rot incidence was recorded in all the surveyed fields and diseased plants appeared in patches in all the affected fields (Plate 1). It is apparent from data depicted in (Table 1) that average root rot incidence in different districts varied from 23.73 to 31.64 per cent. Every surveyed field revealed the presence of root rot and it was ranged from 17.00 to 33.47 per cent with all overall mean of 26.71 per cent. The highest mean disease incidence was observed in Jaipur district (31.64%) followed by Tonk (26.69%), Ajmer (24.81%) and lowest was in Dausa district (23.73%). The disease incidence also varied among the tehsils and followed the sequence of decreasing order as Jamwa Ramgarh (34.28%) > Niwai (30.97%) > Ajmer (30.66%) > Jobner (29.01%) > Dausa (25.80%) > Deoli (22.41%) > Lalsot (21.67%) and > Sarwar (18.96%). Not a single location of surveyed districts was found completely free from the disease incidence. As per verbal discussions held with the farmers during survey, it was also revealed that the disease incidence was higher in fields where mono-cropping with local cultivar followed year after year in sandy loam to sandy soils. The results of the study also revealed that per cent root rot incidence varied from location to location and variety to variety. As compared to improved varieties, local varieties were found to be more susceptible to infection of *R. solani*. Variation in root rot incidence was also observed among the soil types. Sandy soils were more conducive to the pathogen *R. solani*. The root rot incidence was more in rainfed condition than irrigated conditions. The dry spell prevalent in the rainfed conditions might have favoured the pathogen, which could be attributed to the higher level of disease incidence.

In the present study, it evident from survey data, root rot incidence varied from locality to locality. Soil type, varieties grown, environmental conditions and prevalence of the different pathogen isolates in their virulence could be the reason for the variation in the extent of the root rot incidence observed in the present study.

Our results are in accordance with findings of earlier workers (Singh and Rao 2015; Kumar *et al*., 2019; Amadi *et al*., 2014). During survey, Singh and Rao (2015) observed 34.67 per cent incidence of root rot of fenugreek caused by *Rhizoctonia solani* with yield loss of 55.26 per cent from Chhattisgarh. Karibasappa *et al*. (2018) recorded maximum stem and root rot incidence under sandy soils, followed by loamy sand and loam soil textures. The occurrence and severity of root rot incidence was directly related to the availability of sclerotia present in the soil. Kumar *et al*. (2019) also conducted a field survey to assess the prevalence and incidence of cow pea dry root rot disease in major cowpea growing regions in Tamil Nadu and revealed the endemic nature of the root rot disease with the maximum disease incidence (18.43%) in Kaveripattinam of Krishnagiri region (MP5) and the least incidence (12.38%) was recorded in Omalur of Salem region. The prevalence of the isolates of the pathogen differing in their virulence could be the reason for the variation in the extent of the disease incidence. Amadi *et al*. (2014) conducted survey of okra (*Abelmoschus esculentus* L.) fruit rot in four towns in Awka South LGA of Anambra State in the cropping season of 2013 (June-August). It was observed that okra fruit rot was quite rampant in the surveyed locations during the period reviewed. Isolation of associated organisms resulted in six fungi namely: *Rhizopus stolonifer, Fusarium oxysporum, Rhizoctonia solani, Penicillium oxalicum, Botryodiplodia theobromae* and *Aspergillus flavus*. Pathogenicity test showed that four of the fungi namely: *R. stolonifer*, *F. oxysporum, R. solani* and *A. flavus* reproduced fruit rot in artificially inoculated okra fruits.

Table 1: Status of root rot of okra in surveyed districts of Rajasthan (Zone-III A).

Sr. No.	District	Tehsil	Village	% Disease incidence (PDI) in surveyed field & their No.			Av. PDI of village (Avg. of three fields)	Av. PDI of tehsil (Avg. of two village)	Av. PDI of district (Avg. of two tehsil)
1.	Ajmer	Sarwar	Vijaypath	21.31(1)	19.11(2)	17.61(3)	19.43	18.96	24.81
			Jadana	17.00(4)	20.92(5)	17.57(6)	18.49		
		Ajmer	Manpura	30.68(7)	33.01(8)	28.35(9)	30.68	30.66	
			Madarpura	28.83(10)	30.89(11)	32.25(12)	30.65		
2.	Dausa	Dausa	Didwana	29.75(13)	25.67(14)	23.68(15)	26.36	25.80	23.73
			Ramthala	25.91(16)	22.61(17)	27.25(18)	25.25		
		Lalsot	Khatwa	18.77(19)	29.02(20)	25.16(21)	24.31	21.67	
			Haripura	20.92(22)	22.07(23)	17.14(24)	19.04		
3.	Jaipur	Jamwa Ramgarh	Gopalgarh	30.73(25)	40.74(26)	35.16(27)	35.54	34.28	31.64
			Kelanwas	27.87(28)	31.73(29)	33.47(30)	33.02		
		Jobner	Jobner	28.15(31)	32.16(32)	29.40(33)	29.90	29.01	
			Gokulpura	25.48(34)	27.14(35)	31.75(36)	28.12		
4.	Tonk	Deoli	Kakod	17.42(37)	22.38(38)	20.98(39)	20.26	22.41	26.69
			Bikhapura	26.94(40)	24.32(41)	22.44(42)	24.56		
		Niwai	Mundia	28.54(43)	30.33(44)	27.85(45)	28.90	30.97	
			Hingotiya	32.65(46)	34.56(47)	31.93(48)	33.04		
Over all mean									26.71

PDI = Per cent disease incidence

Plate 1. Fields okra crop surveyed in Zone-III A of Rajasthan.

CONCLUSIONS

The overall average disease incidence of root rot of okra was recorded 26.71 percent in surveyed four districts (Zone-lll A) of Rajasthan. The highest incidence was recorded in Jaipur district (31.64%) while lowest in Dausa district (31.64%).

REFERENCES

Amadi, J. E., Nnamani, C., Ozokonkwo, C. O. and Eze, C. S. (2014). Survey of the incidence and severity of okra (*Abelmoschus esculentus* L. Moench) Fruit rot in Awka South lga, Anambra state, Nigeri. *International Journal of Current Microbiology and Applied Science, 3*(4), 1114-1121.

Anonymous (2003). Indian Agriculture. Vikas Singhal for Indian Economies Data Research Centre, Maya Puri, New Delhi 271-272.

Anonymous (2013). Okra Area under cultivation. National Horticulture Board website: http://nhb.Govt.in/bulletin-vegtables.html. 52-56.

Karibasappa, S., Bharati, N., Bhat, S. and Chander Rao (2018). Survey for the disease incidence of root rot of sesame caused by *Macrophomina phaseolina* (Tassi.) Goid, in major sesame growing areas of Telangana. *Journal of Pharmacognosy and Phytochemistry, 7*(6), 655-657.

Kumar Ashwini, Reddy Surya, P. M., Srivastava, A. and Verma, R. K. (2019). Pathogenic variability of soybean charcoal rot caused by *Macrophomina phaseolina* isolates against pulse crops. *International Journal of Pure and Applied Biosciences, 7*(5), 279-286.

Martin, F. W. (1982). Okra, potential multiple-purpose crop for the temperate zones and tropics. *Economic Botany, 36*, 340-345.

Mithal, M. J. (2006). Low cost and pollution free technology against root rot of okra. Web source: www.pakissan.com.

Parmerter, J. R. and Whitney, H. S. (1970). Taxonomy and nomenclature of the imperfect state. In *Rhizoctonia solani*. Biology and Pathology (Parmerter, J.R., ed.), p. 225.

Qayyum, S. (1990). A varietal trial on okra (*Hibiscus esculentus* L.) cultivars. *Pakistan Journal of Agriculture research, 7*, 55-78.

Rao, P. S., Rao, P. U. and Serikeran, B. (1991). Serun cholesterol, triglycerides and total fatty acid of rates in response to okra (*Hibiscus esculentus*) seed oil. *JAOCA, 68*, 433.

Roberts, P. (1999). *Rhizoctonia*-Forming Fungi: A Taxonomic Guide. Kew: Royal Botanical Gardens. p. 239.

Rogers, D. P. (1935). Notes on the lower Basidiomycetes. *Studies Natural History University Iowa, 17*, 1-43.

Safiuddin, S. A., Tiyagi, R. R. and Mahmood Irshad (2014). Biological control of disease complex involving *Meloidogyne incognita* and *Rhizoctonia solani* on growth of okra through microbial inoculants. *Journal Microbiology Biotechnology Research, 4*(5), 46-51.

Singh, A. K. and Rao, S. S. (2015). Management of root rot disease of fenugreek. *Journal Spices Aromatic Crops, 24*(1), 58-60.

Singh, P. V., Chauhan, B. K., Tiwari, S. S., Chauhan, S., Simon, S., Bilal and Abidi, A. B. (2014). An overview on okra (*Ablemoschus esculentus*) and its importance as a nutritive vegetable in the world. *International Journal of Pharmacy and Biological Sciences, 4*(2), 227-223.

Sneh, B., Jajabi-Hare, S., Neate, S. and Dijst, G. (1996). *Rhizoctonia Species* Taxonomy, Molecular Biology, Ecology, Pathology and Disease Control. Dor-drecht: Kluwer Academic Publishers, p. 578.

Stalpers, J. A. and Andersen, T. F. (1996). A synopsis of the taxonomy of teleomorphs connected with *Rhizoctonia* in *Rhizoctonia Species*: Taxonomy, Molecular Biology, Ecology, Pathology and Disease Control pp. 49–63.

Tindall, H. D. (1983). Vegetables in the tropics. Macmillan. *AVI, 33*, 325-327.

Weiss, M. and Oberwinkler, F. (2001). Phylogenetic relationships in Auricu-lariales and related groups-hypotheses derived from nuclear ribosomal DNA sequences. *Mycology Research, 105*, 403-415.

How to cite this article: Ranjana Meena, R.P. Ghasolia, Shailesh Godika, Kewal Chand and Monika Meena (2023). Status of Root Rot (*Rhizoctonia solani*) of Okra in Zone-III A of Rajasthan. *Biological Forum – An International Journal, 15*(10): 1582-1585.