Biological Forum – An International Journal **14(1): 879-882(2022)**

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

Survey and Surveillance of Major Greengram (*Vigna radiata* L.) Growing areas around Udaipur Region to Observe occurrence and Severity of *Alternaria* Leaf Spot

Neeraj Kumar Meena[1]*, Amit Trivedi[1], Mahendra Kumar Meena[1], Suresh Chand Meena[2] and Suresh Kumar[1]
[1]Department of Plant Pathology, Rajasthan College of Agriculture, MPUAT, Udaipur, (Rajasthan), India.
[2]College of Agriculture, Sumerpur, Agriculture University, Jodhpur, (Rajasthan), India.

(Corresponding author: Neeraj Kumar Meena)*
(Received 02 November 2021, Accepted 06 January, 2022)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Surveys were conducted to study the occurrence and severity of *Alternaria* leaf spot diseases in major greengram growing areas around Udaipur district of Rajasthan during *Kharif* 2017 and 2018. The roving survey of the farmer's field was carried out to study for symptomatology, severity, distribution, and spread of both the diseases at the flowering and pod formation stage of the crop. Among the different areas surveyed, the highest mean disease severity of 48.23 per cent was observed at Sisarma, where the PDI at the flowering stage was recorded to be 41.65 per cent which increased up to 54.82 per cent at the pod formation stage and the lowest mean PDI of 25.72 was observed in Jhallara village here the PDI at flowering and pod formation stage was 21.93 and 29.50 per cent during *kharif* 2017. In the subsequent year *kharif* 2018, the intensity of *Alternaria* leaf spot disease was lower at RCA experimental field, the mean PDI was recorded maximum of 44.85 per cent and the least mean PDI of 23.41 per cent was noted again in Jhallara village showing 19.83 PDI at flowering stage and 27.00 PDI at pod formation stage.

Keywords: *Alternaria*, greengram, Severity, Survey.

INTRODUCTION

Greengram [*Vigna radiata* (L.) Wilczek] is an important pulse crop belongs to the *Leguminosae* family and sub-family *Papilionaceae*. It is commonly referred to as mung bean, mung, moong or golden gram (John, 1991). It is indigenous and third most important self-pollinated, short-duration grain legume crop after chickpea and pigeonpea (Kumar and Kumar, 2014).

Greengram is an important and cheap source of food protein across Asia, especially for the poor, thus plays an imperative role in the alleviation of protein malnutrition especially in the developing countries (Selvi *et al*., 2006). It contains a relatively high proportion of easily digestible good quality protein (24%) with low flatulence and is also rich in iron contents (40–70 ppm), making it an ultimate choice for balanced diets (Selvi *et al*., 2006; Vairam *et al*., 2016).

In India, greengram is mainly grown in the states of Andhra Pradesh, Madhya Pradesh, Orissa, Maharashtra, Rajasthan, Bihar, Uttar Pradesh, Tamil Nadu and Gujarat. India occupies an area of 47.55 lakh hectares with total production of 24.55 lakh tonnes and productivity of 516 kg per hectare of greengram (Anon. 2018-19). In Rajasthan, it is cultivated on about 24.66 lakh hectares with total production of 12.22 lakh tonnes and productivity of 496 kg per hectare (Anon. 2018-19).

Sustainable greengram production is continuously challenged by biotic stresses that take a heavy toll of the crop and diseases could cause an estimated yield loss of 21.93 to 68.77 % (Sharma *et al*., 2008). Various factors are responsible for low yields in green gram crop. Biotic and abiotic stresses take a heavy toll of the crop, out of which diseases cause an estimated yield loss of 20 to 30 per cent (Singh, 1995). Among the different diseases caused by the genus *Alternaria*, blight disease is one of the most dominant one that causes average yield loss in the range of 32-57 per cent (Conn and Tewari, 1990).

MATERIAL AND METHODS

A. Survey and collection of diseased plant materials

The roving survey of the farmer's field was carried out during both the years of study for symptomatology, severity, distribution, and spread of both the diseases at the flowering and pod formation stage of the greengram crop. In the present investigation, samples of *Alternaria* leaf spot disease of greengram were collected in *Kharif* season of 2017 from the severely infected fields of Instructional farm, RCA campus, Sisarma, Jhadol,

Mavli, Kotra and Sarada villages of Udaipur district, Rajasthan. In these areas, farmers preferably grew local varieties using seeds of the previous season crop. Isolation of pathogen was done from the infected greengram plants showing typical symptoms of the *Alternaria* leaf spot disease. Samples were collected and brought to the laboratory, followed by subsequent isolation of pathogen and identification.

greengram fields were selected randomly from a location on the survey route. In each field, greengram plants of 1 metre square area from randomly 5 sites were selected and the occurrence and severity of the disease were recorded for *Alternaria* leaf spot. The per cent disease index was estimated by counting the number of plants showing symptoms of *Alternaria* leaf spot. Observations for disease severity were recorded using 1-5 disease rating scale given by Sangeetha and Siddaramaiah, 2007 for *Alternaria* leaf spot.

Table 1: Standard disease rating scale (1-5 scale) for accessing PDI of *Alternaria* leaf spot.

Scale	Description of the symptom
1.	Small irregular spots covering <5% leaf area.
2.	Small irregular brown spots with concentric rings covering 5.1-10% leaf area.
3.	Lesions enlarge, irregular brown with concentric rings covering 10.1-25% leaf area.
4.	Lesions coalease to form irregular and appears as a typical blight symptom covering 25.1-50% leaf area.
5.	Lesions coalease to form irregular and appears as a typical blight symptom covering >50% leaf area.

RESULT AND DISCUSSION

Surveys were conducted to study the occurrence and severity of *Alternaria* leaf spot diseases in major greengram growing areas around Udaipur district of Rajasthan during *Kharif* 2017 and 2018. The selected location-wise data of Udaipur district on disease severity *Alternaria* leaf spot as shown by Per cent Disease Index (PDI) have been presented in Table 2, 3 and Plate 1.

During *Kharif* 2017, *Alternaria* leaf spot on greengram clearly indicated that the disease was abundantly distributed in the area (Table 2). Among the different areas surveyed, the highest mean disease severity of 48.23 per cent was observed at Sisarma, where the PDI at the flowering stage was recorded to be 41.65 per cent which increased up to 54.82 per cent at the pod formation stage. Similarly, 46.74 per cent mean disease severity was recorded at the experimental field of Rajasthan College of Agriculture (RCA), Udaipur with 42.24, and 51.25 per cent PDI at flowering and pod formation, respectively. It was followed by Jhadol with a mean PDI of 42.32 and here, the PDI at the flowering stage was 35.52, and PDI at the pod formation stage was 49.12 per cent. Further, Kotra and Mavli were also observed to have PDI statistically at par with score of 38.51 and 37.29 per cent mean PDI.

Table 2: Distribution and Intensity of *Alternaria* leaf spot disease of greengram in major growing areas of Udaipur district during *Kharif* 2017.

Sr. No	Village name	Host variety	Area (ha)	Per cent Disease Index* (PDI)		Mean
				Flowering stage	Pod formation stage	
1.	Sisarma	Local	3.2	41.65 (40.18)	54.82 (47.77)	48.23 (43.98)
2.	Kotra	Local	2.4	34.53 (39.95)	42.99 (40.67)	38.51 (38.35)
3.	Sarada	Local	1.0	29.96 (33.13)	37.32 (37.63)	33.64 (35.44)
4.	Jhadol	Local	1.6	35.52 (36.57)	49.12 (44.49)	42.32 (40.58)
5.	Jhallara	Local	1.2	21.93 (27.80)	29.50 (32.84)	25.72 (30.39)
6.	Mavli	Local	0.8	29.96 (33.15)	44.63 (41.90)	37.29 (37.63)
7.	RCA	Local	2.0	42.24 (40.52)	51.25 (45.72)	46.74 (43.13)
8.	Gogunda	Local	1.4	27.27 (31.38)	39.97 (39.19)	33.62 (35.42)
9.	Kali bheet	Local	1.0	23.46 (28.89)	30.75 (33.64)	27.11 (31.36)
10.	Bhatewar	Local	1.7	25.08 (29.99)	33.68 (35.44)	29.38 (32.81)
SEm±				1.53	1.46	0.503
CD at 5%				4.43	4.24	2.18
CV (%)				9.05	7.31	4.11

Figures in parentheses are arcsine √per cent transformed values

The PDI at flowering and pod formation stage was recorded to be 34.53 and 42.99 per cent for Kotra and 29.96 and 44.63 per cent for Mavli. Likewise, no significant difference was observed between Sarada and Gogunda with respect to mean PDI which was observed as 33.64 and 33.62 per cent. In Sarada, the PDI at flowering stage was 29.96 and PDI at pod formation stage was 37.32 per cent, while in Gogunda, the PDI at flowering stage was 27.27 and PDI at pod formation stage was 39.97 per cent. The mean PDI of 29.38 was observed in Bhatewar where PDI at flowering stage was 25.08 per cent which increased to 33.68 at pod formation stage. Following the order Kalibheet recorded mean PDI of 27.11 with 23.46 PDI at flowering stage and 30.75 PDI at pod formation stage. Lowest mean PDI of 25.72 was observed in Jhallara

and here the PDI at flowering and pod formation stage was 21.93 and 29.50 per cent. However, it was found at par with Kali bheet. In a survey study, Srivastav (2008) observed 11.7 to 28.76 per cent intensity of leaf spot disease in different mungbean varieties. Similarly, Maheshwari *et al.* (2011) recorded disease intensity of *Alternaria* leaf spot with a range of 6.5 to 57.9 per cent in different mungbean accessions. Variations in severity of *Alternaria* leaf spot disease could be due to variability in the pathogen.

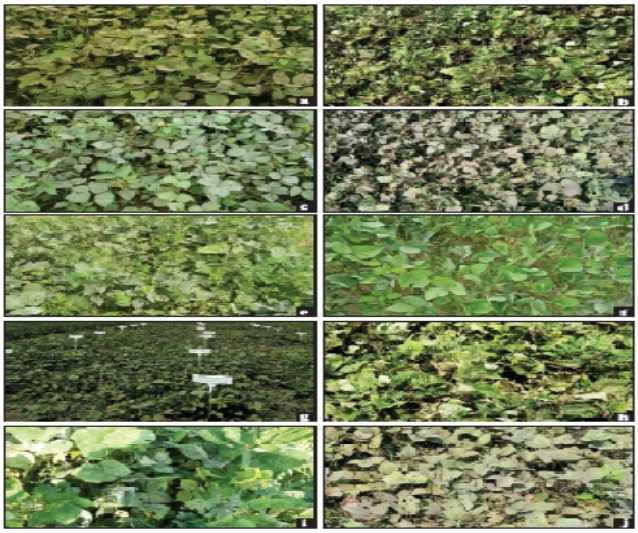
In the subsequent year *kharif* 2018, the intensity of *Alternaria* leaf spot disease was lower (Table 3).

Table 3: Distribution and Intensity of *Alternaria* leaf spot disease of greengram in major growing areas of Udaipur district during *Kharif* 2018.

Sr. No.	Village name	Host variety	Area (ha)	Per cent Disease Index* (PDI)		Mean
				Flowering stage	Pod formation stage	
1.	Sisarma	Local	2.8	37.57 (37.79)	49.74 (44.85)	43.65 (41.35)
2.	Kotra	Local	1.9	30.66 (33.54)	40.88 (39.72)	35.77 (36.72)
3.	Sarada	Local	1.3	32.88 (34.94)	36.97 (37.41)	34.92 (36.21)
4.	Jhadol	Local	2.1	36.55 (37.17)	42.29 (40.55)	39.42 (38.88)
5.	Jhallara	Local	1.5	19.83 (26.40)	27.00 (31.25)	23.41 (28.91)
6.	Mavli	Local	1.2	27.45 (31.56)	39.59 (38.94)	33.52 (35.37)
7.	RCA	Local	2.5	39.11 (38.70)	50.60 (45.34)	44.85 (42.04)
8.	Gogunda	Local	0.8	23.62 (29.02)	33.34 (35.24)	28.48 (32.25)
9.	Kali bheet	Local	1.3	21.54 (27.60)	30.75 (33.64)	26.14 (30.72)
10.	Bhatewar	Local	1.5	25.18 (30.04)	35.38 (36.46)	30.28 (33.36)
SEm±				1.36	1.51	0.88
CD at 5%				3.95	4.40	2.56
CV (%)				8.33	7.91	4.97

Figures in parentheses are arcsine √per cent transformed values

At RCA experimental field, the mean PDI was maximum (44.85 per cent) which was found at par with Sisarma, where the mean PDI was noted to be 43.65 per cent. The PDI at flowering and pod formation stages also showed non-significant differences with each other and recorded 39.11 and 50.60 for RCA experimental field and 37.57 and 49.74 per cent for Sisarma. It was followed by Jhadol where the mean PDI score was 39.42 per cent with 36.55 PDI at flowering stage and 42.29 PDI at pod formation stage. No significant difference was observed in disease severity at Kotra, Sarada and Mavli villages with respect to *Alternaria* leaf spot disease intensity and here, the PDI at flowering and pod formation stages was registered as 30.66 and 40.88 per cent in Kotra, 32.88 and 36.97 per cent in Sarada and 27.45 and 39.59 per cent in Mavli. Consequently, the mean PDI was observed to be 35.77, 34.92 and 33.52 per cent for these villages. In Bhatewar village, the mean disease intensity was 30.28 per cent with 25.18 PDI at flowering stage, which was ascended to 35.38 per cent at pod formation stage. Following the order, 28.48 per cent mean disease severity was noticed in Gogunda village where 23.62 and 33.34 PDI was recorded at flowering and pod formation stages. Further, in Kali bheet village, the mean PDI was reported as 26.14 with 21.54 PDI at flowering stage which moved up to 30.75 per cent at pod formation stage. It was found that disease severity in latter three villages did not differ significantly. Among the surveyed area, the least mean PDI of 23.41 per cent was noted in Jhallara village showing 19.83 PDI at flowering stage and 27.00 PDI at pod formation stage.



(a) Sisarma (b) Kotra (c) Sarada (d) Jhadol (e) Jhallara (f) Mavli (g) RCA (h) Gogunda (i) Kalibheet (j) Bhatewar

Plate 1: Survey and Surveillance for incidence of *Alternaria* leaf spot of greengram on farmer's field around Udaipur region.

Considering the importance of disease-causing pathogen, several authors have also studied the disease severity of *Alternaria* in many crops. Balai *et al.* (2013) found the disease intensity of *Alternaria* in pigeon pea crop in different areas from 16.93 to 38.59 per cent in Uttar Pradesh and 15.12 to 38.86 per cent in Bihar. Similarly, Bhatt *et al.* (2013) observed 19.2 to 28.80 per cent disease intensity of *A. alternata* in gerbera at Kashmir valley. Shamala and Janardhana (2015) recorded 54.57 PDI of *A. alternata* in chrysanthemum in the Southern regions of Karnataka. While Raina *et al.* (2018) noted 9.77 to 38.68 disease intensity of *Alternaria* leaf spot of Brinjal in Kashmir.

FUTURE SCOPE

The research findings on variability are helpful to know the new biotype in pathogen population that will be useful in screening of breeding lines/ varieties for disease resistance. As such correct and accurate identification will lead to more effective disease control and management, e.g., selecting appropriate organic fungicides or long lasting resistant cultivars.

Acknowledgement. The present work is the part of Ph.D. (Plant Pathology) thesis. Hence, the authors are thankful to the Head, Department of Plant Pathology, RCA, MPUAT, Udaipur, for kind support and for facilitating required needs as well as rendering moral support during the entire research work.

Conflict of Interest. None.

REFERENCES

Anonymous. (2018). Area, production and productivity of major pulses. http: // agropedia. iitk. ac. In /?q=content/area-production-and productivity -major-pulses. Accessed 24/9/2019.

Balai, L. P., Singh, R. B. and Yadav S. M. (2013). Survey for the disease status of *Alternaria* blight of pigeonpea in eastern part of Uttar Pradesh and adjoining districts of western Bihar. *The Bioscan*, *8*(1): 63-66.

Bhatt, H. A., Ahmad, K., Ahanger, R. A., Quazi, N. A., Daar, N. A. and Ganie, S. A. (2013). Status and symptomology of *Alternaria* leaf blight (*Alternaria alternata*) of Gerbera (*Gerbera jamesonii*) in Kashmir Valley. *African Journal of Agricultural Research*, 8(9): 819-823.

Conn, K. L. and Tewari, J. P. (1990). Survey of *Alternaria* black spot and *Sclerotinia* stem rot in Central Alberta in 1989. *Canadian Journal of Plant Disease Survey*, *70*: 66-67.

John, M. P. (1991). The mung bean. *Oxford and IBH publications*, New Delhi (India).

Kumar, S., and Kumar, R. (2014). Genetic improvement of mungbean for yield, nutrition and resistance to stresses-A review. *Int. J. Trop. Agril*., *32*(3-4): 683–687.

Maheshwari, S. K., Bhat, N. A., Ahmad, S., Shukla, A. K. and Singh, D. (2011). Screening of mungbean accessions against *Alternaria* leaf spot under Kashmir conditions. *Annals of Plant Protection Sciences*, *9*(1): 246-248.

Raina, Z. K., Rather, R. A., Bhat, S. A., Wani, T. A., Bhat, N. A. and Dorjey, S. (2018). Severity of *Alternaria* Leaf Spot of Brinjal caused by *Alternaria alternata* in Kashmir, India. *International Journal of Current Microbiology and Applied Sciences*, *7*(5): 1339-1347.

Selvi, R., Muthiah, A. R., and Manivannan, N. (2006). Tagging of RAPD marker for MYMV resistance in mungbean (*Vigna radiata* (L.) Wilczek). *Asian J. Plant Sci., 5*, 277–280.

Shamala, G. and Janardhana, G. R. (2015). Prevalence and Severity of Leaf Blight Disease of *Chrysanthemum* in Southern regions of Karnataka and *in- vitro* Fungicidal Effect on *Alternaria alternata. International Journal of Life Sciences*, *9*(3): 38–45.

Sharma, P. N., Sharma, O. P., Padder B. A. and Kapil, R. (2008). Yield loss assessment in common bean due to anthracnose *Colletotrichum lindemuthianum* under sub temperate conditions of North- western in Himalayas. *Indian Phytopathology*, *61*: 323-330.

Singh, D. P. (1995). Breeding for resistance to diseases in pulse crops. In : B. Sharma (Ed.) *Genetic Research and Education : Current Trends and Fifty Years*, pp. 339-420, Indian Society of Genetics and Plant Breeding, New Delhi.

Srivastava, P. K. (2008). Incidence, Development and Integrated Management of a Virulent Foliar Spot Disease of Mungbean. Ph.D. Thesis, D.A.V. College, C.S.J.M. University, Kanpur.

Vairam, N., Lavanya, S. A., Muthamilan, M., and Vanniarajan, C. (2016). Screening of M3 mutants for yellow vein mosaic virus resistance in greengram [*Vigna radiata* (L.) wilczek]. *Int. J. Plant Sci., 11*(2): 265–269.

How to cite this article: Neeraj Kumar Meena, Amit Trivedi, Mahendra Kumar Meena, Suresh Chand Meena and Suresh Kumar (2022). Survey and Surveillance of Major Greengram(*Vigna radiata* L.) Growing Areas Around Udaipur Region to Observe Occurrence and Severity of *Alternaria* Leaf Spot. *Biological Forum – An International Journal*, *14*(1): 879-882.