Survey of Web Blight of Mungbean [*Vigna radiata* (L.) Wilczek.] Caused by *Rhizoctonia solani* Kuhn in major growing district of Rajasthan

Abstract

Web blight of mungbean caused by *Rhizoctoniasolani* Kühn is able to cause the disease through both soil-borne and air-borne modes of infection. Random survey was conducted during the kharif season at 2022 to study the intensity of web blight in mungbean growing areas of Rajasthan *i.e.*Jaipur, Ajmer, Nagaur, Sikar and Tonk. Disease intensity ranged from 16.39% to 31.04%. An average disease intensity of 23.57 per cent was recorded in these surveyed districts. The maximum intensity of web blight disease was recorded in Ajmer District *i.e.*31.04%, while minimum intensity was recorded in Jaipur District*i.e.*16.39%.

Keyword: Survey, Web Blight, *Rhizoctonia*, Disease, Intensity

Introduction

India's vegetarian population has found that pulses are an excellent source of proteins, minerals, and vitamins. Pulses in India are known as 'Poor man's meat' and 'Richman's vegetable' due to their significant contribution to the population's nutritional security. Among pulses mungbean [*Vigna radiate* (L.) Wilczek] which was originated in South and South East Asia and belonging to the family leguminosae (Wilczek, 1954) (now Fabaceae), is one of the most important pulse crops of the country. It is grown in kharif, spring and summer seasons. Mungbean also referred as green gram, moong, mung, golden gram or sona is mainly grown for its highly proteinacious and easily digestible seeds that are used for human consumption. It is consumed as whole grains as *dal*, *halwa* or sprouts as a fresh salad vegetable and for value addition, dehusked and split, cooked, fermented, ground into flour, milled, fried in fat and as snacks. In India, Mungbean is cultivated on 48.52 lakh hectares, production 26.48 lakh tons of grains and average productivity of mungbean in India is 546 kg/ha^{-1}. It is mainly grown in Rajasthan, Madhya Pradesh, Maharashtra, Karnataka, Bihar, Gujarat, Andhra Pradesh, Orissa, Tamil Nadu and Uttar Pradesh (Anonymous, 2021-22). In Rajasthan it is cultivated on 23.25 lakh hectares with production of 11.16 lakh tons and average productivity of mungbean in Rajasthan is 480 kg/ha.). In warm and humid tropic zones of the world, web blight of mungbean is one of the major serious constraints in its production.

Web blight of mungbean caused by *R. solani* Kühn is able to cause the disease through both soil-borne and air-borne modes of infection. The fungus infects all above ground parts of the plants *i.e.* leaves, petioles, stem and pod but is most destructive on foliage during the second to third week of plant growth causing seedling mortality. If infection occurs in the collar region, a reddish brown lesion in the cortex of hypocotyle at or below the soil level develops. The seedling is killed when the lesions on the hypocotyle; girdle the stem after they coalesce or enlarge in size. On the foliage of mungbean (Dwivedi and Saksena, 1974; Wang and Yang, 1976), the symptoms start with the development of small, irregular, water soaked greenish pale spots with a damp appearance on any portion of leaf and stem. The spot turns dark brown, the leaflets shrivel and dry up. During the period of high humidity, the disease spreads very quickly. In the beginning, the infection only occurs on the basal parts, including the petiole of the lower leaf, from which it extends upwards. The spot increases in size very rapidly covering greater parts of the leaf blade and stem; this is a very conspicuous and destructive phase of the disease. The colour, spider-web-like mycelium and white microsclerotia develop in abundance on the affected plant parts. The sclerotia later turn

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brown to chestnut brown in color within 2-3 days of their development. All the above ground parts including pods are attacked (Saikia, 1976). Purpose/objectives of the study??

Materials and Method

Survey and status of web blight of mungbean

The disease survey was conducted during the kharif season at 2022, for the intensity study of web blight in mung-bean growing ~~5~~five districts (*i.e.* Jaipur, Ajmer, Nagaur, Sikar and Tonk districts) of Rajasthan. During the survey, web blight infected mung–bean plants were observed at pod formation stage of the crop. Survey was carried out in two tehsil under each district was surveyed. Each tehsil two villages was selected and under each village one farmer's field.

The disease intensity was recorded as per 1-9 rating scale given by Stonehouse (1994) (Table .1 and plate-3). Randomly selected ten plants from each field were rated as per following description and per cent disease intensity (PDI) on foliage was calculated using the formula of McKinney (1923).

$$\text{PDI (\%)} = \frac{\text{Sum of all numerical rating}}{\text{Total number of leaves examined x Maximum grade}} \times 100$$

Table 1: Web blight disease rating scale on mungbean

S. No.	Disease rating/grading	Description	Disease Reaction
1.	1-2	No lesions on the leaves	Highly resistant (HR)
2.	3-4	1-25% area covered by lesions	Moderately resistant (MR)
3.	5-6	25.1- 50.00% area covered by lesions	Moderately susceptible (MS)
4.	7-8	50.1-75.00% area covered by lesions	Susceptible(S)
5.	9	75.1-100% area covered by lesions	Highly Susceptible (HS)

1-2

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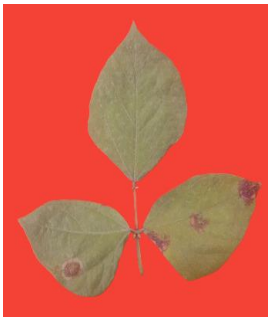

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Plate: 1 Web blight disease rating scale on mungbean

Result

~~A survey was conducted in major mungbean growing regions of Rajasthan during *Kharif* season of 2022 which showed that web blight caused by *R. solani* is a fundamental obsessive issue for the major part of areas of Jaipur, Ajmer, Nagaur, Sikar, and Tonk districts~~. An average disease intensity of 23.57 per cent was recorded in these surveyed districts. The higher disease frequency (31.04%) was assessed in Ajmer while least in Jaipur location (16.39%). The neighbourhood assortments were viewed as more defenceless to the disease of *R. solani* connected with overhauled assortments. The most extreme disease frequency was seen in plants at a flowering and podding stage in July and August. The severity of the disease was highest in the Ajmer region which ranged from 25.44 to 37.46% with an average of 31.04 % followed by Nagaur, Tonk, Sikar and Jaipur district. Information on the predominance of web blight of mungbean summed up (Table 2, Fig.1 and Plate 1).

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Table 2(a): Per cent disease intensity web blight of mungbean incited by *R. solani* in different regions of Rajasthan

Districts	Tehsils	Villages	No. of fields	PDI in surveyed field and sample No.	Avg. disease intensity (Tehsil)	Soil type	Avg. disease intensity (Districts)
Jaipur	Phaghi	Mohanpura	1	27.75(1)	25.71	Sandy loam	16.39
		Nimera	1	23.66(2)			
	Dudu	Gidani	1	5.82(3)	7.08	Sandy loam	
		Mangalwada	1	8.33(4)			
Ajmer	Kishangarh	Lamba	1	37.46(5)	34.81	Loamy soil	31.04
		Dang	1	32.15(6)			
	kekri	Meoda Kalan	1	25.44(7)	27.27	Loamy soil	
		Kekri	1	29.10(8)			
Nagaur	Nava	Mundghasoi	1	25.76(9)	23.79	Clay loam	26.92
		Panchota	1	21.82(10)			
	Riyabari	Morikalan	1	31.22(11)	30.05	Clay loam	
		Bherunda	1	28.88(12)			
Tonk	Malpura	Nagar	1	30.22(13)	28.86	Clay loam	24.48
		Pachewar	1	27.50(14)			
	Deoli	Deoli	1	10.75(15)	20.10	Clay loam	
		Dooni	1	29.44(16)			
Sikar	Srimadhopur	Arniya	1	26.22(17)	27.20	Sandy loam	19.00
		Mau	1	28.17(18)			
	Khandela	Shyamgarh	1	9.95(19)	10.81	Sandy loam	
		Barsinghpura	1	11.67(20)			
Overall Mean							23.57

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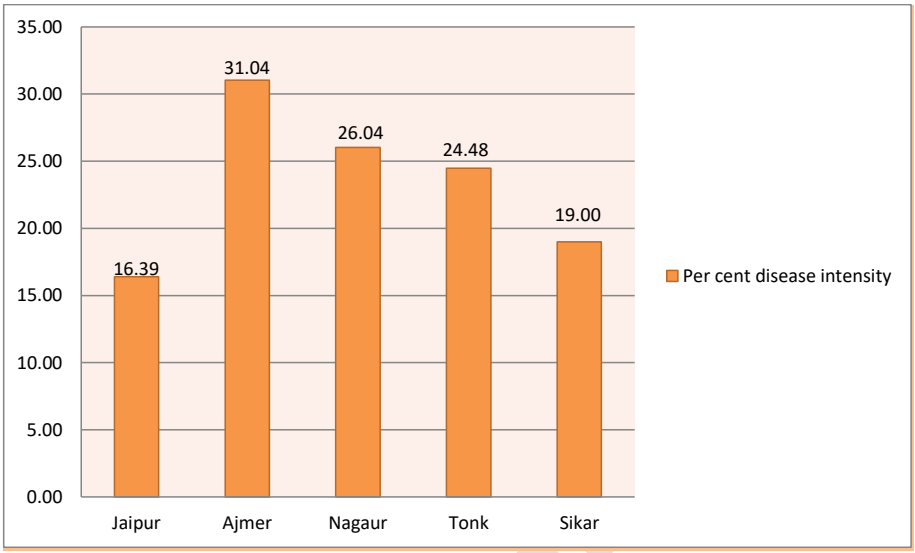
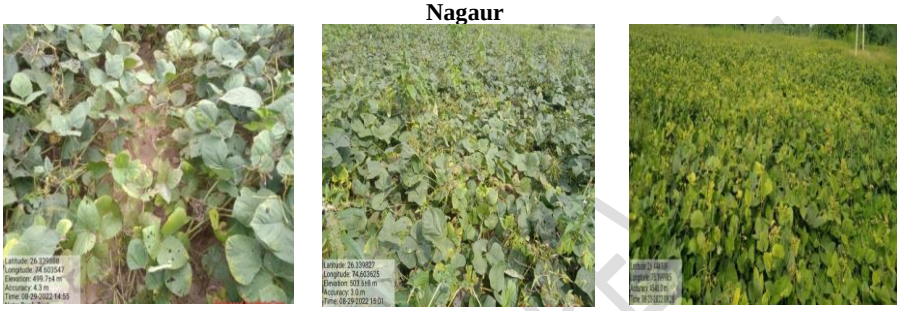


Fig 1: Per cent disease intensity of web blight of mungbean in major mungbean growing districts of Rajasthan

Jaipur

Ajmer

Nagaur



Tonk

Plate 2: Field survey

Sikar

Plate 3: Field survey

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DISCUSSION

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Different diseases affect and damage the mungbean crop in the field and huge loss in caused by the pathogen, especially during *kharif* season. Among these, web blight is a major disease of mungbean in Rajasthan incited by *R. solani*, causes significant damage to the crop every year and sometimes becomes more severe. For effective disease management, information on the occurrence and distribution of *Rhizoctonia solani* is crucial and imperative.

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~~During *Kharif* season 2022, an extensive survey was conducted to determine the prevalence and intensity of web blight of mungbean in five major mungbean growing districts (Jaipur, Nagaur, Ajmer, Tonk and Sikar) of Rajasthan.~~ The results of present study showed that disease intensity varied from severe to moderate in all surveyed districts. The web blight disease was noticed in almost entire mungbean growing fields of surveyed region. The overall average disease intensity (23.57%) of web blight was recorded in five surveyed districts of Rajasthan. The highest average disease intensity of web blight was observed in the Ajmer (31.04%) district followed by Nagaur (26.92%), Tonk (24.48%), Sikar (19.00%) and minimum in Jaipur (16.39%) district.

The disease intensity also varied among the tehsil and followed the sequence of decreasing order as Kishangarh (34.81%) >Riyabari (30.05%)>Malpura (28.86%) >Kekri(27.27%) >Srimadhopur (27.20%) >Phagi (25.71%) >Nava (23.79%) >Deoli (20.10%)>Khandela (10.81%)>Dudu (7.08%).

Our results are in accordance with the findings of Jhamaria and Sharma (2002) studied that web blight induced by *Rhizoctonia solani* Khun (*Thanatephoruscucumeris*), is a common and wide spread disease on mungbean. They further reported that intensity of disease varied from 17-90 per cent in India and 30-40 per cent in Rajasthan. Singh *et al.* 2003 also reported that status of web blight of mungbean in eastern Uttar Pradesh was 1.0 to 69.0 per cent with an average of 12.7 per cent. Singh *et al*. (2012) and Gupta *et al*. (2010) have also conducted survey and reported that web blight disease at different level of disease severity and in different variety reduced 33 to 40 per cent grain yield and 28.6 percent in 1000 grain weight of mungbean in eastern parts of UP. Since then web blight disease of mungbean has become one of the most serious problems in Northern India causing extensive damage. Similarly, Singh *et al. (*2020) have also conducted survey on 46 farmer's fields of Sarethi, Chhavari, Mankesher and Barmani Villages in Sidhi District of Madhya Pradesh during 2016-2019. The average web blight intensity ranged from 15.6 to 51.25 % in different surveyed mungbean producing areas. Similarly, findings of Rawate *et al.* (2022) conducted a

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random survey during the *kharif* season in 2020-21 to study the incidence of web blight in mungbean growing areas of Chhattisgarh, including Raipur, Balod, Kanker, Narayanpur, and Rajnandgaon. They found that the disease incidence ranged from 15.5% to 78.85%. The highest incidence was recorded in Raipur District at 78.85%, while the lowest was recorded in Narayanpur District at 15.5%. This suggests that web blight was a significant concern in mungbean cultivation in these areas, with varying levels of severity across districts.

Conclusion

Reference

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