



Survey for the powdery mildew of black gram [*Vigna mungo* (L.) Hepper] in parts of Northern Karnataka, India.

Channaveeresh T.S. and Shripad Kulkarni²¹Department of Plant Pathology, University of Agricultural Sciences, Dharwad- 580 005, India.²Department of Plant Pathology, Institute of Organic Farming, University of Agricultural Sciences, Dharwad, India.

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Abstract: Powdery mildew caused by *Erysiphe polygoni* DC is one of the major constraints in the production of black gram, which lead to a potential decrease in yield (40-90%). In order to know the severity of black gram powdery mildew, the roving survey was carried out to know the severity of the disease in five districts of northern Karnataka *viz.*, Belgaum, Dharwad, Gadag, Haveri and Uttara Kannada districts during *Kharif* and *Rabi* season of 2012-13. Maximum mean per cent disease severity (PDI) was observed in Belgaum district (68.72%) followed by Dharwad district (59.73%), Haveri district (52.10%) and Uttara Kannada district (44.59%). Whereas, minimum per cent disease severity (PDI) was noticed in Gadag district (20.23%).

Key words: Powdery mildew; *Erysiphe polygoni*; Survey and black gram.

Introduction

Black gram [*Vigna mungo* (L.) Hepper] is one of the most important pulse crops of Fabaceae. It is an ancient and well-known leguminous crop of Asia, due to its nutritional quality and the suitability to cropping system. Known as “poor man’s meat”, it constitutes a major source of dietary protein of the large section of the vegetarian population of the world. The lower productivity of black gram is mainly attributed to low genetic yield potentiality, indeterminate growth habit, canopy architecture, low partitioning efficiency, cultivation in marginal land and due to biotic and abiotic stresses. Among biotic stresses powdery mildew, cercospora leaf spot, anthracnose and mungbean yellow mosaic virus (MYMV) are the major diseases of black gram. The powdery mildew is particularly severe in late sown *kharif* crop and under favourable conditions, it occurs throughout the year.

Powdery mildew has long been known as an important disease of plants in all parts of the world. Linnaeus (1767) established a genus *Erysiphe*. De Condolle (1802) described many species of the genus. The disease noticed generally on all aerial parts of the plants. Powdery mildew caused by *Erysiphe polygoni* DC is one of the major constraints in the production of black gram, which cause both qualitative and quantitative loss of grains. However, disease intensity depends upon the cultivar, growing period and environmental conditions. The disease has world-wide importance, occurring wherever it is grown, particularly in the Indian sub-continent and southeast-Asian countries (Butler, 1918). Survey of the disease over a period of time gives the intensity with which it affects the yield and quality. Since

the information on the severity of powdery mildew of black gram is inadequate, there is a need to have a survey on the severity and status of the disease in black gram growing areas of Northern Karnataka. Hence, an attempt was made to assess the severity of powdery mildew in black gram growing areas of Northern Karnataka.

Materials and Methods

The roving survey was carried out in Northern Karnataka districts *viz.*, Haveri, Belgaum, Gadag, Uttar Kannada and Dharwad districts during *Kharif* and *Rabi* season 2012-13. The black gram fields on the survey route were visited and the observations on powdery mildew severity, stage of the crop, variety and other details were recorded. Powdery mildew severity was recorded by following 0 to 5 scales of Gawande and Patil (2003).

Grade	Leaf area infection (%)	Reaction
0	No infection	Highly resistant
1	0.1-10.0%	Resistant
2	10.1-25.0%	Moderately resistant
3	25.1-50%	Moderately susceptible
4	50.1-75%	Susceptible
5	75.7-100%	Highly susceptible

The recorded grade values were converted into Percent Disease Index (PDI) by using following formula proposed by Wheeler (1969).

$$\text{Percent disease index} = \frac{\text{Sum of the individual disease ratings}}{\text{No. of leaves observed} \times \text{Maximum disease grade}} \times 100$$

*Corresponding Author:

Dr. Shripad Kulkarni,
Department of Plant Pathology,
University of Agricultural Sciences,
Dharwad- 580 005, India.

E-mail: shripadkulkarni@rocketmail.com



Result

Survey for powdery mildew of black gram was carried out in five districts of Northern Karnataka during 2012-13 in late *kharif*, *rabi* and summer seasons to find out

incidence and severity of the disease as explained in the “Materials and Methods” and the village wise disease severity has been presented in Table 1.

Table 1: Survey for powdery mildew of black gram in parts of Northern Karnataka during 2012-13

District	Taluka	Village	Soil type	Season	Stage of the crop	Irrigated/ Rainfed	PDI	Taluka mean	District mean
Belgaum	Bailahongal	Belvadi	Black	<i>Kharif</i>	Pod formation	I	72.68	73.13	68.72
		Chikkabagevadi	Black	<i>Kharif</i>	Pod formation	I	71.34		
		Doddavada	Black	<i>Kharif</i>	Pod formation	R	69.16		
		Govinkoppa	Black	<i>Kharif</i>	Pod formation	I	74.56		
		Nayanagar	Black	<i>Kharif</i>	Flowering	I	76.19		
		Sampgoa	Black	<i>Kharif</i>	Pod formation	I	74.88		
	Savadatti	Asundi	Black	<i>Kharif</i>	Pod formation	R	67.83	64.32	
		Karikatti	Black	<i>Kharif</i>	Pod formation	R	59.15		
		Shingarkoppa	Black	<i>Kharif</i>	Pod formation	R	63.87		
		Sutagatti	Black	<i>Kharif</i>	Pod formation	R	66.46		
		Amminabhavi	Black	<i>Kharif</i>	Pod formation	R	64.87		
		Marewada	Black	<i>Kharif</i>	Pod formation	R	66.74		
Dharwad	Dharwad	Mugud	Black	<i>Kharif</i>	Pod formation	R	71.13	65.48	
		Karadigudda	Black	<i>Kharif</i>	Pod formation	R	56.34		
		Timmapur	Black	<i>Kharif</i>	Pod formation	R	68.35		
	Kalaghatagi	Bammigatti	Laterite	Late <i>Kharif</i>	Flowering	R	34.56	59.73	
		Kalaghatagi	Laterite	Late <i>Kharif</i>	Pod formation	I	65.10		
Gadag	Gadag	Sangatikoppa	Laterite	Late <i>Kharif</i>	Pod formation	I	62.30	13.29	
		Harlapur	Black	Kharif	Flowering	R	11.16		
		Lakkundi	Black	Kharif	Flowering	R	13.69		
	Mundaragi	Timmapur	Black	Kharif	Flowering	R	14.72	25.14	
		Korlahalli	Mixed red and black	Kharif	Pod formation	I	28.16		
		Shingatalur	Mixed red and black	Kharif	Pod formation	I	22.13		
		Ron	Mallapura	Black	Kharif	Pod formation	R		23.14
Haveri	Ron	Ron	Black	Kharif	Pod formation	R	17.13	22.28	
		Savadi	Black	Kharif	Pod formation	R	26.58		
		Aregoppa	Laterite	Rabi	Pod formation	R	65.17		
	Hangal	Basapura	Laterite	Rabi	Pod formation	R	69.14	55.65	
		Bommanahalli	Laterite	Rabi	Flowering	R	38.91		
		Hullatti	Laterite	Rabi	Pod formation	R	68.34		
		Yalavatti	Laterite	Rabi	Flowering	R	36.73		
		Shiggaon	Andalgi	Laterite	Rabi	Flowering	I		41.37
		Badrapura	Laterite	Rabi	Flowering	R	36.46		
		Hanakanahalli	Laterite	Rabi	Pod formation	I	64.16		
Uttar Kannada	Konankeri	Laterite	Rabi	Flowering	R	38.45	48.56		
		Lakkikoppa	Laterite	Rabi	Pod formation	I		62.38	
		Belavatagi	Laterite	Rabi	Pod formation	R		47.43	
		Haliyal	Belavatagi	Laterite	Rabi	Pod formation		R	44.76
	Mundgod	Havagi	Laterite	Rabi	Pod formation	R	36.54	44.42	
		Mundawad	Laterite	Rabi	Pod formation	R	45.98		
		Murkwad	Laterite	Rabi	Pod formation	R	49.10		
		Agadi	Laterite	Rabi	Pod formation	R	48.32		
Mundgod	Choudalli	Laterite	Rabi	Pod formation	R	43.67	44.59		
	Indur	Laterite	Rabi	Pod formation	R	44.26			
	Koppa	Laterite	Rabi	Pod formation	R	39.14			
	Malavalli	Laterite	Rabi	Pod formation	R	46.74			

Maximum mean percent disease severity (PDI) was observed in Belgaum district (68.72%) followed by Dharwad district (59.73%), Haveri district (52.10%) and Uttara Kannada district (44.59%). Whereas, minimum per cent disease severity (PDI) was noticed in Gadag district (20.23%).

In Dharwad district, maximum disease severity was recorded in Dharwad taluka (Mugad, 71.13%) at pod formation stage followed by Timmapur 68.35% at pod formation stage. However, least disease severity was observed in Kalaghatagi taluk (Bammigatti, 34.56%) at flowering stage of the crop. Among the two talukas surveyed highest severity of powdery mildew was observed in Dharwad taluka (65.48%). Whereas, least disease intensity was observed in Kalaghatagi taluka (53.98%).

In Belgaum district, maximum disease severity was recorded in Nayanagar village (76.19%) of Bailhonal taluk at flowering stage and Asundi village (67.83%) of Savadati taluk at pod formation stage. Minimum severity was observed in Karikatti village (59.15%) of Savadati taluk at pod formation stage. Among the two talukas surveyed highest severity of powdery mildew was observed in Bailhonal taluka (73.13%). Whereas, least disease severity was observed in Savadatti taluka (64.32%).

A survey conducted in Gadag district revealed that maximum black gram powdery mildew severity was observed in Korlhalli village (28.16%) of Mundaragi taluka at pod formation stage of the crop followed by Savadi village (26.58%) of Ron taluka and minimum severity was in Harlapura (11.16%) of Gadag taluka at flowering stage. Among the three talukas surveyed highest severity of powdery mildew was observed in Mundargi taluka (25.14%) followed by Ron taluka (22.28). Whereas, least disease severity was observed in Gadag taluka (13.29%).

Among the two talukas surveyed in Haveri district, maximum disease severity was observed in Basapura (69.14%) of Hangal taluka at pod formation stage of the crop and minimum severity prevailed in Shiggaon taluka Badrapura, 36.46% at flowering stage of the crop. The maximum average PDI was observed in Hangal taluka (55.65%) and minimum average PDI in Shiggaon taluka (48.56%).

Among the two talukas surveyed in Uttara Kannada district, maximum disease severity was observed in Murkwad (49.10%) of Haliyal taluka at pod formation stage of the crop and minimum severity prevailed in Havagi (36.54%). In Mundgod taluka maximum disease severity observed in Agadi village (48.32%) and minimum severity observed in Kopp (39.14%) at pod formation stages. The maximum average PDI was observed in Haliyal taluka (44.76%) and minimum average PDI in Mundgod taluka (44.42%).

Discussion

The variation of disease severity in various localities is mainly attributed to the weather factors like temperature, relative humidity and distribution of rainfall, varieties used, cultural practices followed like sanitation and other management practices. The age of the crop, the cool nights and dry weather situation were more favourable for the development of powdery mildew disease (Aust and Jurgren, 1986). The survey gives information about existences of variability among the pathogen in particular agro-climatic zones and the intensity with which it affects the yield and quality. It is necessary to conduct a systematic survey of disease to understand its appearance, prevalence, distribution and extent of its spread, to identify endemic areas or hot spots.

The findings of the present study revealed that powdery mildew was noticed in all the black gram growing locations surveyed. Overall disease severity observed in northern Karnataka was 49.07% at pod formation stage. The severity of the disease was more in Belgaum district (68.72%) followed by Dharwad (59.73%), Haveri (52.10%), Uttara Kannada (44.59%) and Gadag (20.23%) districts. This may be due to the susceptibility of the local cultivar and prevailing favourable environmental conditions such as varied temperature, rainfall and dry spell experienced during the period under study. The climatic conditions like cool temperature and low relative humidity prevailed during the crop growth favoured the build-up of inoculum level. Similar observations were made by Kolte (1985) and Ashtaputre *et al.*, (2007) while working with powdery mildew of sunflower and chilli powdery mildew.

Microclimate build up due to heavy crop canopy also helped in pathogen multiplication (Hiremath, 1996). In the present investigation, the data are collected during the flowering and pod formation stage, this clearly indicated that the disease severity and developments depend on factor like location, stage of the crop, cultural practices and susceptibility of the cultivars grown. Wherever black soil was there crop growth was more and higher crop canopy leads to the formation of microclimate which resulted in a build up the inoculum.

Conclusion

The survey during 2012-13 revealed that the disease was noticed in varying intensities in five districts surveyed. The severity was more in Belgaum district (68.72%) followed by Dharwad (59.73%) and Haveri (52.10%). The disease severity was less Uttara Kannada (44.59%). Whereas, it was lowest in Gadag district (20.23%). The maximum disease severity of 76.19 per cent was observed in Nayanagar village of Bailhonal taluka, Belgaum district where in prevailing fertile black soils resulted in good growth of the crop and dry condition helped to build up the inoculum hence the disease was severe.

References

1. Ashtaputre, S., Srikant Kulkarni, Shivaprasad, M., Rao, M. S. L., Kulkarni, V. R. and Mohankumar, H. D., 2007, Survey and surveillance for the incidence of powdery mildew of chilli in Northern Karnataka. *Ann. Biol.*, 23(2): 177-183.
2. Aust, H. J. and Jurgren, H. H., 1986, Microclimate in relation to epidemics of powdery mildew. *Ann. Rev. Phytopathol.*, 29 : 144-145.
3. Butler, E. J., 1918, *Fungi and diseases in plants*. Thacker Spink and Co. Calcutta, 547.
4. De Candolle, 1802, History and Taxonomy. In : *The Powdery Mildew* Ed. Spencer, D. M., Academic Press, London, pp. 3-15.
5. Gawande, V. L and Patil, J. V., 2003, Genetics of powdery mildew (*Erysiphe polygoni* DC.) resistance in mungbean (*Vigna radiata* (L.) Wilezck). *Crop Protect.*, 22 : 567-571.
6. Hiremath, S. S., 1996, Studies on powdery mildew of Bhendi caused by *Erysiphe cichoracearum* DC. Ex. Merat. *M. Sc. (Agric.) Thesis*, Univ. of Agril. Sci, Dharwad (India).
7. Kolte. S. J., 1985, Diseases of annual edible oilseed crops III. CRC Press, Florida, pp. 9-96.
8. Linnaeus, C., 1767, History and taxonomy. In : *the powdery mildew*. Ed. Spencer, D. M. Academic Press, London, pp. 16-25.
9. Wheeler, B. E. J., 1969, *An introduction to plant disease*. John Wiley and Sons Ltd., London, 301.

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