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RESEARCH NOTE

Survey on the incidence of pigeonpea sterility mosaic disease in Northern Karnataka

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Abstract: The present investigation to study the incidence of sterility mosaic disease in major pigeonpea growing areas *i.e.,* Vijayapur and Bagalkote revealed that the SMD incidence ranged from 15.35 per cent to 28.24 per cent in both the districts. Among them, Vijayapur recorded highest mean disease incidence of 21.60 per cent followed by Bagalkote with mean disease incidence of 20.69 per cent incidence. In Vijayapur district, the highest average per cent disease incidence of 23.21 per cent was observed in Vijayapur taluk and among villages, Vijayapur out skirts recorded highest mean disease incidence of 28.24 per cent and lowest disease incidence of 16.89 per cent was observed in Almatti village. In Bagalkote district, the highest average per cent disease incidence was observed in Jamakhandi taluk with 24.79 per cent and lowest per cent disease incidence of 17.27 per cent was recorded in Hungund taluk. Among villages, highest per cent disease incidence of 26.45 per cent was recorded in Jamakhandi and lowest per cent disease incidence of 15.35 was observed in Hiremagi village. The main reason for the outbreak of sterility mosaic disease in the above districts is may be due to extensive and continuous cultivation of the same cultivars like Gulyal local and TS-3R year after year and the epidemiological factors favouring the spread of the mites.

Key words: Incidence, Mosaic, Pigeonpea, Sterility

Pigeonpea [*Cajanuscajan* (L.) Millsp.]is the major pulse crop belonging to the family Leguminosae.In India, it is cultivated in Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, Uttar Pradesh and Tamil Nadu (Anon., 2020). Pigeonpea is infected by more than 50 pathogens, in mild to acute form. Among them, Sterility mosaic disease (SMD), Fusarium wilt and Phytophthora blight are major diseases. Among these, SMD is said to be economically more important as it causes yield losses up to 100 per cent.The SMD causal agent was lately identified as a novel *Pigeonpea Sterility Mosaic Virus* (PPSMV) (Kumar *et al.,* 2003). It is generally transmitted by an eriophyid mite (*Aceriacajani*) and was first reported in 1931 from Pusa, Bihar. The symptoms of SMD are of three kinds *i.e.,* systemic severe mosaic and complete sterility, systemic mild mosaic and partial sterility and localized chlorotic ring spots without any sterility. It is occasionally referred to as the "*Green plague*" due to excessive vegetative growth during reproductive stage. In Karnataka, the pigeonpea is grown in different climatic conditions under different cropping patterns. Therefore, it was necessary to assess the prevalence of SMD in different pigeonpea growing areasof Vijayapur and Bagalkote districts.

A random roving survey was conducted to study the extent of sterility mosaic disease incidence on different pigeonpea cultivars in major pigeonpea growing districts of northern Karnataka *i.e.,* Vijayapur and Bagalkote during 2020-21.The diagnosis of the disease in the field was based on the symptoms on the plant. In each field, five lines were randomly selected and the percentage of disease incidence was assessed by recording the number of plants showing disease symptoms out of total number of plants examined by using the formula mentioned below.

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

The other information such as, type of varieties grown, cropping system followed and type of symptoms exhibited by the crop *etc.,* were also recorded.

Results indicated that Vijayapur recorded highest mean disease incidence of 21.60 per cent followed by Bagalkote with mean disease incidence of 20.69 per cent incidence (Table 1 and 2). In Vijayapur district, the survey was conducted in two taluks. Amongst the taluks, highest average per cent disease incidence was observed in Vijayapur taluk with 23.21 per cent. In Vijayapur taluk, minimum per cent incidence of 19.56 was observed in Arakeri village and the maximum per cent incidence of 28.24 was observed in Vijayapur out skirts followed by Hitnalli with 25.32 per cent disease incidence. The average per cent disease incidence of 18.86 per cent was recorded in Basavana Bagevadi taluk. The minimum per cent disease incidence of 16.89 was observed in Almatti and the maximum per cent disease incidence of 21.50 was observed in Byakod village (Table 1 and 2).

In Bagalkote district, the survey was conducted in 5 taluks. Among them, the highest average per cent disease incidence was observed in Jamakhandi taluk with 24.79 per cent followed by Bagalkote taluk with 22.48 per cent incidence and the lowest average per cent disease incidence of 17.27 was recorded in Hungund taluk. In Bagalkote taluk, the highest incidence was observed in Bagalkote out skirts with 23.45 per cent disease incidence. In Badami taluk, highest incidence of 23.25 per cent was observed in Hoolageri village and lowest disease incidence was observed in Maninagar with 16.50 per cent. In Hungund taluk, lowest disease incidence of 15.35 per cent was observed in Hiremagi village and highest per cent disease incidence of 19.20 per cent was observed in Muradi village. In Mudhol taluk, highest and lowest per cent disease incidence of 22.32 and 17.20 per cent was observed in Shirol and Malapur villages, respectively. In Jamakhandi taluk, highest per cent incidence of 26.45 per cent was observed in Jamakhandi followed by Siddapur with 23.12 per cent incidence (Table 1 and 2). In the surveyed villages, the pigeonpea is grown majorly as sole crop. Gulyal local and TS-3R are predominantly grown varieties. The characteristic symptoms observed in the field during survey included severe to moderately mosaic symptoms, absence of reproductive structures, stunting of the plants, reduced leaf

Table 1. Survey on the incidence of pigeon pea sterility mosaic disease in northern Karnataka

District	Taluk	Village	Crop	Variety	Age of the crop	Stage of the crop	Cropping pattern	Acreage	Disease incidence (%)
Vijayapur	Vijayapur	Vijayapur	Pigeon pea	Gulyal local	110 days	Podding stage	Sole crop	1	28.24
		Hitnalli	Pigeon pea	Gulyal local	110 days	Podding stage	Sole crop	2	25.32
		Jumnal	Pigeon pea	Gulyal local	100 days	Podding stage	Sole crop	1	24.54
		Sarwad	Pigeon pea	Gulyal local	75 days	Flowering stage	Sole crop	0.5	23.40
		Arakeri	Pigeon pea	Gulyal local	110 days	Podding stage	Sole crop	0.5	19.56
		Bableshwar	Pigeon pea	Gulyal local	75 days	Flowering stage	Sole crop	0.5	25.00
	Basavana Bagewadi	Almatti	Pigeon pea	TS-3R	80 days	Flowering stage	Sole crop	1	16.89
		Byakod	Pigeon pea	Gulyal local	110 days	Podding stage	Sole crop	1	21.50
		Basavana Bagewadi	Pigeon pea	TS-3R	100 days	Podding stage	Sole crop	1.5	18.20
Bagalkote	Bagalkote	Bagalkote	Pigeon pea	Gulyal local	80 days	Flowering stage	Sole crop	1	23.45
		Simikeri	Pigeon pea	TS-3R	65 days	Vegetative stage	Sole crop	1	21.50
	Badami	Hansnoor	Pigeon pea	TS-3R	80days	Flowering stage	Sole crop	1.5	17.00
		Kutakanakeri	Pigeon pea	Gulyal local	65 days	Vegetative stage	Sole crop	1	20.12
		Maninagar	Pigeon pea	TS-3R	75 days	Flowering stage	Sole crop	1	16.50
		Kerur	Pigeon pea	Gulyal local	90 days	Flowering stage	Sole crop	2	19.27
		Hoolageri	Pigeon pea	Gulyal local	110 days	Podding stage stage	Sole crop	2.5	23.25
	Hungund	Ganjihal	Pigeon pea	TS-3R	75 days	Flowering stage	Sole crop	1	15.70
		Kamatagi	Pigeon pea	Gulyal local	65 days	Vegetative stage	Sole crop	1	17.30
		Muradi	Pigeon pea	Gulyal local	75 days	Flowering stage	Sole crop	1.5	19.20
		Muganur	Pigeon pea	TS-3R	105 days	Podding stage	Sole crop	0.5	18.82
		Hiremagi	Pigeon pea	TS-3R	100 days	Flowering stage	Mixedcrop (Pigeon pea+ Mulberry)	1	15.35
	Mudhol	Mudhol	Pigeon pea	TS-3R	90 days	Flowering stage	Sole crop	1	19.50
		Malapur	Pigeon pea	Gulyal local	100 days	Podding stage	Sole crop	1	17.20
		Shirol	Pigeon pea	Gulyal local	90 days	Flowering stage	Sole crop	1	22.32
	Jamakhandi	Jamakhandi	Pigeon pea	Gulyal local	110 days	Podding stage	Sole crop	1	26.45
		Siddapur	Pigeon pea	TS-3R	85 days	Flowering stage	Sole crop	0.5	23.12

size and excessive vegetative growth. The survey results indicated that the sterility mosaic disease incidence ranged from 15.35 per cent to 28.24 per cent in Vijayapur and Bagalkote districts.

The practices followed by the farmers like sole cropping, leaving stubbles in the field and ratooning are the main reasons for the increasing trend of the disease over years. The main reason for the outbreak of sterility mosaic disease in Vijayapur

Table 2. Average per cent incidence of sterility mosaic disease in different districts of northern Karnataka

Districts	Taluks	Average disease incidence (%) of taluk	Average disease incidence (%) of districts
Vijayapur	Vijayapur	24.34	21.60
	Basavana Bagewadi	18.86	
Bagalkote	Bagalkote	22.48	20.69
	Badami	19.23	
	Hungund	17.27	
	Mudhol	19.67	
	Jamakhandi	24.79	

and Bagalkote districts is may be due to extensive and continuous cultivation of the same cultivars like Gulyal local and TS-3R year after year and the epidemiological factors favouring the spread of the mites. The variation in the incidence of SMD from location to location may be attributed by the variety grown and climatic factors affecting the survival and multiplication of mite vectors (Saifulla and Mahesh, 2009). Pallavi *et al*. (2020) reported that the maximum disease incidence and mite population was recorded in crop grown during month of June and July where mean temperature was 24 to 26°C, RH 66 to 71 per cent and rainfall of 2.13.Sayipratap *et al.* (2020) showed that the SMD incidence in Bijapur was 12.33 per cent, while in Gulbarga and Kolar districts it was 14.71 and 19.78 per cent, respectively. The higher disease in Karnataka was attributed to the growing of susceptible cultivars like TTB-7 and local varieties.

In conclusion, Sterility mosaic disease incidence ranged from 15.35 per cent to 28.24 per cent in Vijayapur and Bagalkote districts among which Vijayapur recorded highest mean disease incidence (21.60%) followed by Bagalkote (20.69%). In Vijayapur district, the highest average per cent disease incidence was observed in Vijayapur taluk (23.21%) and the maximum per cent incidence was observed in Vijayapur out skirts (28.24%). In Bagalkote district, the highest average per cent disease incidence was observed in Jamakhandi taluk (24.79%). In Jamakhandi taluk, highest incidence was observed in Jamakhandi (26.45%) followed by Siddapur (23.12%).

References

Anonymous, 2020, Agricultural statistics at a glance, Directorate of Economics and Statistics, Ministry of Agriculture.

Kumar P L, Jones A T and Reddy D V R, 2003, A novel mite transmitted virus with a divided RNA genome closely associated with pigeon pea sterility mosaic disease. *Phytopathology,* 93:71-81.

Pallavi M S, Ramappa H K and Singh P, 2020, Pigeon pea sterility mosaic virus disease in Karnataka: Epidemological aspects, *Journal of Pharmacology and Phytochemicals*, 8(6): 893-899.

Saifulla M and Mahesh M, 2009, Status of Fusarium wilt and sterility mosaic disease in pigeon pea in southern Karnataka. *Trends in Bioscience Journal,* 2(1): 6-9.

Sayipratap B R, Pratibanda A K, Kumari P V, Jayalalitha K, Rao S V, Sharma M and Sudini H K, 2020, Prevalence of sterility mosaic disease (SMD) and variability in pigeon pea sterility mosaic virus (PPSMV) in southern India, *Indian Phytopathology,* 15: 212-236.