

Incidence of Bhendi Yellow Vein Mosaic Disease in Northern Karnataka

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Abstract An intensive rowing survey was conducted for two seasons, once during *kharif* 2014 and another during summer 2012 to know per cent disease incidence of bhendi yellow vein mosaic disease. The survey was taken up in some of bhendi growing areas of Bagalkot, Belagavi, Dharwad, Haveri and Vijayapura districts. A total of 573 fields belong to 64 villages were covered during the survey. In each field, five rows of 50 plants was randomly selected and the percent disease incidence was assessed by recording the number of plants showing disease symptoms and the total number of plants examined. The results revealed that during *kharif* of 2014, the disease incidence ranged from 1.47 to 16.67. The average highest per cent disease incidence (PDI) was noticed in Budihal (16.67) village of Bailhongal taluk followed by 14.50 in Hanjagi (Vijayapura) and 14.17 in Yarnal

(Vijayapura), while the lowest incidence (1.47%) was noticed in Muthalli village of Shiggaon taluk. During summer 2015 the result revealed that the PDI ranged from 7.67 to 30.83. The highest per cent disease incidence (PDI) was recorded in Toravi (30.83) village of Vijayapura taluk followed by 30.11 in Salotagi (Indi) and 28.42 in Tikota (Vijayapura), while the lowest incidence was recorded at Rayapura (7.67) village of Hubballi taluk.

Keywords Bhendi, Survey, Yellow vein mosaic.

Introduction

Bhendi (*Abelmoschus esculentus* L. Moench) also known as okra, lady's finger, is an important vegetable crop, widely grown in tropical and sub-tropical areas for its immature pods, that can be used in salads, soups and stews or as fried or boiled vegetable. It is most popular in India, Nigeria, Pakistan, Cameroon, Iraq and Ghana.

The bhendi crop is very susceptible to white fly (*Bemisia tabaci* Genn.) transmitted yellow vein mosaic virus (YVMV) causing heavy losses by infecting at all the stages of plant growth. In India, occurrence of this disease was first reported by Kulkarni [1] in Bombay province. In Karnataka, the disease is more serious when sowing is carried out from January to May [2]. It was revealed that the occurrence of BYVMV disease incidence ranged from 23.0 to 67.67% in Karnataka [3]. The highest disease incidence was

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Table 1. Disease incidence of BYVMV during *kharif* of 2014 and summer 2015.

Sl. No.	District	Taluk	Kharif 2014				Summer 2015								
			Village	No. of fields	Villages	Mean PDI Talukas	Districts	District	Taluk	Village	No. of fields	Villages	Mean PDI Talukas	Districts	
I. Bagalkote			Anadinni	5	11.20	8.39	Bagalkote		Anadinni	4	20.58	21.04			
			Bagalkote rural	5	13.93				Bagalkote rural	4	24.83				
			Chabbi	5	6.80				9.86	Chabbi	4			26.92	22.40
			Kaladgi	5	9.73				Kaladgi	5	22.80				
			Muranal	5	7.67				Muranal	5	16.87				
			Adagal	5	8.67				Adagal	4	25.33				
			Badami rural	5	6.00				Badami rural	4	23.58				
			Kendur	6	8.94				6.92	Kendur	5			16.60	19.68
			Kerur	4	5.50				Kerur	4	17.50				
			Nandikeshwar	6	5.50				Nandikeshwar	5	15.40				
			Bailhongal	5	2.73				Bailhongal	4	13.83				
			Bailwad	5	6.47				Bailwad	4	16.42				
			Budihal	4	16.67				8.15	Bailhongal	-			-	18.79
			Hirebhagawadi	5	8.40				Hirebhagawadi	4	28.42				
Sampangoan	5	6.47	Sampangoan	4	16.50										
Arabhavi	4	8.25	Arabhavi	2	15.67										
Lolasur	5	8.80	Lolasur	5	20.53										
II. Belagavi			Mamadapur	5	8.80	8.41	8.33	Belagavi	Gokak	Mamadapur	4	14.08	17.02	18.73	
			Shingalapur	5	4.33	Shingalapur	5	12.53							
			Tavag	5	11.87	Tavag	5	22.33							
			Alur	5	7.53	Alur	5	23.07							
			Aralikatti	5	6.33	Aralikatti	4	18.42							
			Hanchinal	5	6.53	8.43	Hukkeri	Hanchinal	4	18.67	20.39				
			Hukkeri rural	5	9.53	Hukkeri rural	5	21.40							
			Sankeshwar	5	12.27	Sankeshwar	5	20.40							
			Belur	5	6.00	Belur	3	7.89							
			Garag	5	9.00	Garag	4	13.42							
III. Dharwad			Mugad	5	4.42	Mugad	4	20.00							
			Narendra	4	5.53	6.77	Dharwad	Narendra	4	22.75	16.61				
			Navalur	8	5.58	Navalur	3	10.67							
			Thadakoda	4	7.20	6.56	Dharwad	Thadakoda	4	24.75	15.24				
			Yettinagudda	5	9.67	Yettinagudda	6	16.83							
			Gabbur	5	3.47	Gabbur	4	9.00							
			Hubballi Rayapura	7	5.90	6.36	Hubballi	Rayapura	6	7.67	13.88				
			Sattur	5	8.73	Sattur	4	23.42							
Unkal	5	7.33	Unkal	2	15.44										

Table 1. Continued.

Sl. No.	District	Taluk	Kharif 2014					Summer 2015					Districts				
			Village	No. of fields	Villages	Mean PDI Talukas	Dis-tricts	District	Taluk	Village	No. of fields	Villages		Mean PDI Talukas			
IV. Haveri	Ranebennur		Belur	5	10.80					Belur	4	19.83					
			Chalageri	5	9.20				Chalageri	5	18.13						
			Devaragudda	5	10.87				Ranebennur	Devaragudda	4	26.58	21.09				
			Halageri	5	11.33	10.11			Halageri	4	14.92						
			Kamadod	5	9.80				Kamadod	5	22.60						
			Ranebennur rural	6	8.67		7.54	Haveri	Ranebennur rural	4	24.50		18.65				
	Shiggaon			Gotagodi	5	5.60				Gotagodi	5	10.87					
				Kungapur	5	5.33				Kungapur	4	15.58					
				Muthalli	5	1.47	4.97			Shiggaon	Muthalli	5	19.13	16.22			
				Shiggaon rural	5	4.47				Shiggaon rural	5	21.73					
				Tadas	5	8.00				Tadas	4	13.83					
				Basavana bhagevadi	5	13.07				Basavana bhagevadi	4	23.67					
V. Vijayapura	Bhagevadi		Huvin hippargi	3	9.22				Basavana bhagevadi	Huvin hippargi	3	14.22	21.07				
			Ivanagi	4	7.50	10.77			Ivanagi	4	25.25		22.90				
			Nagur	5	9.87		10.47	Vijayapura	Nagur	4	21.25						
			Yarnal	4	14.17				Yarnal	4	21.00						
			Atharga	3	9.11				Indi	Atharga	3	17.					
			Indi	4	9.58				Indi	3	27.00						
	Indi			Rugi	4	10.83				Rugi	3	14.11					
				Salotagi	4	8.33				Salotagi	3	30.11					
				Tadavalga	4	13.08				Tadavalga	4	19.83					
				Arakeri	5	11.40				Arakeri	4	27.00					
				Babales-hawar	6	10.83				Babales-hawar	6	26.66					
				Nagathan	5	7.93	9.73			Vijayapura	Nagathan	3	20.89	26.14			
Vijayapura			Tikota	5	8.53				Tikota	4	28.42						
			Toravi	5	13.93				Toravi	4	30.83						
			Vijayapura	6	5.78				Vijayapura	5	23.07						
			Total	5	12	64	312	8.51	8.44	8.25	5	12	63	261	19.68	19.57	19.31

recorded in the districts of Gulbarga (75.0%) and least is in Bangalore rural (44.01%).

This drawn an attention to conduct survey on occurrence of BYVMV disease over a period of time in northern Karnataka to know the disease incidence and distribution which aids to design the appropriate management practices to curb the disease effectively.

Materials and Methods

An intensive rowing survey was conducted for two seasons, once during July–September (*kharif* 2014) and another during February–May (summer 2012) to know per cent disease incidence of bhendi yellow vein mosaic disease. The survey was taken up in some of bhendi growing areas of northern Karnataka

i.e. Bagalkot, Belagavi, Dharwad, Haveri and Vijayapura districts. In Bagalkot; Badami and Bagalkot talukas were covered, In Belagavi; Bailhongal, Gokak and Hukkeri talukas, In Dharwad; Dharwad and Hubballi talukas, whereas in Haveri; Shiggavi and Ranebennur talukas. Basavana bhagevadi, Indi and Vijayapura talukas were selected for survey in Vijayapura districts. A total of 573 fields belongs to 64 villages were covered during the survey. In each field, five rows of 50 plants was randomly selected and the percent disease incidence was assessed by recording the number of plants showing disease symptoms and the total number of plants examined by using the formula.

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

Results and Discussion

The results revealed that during *kharif* of 2014, the disease incidence ranged from 1.47 to 16.67. The average highest per cent disease incidence (PDI) was noticed in Budihal (16.67) village of Bailhongal taluk followed by 14.50 in Hanjagi (Vijayapura) and 14.17 in Yarnal (Vijayapura), while the lowest incidence (1.47%) was noticed in Muthalli village of Shiggaon taluk. Taluk wise mean incidence revealed the highest disease incidence of 10.91 in Indi taluk followed by Basavana Bhagevadi (10.77) and Ranebennur taluk whereas, the lowest PDI of 4.97 was observed in Shiggaon taluk. Comparison among the districts indicated the highest disease incidence of 10.47 PDI in Vijayapura and lowest in Dharwad (6.53 PDI) (Table 1).

During summer 2015 the result revealed that the PDI ranged from 7.67 to 30.83. The highest per cent disease incidence (PDI) was recorded in Toravi (30.83) village of Vijayapura taluk followed by 30.11 in Salotagi (Indi) and 28.42 in Tikota (Vijayapura), while the lowest incidence was recorded at Rayapura (7.67) village of Hubballi taluk. Maximum mean PDI of 26.14 was recorded in Vijayapura taluk followed by Bagalkote (22.40) and Indi (21.50) whereas lowest incidence of

13.88 PDI was observed in Hubballi taluk. Among the districts, lowest disease incidence of 15.24 was recorded in Dharwad and highest incidence was documented in Vijayapura (22.90) district (Table 1).

All the genotypes grown in different parts of surveyed area were found susceptible to bhendi yellow vein mosaic virus. It was noticed that crop infected at early stage suffered more with severe symptoms like vein clearing, veinal chlorosis, complete yellowing of leaves and minute enations on the axial side of the leaves. Fruits were also malformed and appeared bleached. Invariably whiteflies were found feeding on the bhendi in most of the field surveyed along with mites, leafhoppers and thrips in some of the field. The variation of disease incidence in different locations was attributed mainly to the prevailed environmental conditions and cultivars adapted by the farmers of that particular location.

Zulfequar and Patil [4] conducted the roving survey to assess the incidence of yellow vein mosaic virus on different okra cultivars in Karnataka. The result revealed that, maximum average per cent disease incidence was observed in Pusa Sawani in both *kharif* 2000 (15.08%) and summer 2001 (58.14%), whereas low incidence was observed in commonly cultivated variety Arka Anamika in *kharif* 2000 (0.07%) and during summer 2001 (20.47%).

The survey revealed that the occurrence of BYVMV disease incidence ranged from 23.0 to 67.67% in Karnataka. The highest disease incidence was recorded in the districts of Gulbarga (75.0%) and least is in Bangalore rural (44.01%) (3).

Similarly Prakash et al. [5] revealed that, the highest average disease incidence was recorded in Haveri district (30.04%) followed by Belgaum (26.49%) and Dharwad (25.62%) districts and least incidence was noticed in Tumkur (23.63%) district during the summer months of April–May 2009. During *kharif* of 2008, disease incidence was maximum in Haveri (7.18%) followed by Belgaum (6.48%), Dharwad (6.11%) and Tumkur (5.19%). Tsai et al. [6] were observed 50 to 100% bhendi yellow vein mosaic diseased plants in fields in Kanchanaburi and Nakhon Pathom provinces of Thailand in 2009 and 2010, respectively.

Infection of YVMV under natural field conditions depends on the environmental parameters, crop characteristics and efficient vector population. Susceptibility of cultivars encourages its incidence in the field in presence of the active vectors. Fajinmi and Fajinmi [7] survey report revealed that virus infection in okra plants at growth stages earlier than four weeks has more severe effect on the physiological performance of okra plant and subsequent reduction in growth performance and yield of okra. Therefore some effective control measure is very necessary at early growth stages of okra plant.

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