



Survey on Incidence of Bud Necrosis Disease on Watermelon in Karnataka and Andhra Pradesh

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ABSTRACT

Survey carried out in Karnataka and Andhra Pradesh revealed that the *Watermelon bud necrosis virus* (WBNV) was prevalent in different locations and causing diseases in watermelon, muskmelon, bitter gourd, ridge gourd and bottle gourd. The average incidence of watermelon bud necrosis disease in Karnataka was 34.55 ± 25.09 and 24.83 ± 17.32 per cent in consecutive years and ranging from 0 to 100 per cent. The mean PDI of watermelon bud necrosis disease in Andhra Pradesh was 25.14 ± 18.67 and ranged between 0 to 80 per cent during the summer season. Apart from these, GBNV infection was also noticed on bitter gourd, soybean, black gram and tomato. Both WBNV and GBNV were also found to cause mixed infection in bitter gourd. The occurrence of bud necrosis disease was more in summer crop sown during the months of January and February with a severe disease incidence (100%), when compared to the crops sown during *Rabi* and *Kharif* seasons.

Keywords: *Bud necrosis, Incidence, Roving survey and Watermelon*

Watermelon is one of the important summer fruit vegetable crops. In the World, watermelon is grown in an area of 3.69 million hectares with an estimated annual production of 97.43 million tonnes and an average productivity of 26.37 tonnes per hectare. Leading producers in the world are China, Turkey, Iran, Brazil, USA, Egypt, the Russian Federation and Mexico. In India, watermelon is a major crop of various river beds in Uttar Pradesh, Punjab, Haryana, Rajasthan, Bihar, Gujarat, Maharashtra, Andhra Pradesh and Karnataka. It occupies an area of about 20,000 hectares with an annual production of 2.55 lakh tonnes and productivity of 12.75 tonnes per hectare (Faostat, 2009). The main limiting factor in watermelon cultivation is low productivity due to diseases of diverse etiologies. Parasitic diseases of watermelon are those caused by fungi, bacteria, phytoplasmas, viruses, viroids, nematodes and parasitic phanerogams. Vectors of pathogens may play an integral part in the development and spread of diseases, especially viral diseases and bacterial wilt. Among the diseases affecting watermelon, those caused by viruses are difficult to control and can be

very destructive. Their incidence and severity may vary, depending on the complex relationship among the pathogen, host, vector and the environment in the locality where they occur. It is important to identify the causal agents of viral diseases and, when possible, adopt strategies to minimize their impact on the yield and quality of watermelon crops. In India, tospoviruses are emerging as serious pathogens and affecting the cultivation of a variety of crops. In Andhra Pradesh, *Groundnut bud necrosis virus* (Sarath Babu *et al.*, 2020 and Tejaswini *et al.*, 2022) and *Watermelon bud necrosis virus* (Singh and Krishnareddy, 1996) were cautioning as an emerging pathogen causing significant yield reduction. In Karnataka, WBNV has already become a severe problem on watermelon, resulting in huge yield losses ranging from 60 to 100 per cent (Krishnareddy and Singh, 1993) and up to 100 per cent (Krupasanker, 1998) depending upon the time of sowing and variety/hybrid.

MATERIAL AND METHODS

A roving survey was undertaken to study the per cent incidence of bud necrosis virus (*Watermelon*

bud necrosis virus) disease in major watermelon growing areas of Karnataka during the two consecutive years and in Andhra Pradesh during summer. The survey was conducted in Mysore and Bangalore divisions during the late *rabi* season, Gulbarga and Belgaum divisions, and during summer season, corresponding to a crop stage of 75-85 DAS. In these divisions, five to ten villages based on normal cropped areas were selected district wise. Three to five plots were selected from each village and in each plot five rows were selected at random by leaving three border rows for recording watermelon bud necrosis disease incidence along with details of cultivar. The disease was diagnosed in the field based on symptoms exhibited on plants. The per cent disease incidence was calculated by using the following formula.

Per cent disease incidence (PDI) =

$$\frac{\text{Number of plants infected}}{\text{Total number of plants observed}} \times 100$$

RESULTS AND DISCUSSION

Surveys carried out during consecutive years revealed that the average incidence of watermelon bud necrosis disease in Karnataka state was 34.55 ± 25.09 and 24.83 ± 17.32 per cent, respectively (Tables 1 & 2). The mean incidence percentage of watermelon bud necrosis disease in Andhra Pradesh was 25.14 ± 18.67 and ranged between 0–80 during the summer season (March-April) (Table 3). The incidence of watermelon bud necrosis disease was more severe in 1st year compared to 2nd year. The disease incidence on watermelon ranged from 0 to 100 per cent in various parts of Karnataka during both years and more than 90 per cent incidence was observed in Belgaum, Bellary, Kolar, Dharwad and Uttar Kannada districts. In Andhra Pradesh, the highest disease incidence was observed in Chittoor district (80%) and the overall incidence was less as compared to Karnataka. All the varieties or hybrids grown in the surveyed region were found to be susceptible to the virus. During the surveys, watermelon bud necrosis disease was observed endemically in the predominant watermelon growing regions of Karnataka and Andhra Pradesh. Belgaum, Bellary, Kolar, Dharwad, Uttar Kannada and

Bangalore rural districts of Karnataka were identified as hot spots for the WBNV, causing frequent disease outbreaks.

Surveys conducted in the watermelon growing areas of Karnataka state revealed that the incidence of the disease varied from 20-100 per cent depending upon the time of infection and varieties/hybrids grown (Singh and Krishnareddy, 1995). The overall incidence of bud necrosis virus disease in Bangalore, Kolar, Chitradurga and Mandya districts of Karnataka ranged between 0.7 to 10 per cent up to 30 - 45 DAS and later increased to 10 to 100 per cent up to 60-100 DAS (Krupashankar, 1998). The incidence of bud necrosis in watermelon ranged from 0 to 40 per cent in Maharashtra in 2004 and from 1 to 30 per cent in Karnataka during 2002. Out of 21 fields surveyed, 17 fields showed the incidence of bud necrosis disease in watermelon. A higher incidence up to 40 per cent was observed in Kalegoan area in the Jalna district of Maharashtra (Bhanupriya, 2006). Surveys were carried out on watermelon in Tumkur, Chitradurga, Raichur, Nellore and Pune. Incidence of WBNV ranged from 30-80% in watermelon (cv. NS 295) crop sown in July onwards at Tumkur. Similarly, in Chitradurga the crop (cv. NS 295) sown in November onwards showed WBNV incidence ranging from 50-80 per cent. In Nellore (Andhra Pradesh) low incidence of WBNV (10%) was noticed except in Venkatagiri (30-80%). In Pune incidence ranged from 40-60 per cent (Anonymous, 2007).

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Table 1. Incidence of watermelon bud necrosis disease during 1st Year in Karnataka

Place	Month of survey	Variety/ Hybrid	Incidence (%)	
			Mean and SD	Range
Gulbarga division				
Bellary (9) ^a	March-April	NS-295, Arka manik	57.11 ± 10.89	24.5 - 91
Bidar (3)	March-April	NS-295, Santhrupthi	27.2 ± 1.71	8.75 - 43.5
Koppal (6)	March-April	NS-295, Mahyco hybrid	10.71 ± 1.08	6.75-17.25
Mean			31.67±23.52	6.75-91
Mysore division				
Mysore (5)	Dec-Jan	NS-295, Madhubala	7.59 ± 1.54	0 - 15.75
Mandya (5)	Dec-Jan	NS-295, Arka manik	4.3 ± 0.99	0 - 11.50
Hassan (5)	Dec-Jan	NS-295, Arka manik	5.12 ± 1.12	0 - 12.25
Mean			5.67±1.71	0-15.75
Bangalore Division				
Bangalore rural (5)	February	NS-295,sugar baby, Arka manik	54.96 ± 8.57	12.5 - 87.5
Kolar (7)	March-April	NS-295,sugar baby, Arka manik	48.89 ± 23.66	11.5 - 92.5
Kolar (2)	Dec-Jan	NS-295, Sugar baby	1.10 ± 0.99	0.00 - 4.25
Tumkur (7)	February	NS-295, Arka manik	51.13 ± 4.01	15.00-80.0
Mean			39.02± 25.40	0.00-92.50
Belgaum Division				
Dharwad (6)	March-April	NS-295, Arka manik	67.87 ± 15.63	35 - 94.75
Belgaum (5)	March-April	NS-295, NS-1004	64.3 ± 24.39	14 - 100
Uttar Kannada (6)	March-April	NS-295, NS-1004, Kashish	63.13 ± 11.57	35 - 90
Bijapur (3)	March-April	NS-295, Mahyco hybrid	51.4 ± 6.36	31 - 69
Bagalkot (4)	Feb- March	NS-295, NS-1004	27.25 ± 10.54	Oct-52
Haveri (6)	March-April	NS-295, Madhubala	44.93 ± 19.03	Mar-75
Haveri (4)	Oct- Nov	NS-295, Mahyco hybrid	0.42 ± 0.36	0 - 3
Mean			45.62± 24.38	0-100
Mean incidence in Karnataka during 1 st year			34.55±25.09	0-100

^a number of villages surveyed

Table 2. Incidence of watermelon bud necrosis disease during 2nd year in Karnataka

Place	Month of survey	Variety/ Hybrid	Incidence (%)	
			Mean and SD	Range
Gulbarga division				
Bellary (5) ^a	March-April	NS-295, Arka manik	34.47±13.73	14 - 75.5
Bidar (3)	March-April	NS-295, Santhrupthi	11.47±2.50	2.0 - 19.0
Koppal (8)	March-April	NS-295, Mahyco hybrid	5.35±1.98	0 - 11.5
Mean			17.09±15.35	0-14
Mysore division				
Mysore (6)	Dec-Jan	NS-295, Madhubala	2.05±1.61	0 - 9.25
Mandya (7)	Dec-Jan	NS-295, Arka manik	0.97±0.51	0 - 6.5
Hasan (5)	Dec-Jan	NS-295, Arka manik	1.92±0.90	0 - 10.25
Mean			1.65±0.59	0-10.5

Bangalore Division				
Bangalore rural (6)	February	NS-295,sugar baby, Arka manik	48.74±13.65	10.75 - 75
Kolar (10)	March-April	NS-295,sugar baby, Arka manik	42.86±12.35	6.75 - 68.5
Tumkur (5)	February	Mahyco hybrid, , Arka manik	31.94±6.87	12 - 63.5
Mean			41.18± 8.53	6.75-75
Belgaum Division				
Dharwad (5)	March-April	NS-295, Arka manik	44.93±8.12	16 - 83.25
Belgaum (6)	March-April	NS-295, NS-1004	42.73±21.63	10 - 100
Uttar Kannada (5)	March-April	NS-295, NS-1004	30.09±9.81	Nov-76
Bijapur (3)	March-April	NS-295, Mahyco hybrid	31.93±11.45	15 - 51
Bagalkot (3)	March-April	NS-295, NS-1004	12.52±1.54	8.75-17.75
Haveri (6)	March-April	NS-295,Madhubala	30.6±6.05	10.5 - 49
Mean			32.13±11.55	8.75-100
Mean incidence in Karnataka during 2 nd year			24.83±17.32	0-100

^a number of villages surveyed

Table 3. Incidence of watermelon bud necrosis disease during summer season in Andhra Pradesh

Place	Month of survey	Variety/ Hybrid	Incidence (%)	
			Mean and SD	Range
Coastal Andhra				
West Godavari (5)	March-April	Apurva, Spic Hybrid, Siri seeds hybrid	6.48±0.58	0-12.5
Guntur (5)	March-April	Mahyco hybrid	11.56±4.05	Mar-21
Nellore (5)	March-April	Mahyco hybrid	13.8±15.83	Jan-60
Mean			10.61±3.75	0-60
Rayalaseema				
Chittoor (6)	March-April	Madhubala, Emerald	56.33±13.01	25-80
Kurnool (5)	March-April	Mahyco hybrid, Emerald	32.88±5.39	15-55
Mean			44.61±16.58	15-80
Telangana				
Rangareddy (5)	March-April	NS-295, Mahyco hybrid	41.36±5.48	25-64
Mahaboobnagar (5)	March-April	NS-295, Mahyco hybrid	13.56±1.49	1.5-20
Mean			27.46±19.66	1.5-64
Mean incidence in Andhra Pradesh during summer season			25.14±18.67	0-80

^a number of villages surveyed

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