

RESEARCH NOTE

Survey for the occurrence of major viral diseases of cucumber

MUTTANNA REVADI AND M. S. PATIL

Department of Plant Pathology, College of Agriculture
University of Agricultural Sciences
Dharwad - 580 005, Karnataka, India
E-mail: mutturevadi@gmail.com

(Received: November, 2016 ; Accepted: June, 2017)

Field surveys were conducted in four districts of northern Karnataka during 2014-15 to assess the distribution and frequency of viruses infecting cucumber. In the cucumber mosaic disease (CMD) infected plants, dark green mottling and mosaic were typical symptoms, whereas zucchini yellow mosaic disease (ZYMD) produced dark green islands or blisters and vein banding as diagnostic symptoms. Tomato leaf curl disease (ToLCD) infected leaf samples showed blistering, upward curling and crumpling of leaves as characteristic symptoms. During survey it was notified that, Dharwad district recorded highest mean incidence of CMD (23.94 %) and ToLCD (3.14 %) whereas, Haveri district record highest mean incidence of ZYMD (6.79 %). The mean incidences of CMD, ZYMD and ToLCD in both the seasons were 22.84, 6.20 and 2.92 per cent respectively. The highest mean incidence (%) of viral diseases were recorded at harvesting stage in black soil under irrigated condition compared to rainfed condition.

Key words: Cucumber, Mosaic, Vein banding

Cucumber (*Cucumis sativus* var. *sativus* L.) is one of the most popular and widely cultivated vegetable crops in the cucurbitaceae family with chromosome number $2n=14$.

Cucumber is the seventh most important vegetable crop of the world, grown for its edible tender fruits, preferred as salad ingredient, pickles and also as cooked vegetable. In India, Andhra Pradesh, Assam, Bihar, Jammu & Kashmir, Karnataka and Telangana states contribute more than 80 per cent of production. Karnataka ranks first in the country with a production of 1.20 million tonnes from an area of 0.079 million hectare with an average yield of 15.31 t/ha (Anon, 2015). The low production is due to several diseases most important among them is viral diseases that jeopardizing cucumber production and productivity. In the last decade CMD, ZYMD, papaya ring spot disease, watermelon mosaic disease, watermelon bud necrosis disease and ToLCD are becoming threat to cucumber. These diseases together cause yield reduction up to 80 per cent (Verma *et al.*, 2004). Therefore, it was required to conduct a systematic work on survey in northern Karnataka to know the distribution and frequency of viral disease incidences affecting cucumber.

The roving survey was conducted in major cucumber growing districts of Karnataka viz., Bagalkot, Belagavi, Dharwad and Haveri, to assess the distribution and frequency of viral diseases affecting cucumber during *kharif* 2014 and summer

2015 seasons. The survey was made to record the incidence of viral diseases. In each village, five fields were selected and in each field an area of 10 sq. mt was chosen. During survey, information on soil types, cultivation under irrigation or rainfed conditions, stage of crop and types of symptoms produced was recorded. The per cent disease incidence (PDI) was calculated by using the following formula.

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

During survey, it was noticed that CMD infected diseased plants exhibited typical symptoms viz., dark green mottling, mosaic, stunted growth and dwarfing of vines. Fruits were often misshapen, mottled (yellowish-green), dark green warty and reduced in size. ZYMD infected plants showed diagnostic symptoms viz., chlorotic spots, yellowing, mosaic, dark green islands or blisters and vein banding. Yellowing, mosaic, blistering, upward curling and crumpling of leaves were characteristic symptoms associated with ToLCD. The findings were in agreement with the studies on types of CMD, ZYMD and ToLCD symptoms observed by Johnson *et al.* (2013) and Suresh *et al.* (2013a and b).

Fourty seven villages in four districts were surveyed during *kharif*-2014 (Table 1). The highest CMD incidence of 20.65 per cent was recorded in Dharwad, whereas lowest in Bagalkot (17.92%). Similarly, Haveri recorded highest ZYMD incidence (5.16 %) whereas lowest incidence of 4.15 per cent was recorded Belagavi. Maximum incidence of ToLCD was recorded in Bagalkot (1.81 %) and lowest in Belagavi (1.22 %).

Similarly during the summer-2015, 42 villages were surveyed. The highest CMD incidence of 27.22 per cent was recorded in Dharwad, whereas lowest in Bagalkot (24.69%). The highest ZYMD incidence of 8.42 per cent was recorded in Haveri, whereas lowest in Bagalkot (7.42%). The highest ToLCD incidence of 4.76 per cent was recorded in Dharwad district, whereas lowest in Haveri (4.05%).

The highest mean CMD incidence of 23.94 per cent recorded in Dharwad and least incidence of 21.31 per cent was observed in Bagalkot. Mean incidence of ZYMD was maximum in Haveri district (6.79%) and lowest incidence was observed in Bagalkot (5.80%). Highest mean incidence of ToLCD was observed in Dharwad (3.14%) whereas, Belagavi district recorded lowest incidence of 2.70 per cent. The occurrence of all three viral diseases were more in summer season due to dry climatic conditions that favour expression of symptoms, vector multiplication and their active dispersal. Among three viral diseases, CMD showed higher incidence this could be attributed to wide host range of *Cucumber mosaic virus*. Thereby CMV inoculum is available throughout the year.

Incidence of viral diseases were observed in all the crop stages of cucumber, the highest mean incidence of CMD

Table 1. Incidence of viral diseases of cucumber during 2014-15

Districts	Disease incidence (%)								
	Kharif 2014			Summer 2015			Mean		
	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD
Bagalkot	17.92	4.18	1.81	24.69	7.42	4.10	21.31	5.80	2.96
Belagavi	18.92	4.15	1.22	26.66	7.68	4.18	22.79	5.92	2.70
Dharwad	20.65	4.74	1.51	27.22	7.87	4.76	23.94	6.31	3.14
Haveri	19.88	5.16	1.73	26.79	8.42	4.05	23.34	6.79	2.89
Mean	19.34	4.56	1.57	26.34	7.85	4.27	22.84	6.20	2.92

Table 2. Distribution of viral diseases incidence under different crop stage, soil type and irrigation condition during 2104-15

Season	Average disease incidence (%)																		
	Crop stage						Soil type						Under						
	Flowering			Harvesting			Black			Red			Irrigated			Rainfed			
	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	CMD	ZYMD	ToLCD	
Kharif 2014	17.40	4.27	1.67	20.46	4.68	1.61	19.57	4.67	1.65	17.71	4.13	1.49	19.28	4.59	1.56	19.91	4.80	2.40	
Summer 2015	23.58	8.23	4.29	26.55	7.88	4.46	26.40	8.06	4.41	22.79	7.25	4.56	26.05	7.99	4.43	-*	-	-	
Mean	20.49	6.25	2.98	23.50	6.28	3.03	22.98	6.36	3.03	20.25	5.69	3.02	22.67	6.29	2.99	19.91	4.80	2.40	

*- crop not grown

(23.50%), ZYMD (6.28 %) and ToLCD (3.03 %) was recorded at harvesting stage compared to flowering stage. The early stage (less than 20 days after sowing) of the cucumber plant was more vulnerable for the vector feeding and virus infection and multiplication. In both the seasons, cucumber was grown in red and black soils. The highest mean incidence was recorded in black soil CMD (22.98%), ZYMD (6.36 %) and ToLCD (3.03%) and irrigated condition. The disease incidence increased with

age of crop because the infected plants served as source for further spread. From the present study it was concluded that the CMD, ZYMD and ToLCD were important viral diseases prevalent in major cucumber growing areas of Karnataka during both the seasons however, more in summer season and thus it was also found that the severity depended on cultivars grown, cropping pattern, soil type, vector population and climatic conditions.

References

- Anonymous, 2015, Selected state-wise area and production of cucumber in India. www.indiastat.com.
- Johnson, A. M. A., Vidya, T., Papaiah, S., Srinivasulu, M., Mandal, B. and Gopal, D. V. R., 2013, First report of *Zucchini yellow mosaic virus* infecting gherkin (*Cucumis anguira*) in India. *Indian J. Virol.*, 24 (2): 289-290.
- Verma, R., Prakash, S. and Tomer, S. P. S., 2004, First report of *Zucchini yellow mosaic virus* in cucumber (*Cucumis sativus*) in India. *Pl. Dis.*, 88: 8.
- Suresh, L. M., Malathi, V. G. and Shivanna, M. B., 2013a, Serological diagnosis and host range studies of important viral diseases of a few cucurbitaceous crops in Maharashtra, India. *Archv. Phytopathol. Pl. Protect.*, 4 (5): 501-506.
- Suresh, L. M., Malathi, V. G. and Shivanna, M. B., 2013b, Molecular detection of begomo viruses associated with a new yellow leaf crumple disease of cucumber in Maharashtra, India. *Indian Phytopathol.*, 66 (3): 294-301.