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Occurrence and distribution of chrysanthemum virus B (CVB) in chrysanthemum (*Dendranthema grandiflora* Tzvelen)

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ABSTRACT

Chrysanthemum is one of the leading commercial ornamental crops grown for cut and loose flowers and also used as a pot plant in many parts of the world owing to its unsurpassed beauty and economic value. Surveys were conducted during cropping season of 2016 at 23 locations of major chrysanthemum producing districts of Himachal Pradesh to record the prevalence of chrysanthemum virus B. Results revealed that the virus incidence ranged between 5.33 to 54.48 per cent. The characteristic symptoms were severe mosaic, vein clearing and vein banding on leaves along with stunted growth of plants.

Keywords: Chrysanthemum; CVB; mosaic; prevalence; symptoms

INTRODUCTION

Chrysanthemum (*Dendranthema grandiflora* Tzvelen) is one of the major cut flowers in the world. It ranks second after rose as a cut flower. It is fast becoming an important commercial crop and area under its cultivation is expanding continuously as it pays heavy dividends to the growers when raised on scientific lines. Chrysanthemum is grown on commercial basis in different districts of Himachal Pradesh viz Solan, Kangra, Mandi, Sirmour, Kullu and Una.

Chrysanthemum production of late has faced some constraints by plant pathogens and one of these is systemic disease attacks caused by viruses, viroids and phytoplasma. Till date chrysanthemum virus B (CVB) is still one of the most common viruses found in commercial crops and has caused significant economic losses (Marwoto et al 2004). Taxonomically CVB belongs to carlavirus group. Genome of this virus consists of unipartite, single-stranded RNA with total genome size of 7.5 Kb (Leavy and Zavriev 1991). Typical symptoms of CVB reported are mild leaf mottling and yellow-striped flowers (Noordam1952); vein mottling, mosaic and veinal chlorosis (Verma et al 2003) and prominent green vein banding and occasional flower deformations (Kapoor 2001).

MATERIAL and METHODS

Surveys were conducted during active growth season of 2016 at 23 different locations of Solan and Sirmour districts of Himachal Pradesh to record the occurrence, distribution and incidence of viral diseases in chrysanthemum. Per cent disease incidence was recorded based on the observations on symptoms as per the formula given below:

$$\text{Disease incidence (\%)} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

All the plants existing in the surveyed gardens were critically observed for recording the symptoms on each cultivar. Symptomatic plants of different cultivars were marked for recording the observations on the basis of symptoms produced by each of them. During surveys true to type, good quality, apparently healthy plants of important cultivars namely

Suf, Ajay, Purnima, Thai Chin Queen, White Star, Tata Century, Pusa Centenary, Pusa Sona, Pusa Kesari, Holiday Purple, Pusa Aditya, Chandrama, Daily White, Pusa Anmol, Gulmohar, Solan Shringar, Harvest Home, Yellow Star, Baggi and Shyama were marked in the selected gardens for visual indexing.

RESULTS and DISCUSSION

Surveys of different chrysanthemum growing localities in Solan and Sirmour districts of Himachal Pradesh were conducted during the cropping season of 2016 to determine the occurrence and distribution of different virus disease(s) of chrysanthemum. The data on the disease incidence are presented in Table 1. Most predominant symptoms prevalent in most of the cultivars observed were mild mosaic, vein clearing, mottling, vein banding, flower breaking and necrotic streaks. Most of the times the virus did not show any symptoms. Such type of symptoms have been reported to be prevalent on chrysanthemum plants due to infection of chrysanthemum virus B (Noordam 1952, Brierley 1955, Hollings and Stone 1972, Hakkaart and Maat 1974).

The prevalence of virus infection in all the localities surveyed was with an incidence ranging from 10.0 to 54.48 per cent in Solan and 5.33 to 40.79 per cent in Sirmour district. In Solan district maximum incidence was recorded at Kandaghat with 54.48 per cent followed by Chail and Jaunajee with 52.66 and 49.33 per cent incidence respectively and the minimum incidence of 10.0 per cent was recorded at Gadkhal. In Sirmour district incidence was maximum in Gajo Sargaon (40.79%) followed by Naina Tikker (27.40%) and Narag (27.05%).

Recent studies conducted by several workers across chrysanthemum growing areas of the globe on incidence levels of the virus revealed a greater variation. Studies conducted in Himachal Pradesh revealed an incidence of 48.7 per cent in different chrysanthemum cultivars (Verma et al 2003) and 78 per cent incidence was reported in Taiwan (Lin et al 2005) whereas in Indonesia infection of 7.50 and 67.44 per cent was reported by Temaja et al 2007).

Kapoor (2001) recorded 0-39 per cent incidence of virus disease(s) of chrysanthemum in Solan district of Himachal Pradesh during the cropping season of 1999-2000. Maximum disease incidence of 39 per cent was registered at Majhgaon and a minimum of 2 per cent at Ghatti. A high disease incidence of 33 per cent was recorded at Nauni. However two of the localities surveyed (Kahno and Kasauli) were free from the symptoms of virus disease(s). Various types of symptoms observed under field conditions during the course of investigations are depicted in Fig 1.

Table 1. Incidence of virus disease(s) at chrysanthemum growing localities of Solan and Sirmour districts of Himachal Pradesh

Locality	Number of plants		Disease incidence (%)	Locality	Number of plants		Disease incidence (%)
	Observed	Infected			Observed	Infected	
Solan district				**Sirmour district**			
Chail	150	79	52.66	Gajo Sargaon	126	64	40.79
Dharja	144	20	13.88	Habban	150	8	5.33
Gadkhal	120	12	10.00	Kotla Bangi	145	25	17.24
Jaunajee	150	74	49.33	Naina Tikker	135	37	27.40
Kandaghat	145	79	54.48	Narag	170	46	27.05
Kalaghat	136	45	33.08	Rajgarh	135	18	13.33
Mahog	150	36	24.00	Shanaghat	135	36	26.66
Nauni	127	41	32.28	Tikri	150	26	17.33
Sainj	156	51	32.69	Washi	127	31	24.40
Sadhupul	164	56	34.14	-	-	-	-
Subathu	135	31	22.96	-	-	-	-
Shatal	150	25	16.66	-	-	-	-
University campus, Nauni	60	14	23.33	-	-	-	-

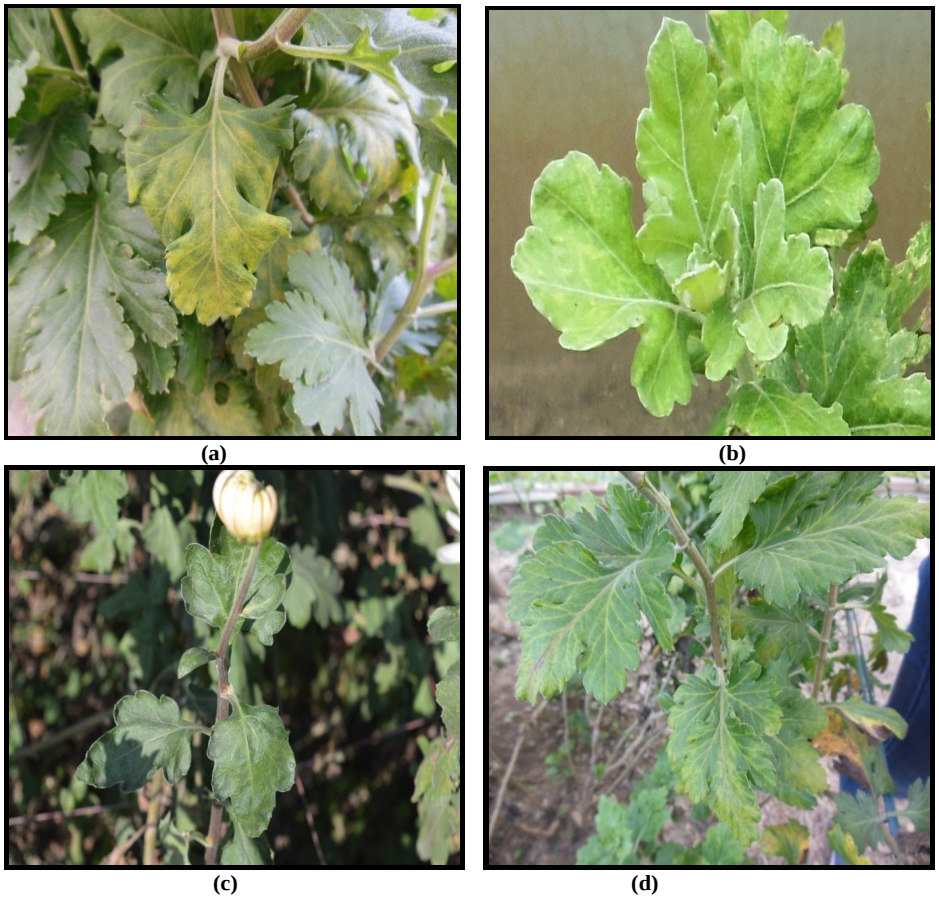

Fig 1. Symptoms observed under the field conditions (a) mottling, (b) mild mosaic, (c) cupping of flowers, (d) vein clearing

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