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Evaluation of cucumber germplam for mosaic resistance under mid-hill conditions of Himachal Pradesh

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ABSTRACT

A naturally occurring mosaic disease of viral etiology has been reported in different cucumber growing areas of Himachal Pradesh. Preliminary studies on sap transmission and serological detection proved this mosaic disease to be a potyvirus. Hence the present investigation was carried out to screen the available germplasm for resistance against the virus isolate. Among 43 germplasms collected 12 were highly resistant to the disease with per cent disease incidence ranging from 1 to 5 whereas four moderately susceptible germplasms had disease incidence of 17-20 per cent.

Keywords: Cucumber; mosaic; disease incidence; potyvirus; germplasm

INTRODUCTION

Cucumber mosaic caused by water melon mosaic virus-2 (WMV-2) has been newly recorded in cucumber (*Cucumis sativus* L) under mid-hills of Himachal Pradesh. WMV-2 naturally infects members of Cucurbitaceae, Chenopodiaceae, Malvaceae and Leguminosae families as reported by Shukla et al (1994). This virus has been reported by Bhargava and Bhargava (1977) in India. The characteristic symptoms exhibited by virus under both natural and glasshouse conditions were vein clearing, vein banding, mild mosaic to yellow mosaic, blistering on leaves along with stunted growth of vines bearing small sized distorted fruits (Anderson 1954, Webb and Scott 1965, Greber 1969, Webb 1971). The incidence of mosaic disease in cucumber germplasm varied from 0-66 per cent. The modern methods to control mosaic virus include sterilization, the use of insecticides to control vectors and breeding resistant cultivars against the disease. The present research focuses on the avoidance of the disease and its further infection which could cause severe

reduction in total yield of cucumber. It also throws a light on development of resistant varieties against the disease reaction.

MATERIAL and METHODS

Extensive survey was carried out at different locations of cucumber growing regions of Himachal Pradesh during 2013 in order to determine the distribution and incidence of virus disease(s). The incidence was recorded from flowering to fruiting stage of the crop at each location in the field and per cent disease incidence was calculated. The observations on the number of healthy and diseased plants were recorded. The cultures of mosaic isolates were collected on the basis of symptoms which were maintained on healthy seedlings of cucumber variety Khira-75 by mechanical sap inoculation under insect proof glasshouse conditions from three different cucumber growing localities of Solan and Sirmour districts.

Table 1. Reaction of different collections/varieties/hybrids to the incidence of cucumber mosaic disease under field condition

Collection/variety/ hybrid	% disease incidence	Reaction	Collection/variety /hybrid	% disease incidence	Reaction
Variety			Local collection		
Khira-75	33	HS	LC-4	20	MS
Japanese Long Green	38.8	HS	LC-5	10	R
Poinsett	17	MS	LC-6	4	HR
Hybrid			LC-7	5	HR
Pusa Sanyog	56	HS	LC-8	3	HR
Khira Hybrid-1 (KH-1)	50	HS	LC-9	4	HR
CH-1	75	HS	LC-10	1	HR
CH-2	69	HS	LC-11	100	HS
CH-3	50	HS	LC-12	75	HS
CH-4	66	HS	LC-13	70	HS
CH-5	19	MS	LC-14	50	HS
CH-6	35	HS	LC-15	80	HS
CH-7	26	S	LC-16	20	MS
CH-8	55	HS	LC-17	40	HS
CH-9	33	HS	LC-18	2	HR
CH-10	66	HS	LC-19	10	R
CH-11	88	HS	LC-20	40	HS
CH-12	44	HS	LC-21	90	HS
CH-13	85	HS	LC-22	50	HS
Local collection			LC-23	80	HS
LC-1	3	HR	LC-24	4	HR
LC-2	2	HR	LC-25	100	HS
LC-3	10	R	-	-	-

RESULTS and DISCUSSION

A significant difference for resistance to mosaic disease was recorded among the different germplasm. The per cent disease incidence was categorized into five classes viz highly resistant (HR), resistant (R), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) (Table 2). Among 43 germplasms of cucumber nine were highly resistant to the disease and three were found resistant while four were moderately susceptible, one was susceptible and rest 26 were highly susceptible to the infection. The data pertaining to the disease reaction are given in the Table 1. The nine cucumber germplasms namely LC-1, LC-2, LC-6, LC-7, LC-8, LC-9, LC-10, LC-18 and LC-24 had fallen under the category of highly resistant (HR) with incidence ranging from 0.1 to 5 per cent whereas three germplasms LC-3, LC-5 and LC-19 were categorized under category of resistant with an incidence falling in the range of 5.1-10.0 per cent. Out of twelve resistant germplasms nine ranged from 1 to 5 per cent of disease incidence. The difference in disease infection on germplasm might be due to the biochemical contents in the plants and the environmental conditions.

Table 2. Reaction of cucumber germplasm to mosaic disease

Level of resistance/susceptibility	Collection/variety/hybrid
Highly Resistant (HR)	LC-1, LC-2, LC-6, LC-7, LC-8, LC-9, LC-10, LC-18, LC-24
Resistant (R)	LC-3, LC-5, LC-19
Moderately susceptible (MS)	Poinsett, CH-5, LC-4, LC-16
Susceptible (S)	CH-7
Highly susceptible (HS)	Khira-75, Japanese Long Green, Pusa Sanyog, Khira Hybrid-1 (KH-1), CH-1, CH-2, CH-3, CH-4, CH-6, CH-8, CH-9, CH-10, CH-11, CH-12, CH-13, LC-11, LC-12, LC-13, LC-14, LC-15, LC-17, LC-20, LC-21, LC-22, LC-23, LC-25

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