NEW RECORD

Necrotic Strain of Bean Common Mosaic Virus in Ethiopia

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Abstract

Symptoms of the necrotic strain of bean common mosaic virus (BCMV) were observed on haricot bean (*Phaseolus vulgaris*) *cv* 'Nicaragua 35' during the 1995 cropping season in the international bean anthracnose trial at Ambo. The virus isolate showed a positive reaction on selected differential bean varieties. Further confirmation was made by ELISA, with monoclonal antibodies to Serotype A. The systemic necrotic reaction was localised-restricted veinal necrosis or black root and death of plants, depending on the differential variety used. When bean varieties with I-gene and non-I-gene were inoculated with the isolate they showed necrotic and mosaic symptoms, respectively, indicating that the isolate represents serotype A. This is the first confirmed record for the necrotic strain (serotype A) of BCMV in Ethiopia.

Introduction

Bean common mosaic virus (BCMV) is the most important viral disease of beans (Schwartz & Galvez 1980) and it occurs worldwide (Brunt et al. 1996). The virus is transmitted through contaminated seed and by aphid vectors (Schwartz et al. 1980). BCMV causes two types of symptoms, *viz.* common mosaic and black root.

The black root is characterized by vascular necrosis, which may result in death of the plant if the infection started during the early growth stage of the plant. If the infection occurs later in the plant development, the plant may survive but some tissue or organs may die. Consequently, pods may also become unmarketable. Black root occurs only in genotypes possessing a dominant I-gene (Drijfhout 1978, Morales & Bos 1988). In Ethiopia there have been frequent reports on the occurrence of BCMV (Agranovsky et al. 1985). Although the prevalence of serotype B has been confirmed through previous surveys (Spence & Walkey 1994) serotype A has not been found in Ethiopia until this time. In this communication we report the first confirmed occurrence of the necrotic strain of BCMV causing black root of haricot bean in this country.

Materials and Methods

Sample Collection and Back Inoculation

Samples with mosaic and curling symptoms were collected from the International Bean Anthracnose (IBAT) trial plots at Ambo during the 1995 crop season. Prior to inoculation onto deferential host series and to other bean varieties, the virus was positively identified as BCMV by host symptoms and by ELISA. The sample was homogenised in 0.01 M K_2HPO_4 containing 0.1% Na_2SO_3 buffer (pH 7.5) and inoculated onto 10 seedlings of the haricot bean

varieties 'Prince' and 'Nicaragua 35' on sterilised mixed soil in clay pots for propagation in the greenhouse.

Differential Hosts and Serological Test

Ten seedlings of each group of bean differential and other bean varieties were raised in clay pots. The differential plats were mechanically inoculated with the virus isolate when they were 10 days old. Along with the differentials 15 other varieties were also inoculated to observe the reaction of the virus isolates. The induced reactions of differentials were observed regularly for a period of 2 to 4 weeks after inoculation.Resistance groups 1 to 5 were maintained at 20°C while groups 9, 9a, and 9b were kept at 26-32°C. The virus isolates were assayed by direct antigen coating and indirect ELISA, as described by Hobbs et al. (1987). A sample was considered positive when the optical density reading (A_{405nm}) was at least twice that of the mean of four healthy controls per plate.

Results and Discussion

Bean varieties from resistance groups 1 to 5 showed systemic mosaic whereas those in groups 8, 9a and 9b, showed systemic necrotic symptoms along the veins (Table 1). These varieties are known to possess dominant I gene and the reaction of differential hosts were consistent with the expected host reactions described by Drijfhout (1978). As symptoms induced in other varieties could differ (Brunt et al. 1996) and most of the symptoms observed in the 15 varieties consisted of, systemic mosaic, mottling, leaf deformation, veinal clearing. However, the varieties 'TY-3396-6' and 'AND-903' showed veinal necrosis which is a characteristic symptom of the black root disease. The control plants inoculated with buffer did not show any symptom. Thus, the reactions of the differentials , serological test and that of the 15 varieties, suggested that this isolate belongs to the necrotic strain (serotype A) of BCMV.

Extensive surveys conducted by Spence and Walkey (1994) revealed the absence serotype A in Ethiopia. This is the first report for the occurrence of the necrotic strain of BCMV in the country. More recently, black root symptoms suspected to be caused by the necrotic strain have also been observed in bean experimental plots at Awassa Research Centre during the 1996 crop season (Habtu Assefa, personal communication). Since the occurrence of the necrotic strain of BCMV is reported only from research centres on experimental plots, it is possible that the disease is accidentally introduced with infected seeds from other countries.

Therefore, seeds imported from other countries should be tested to prevent further introduction of necrotic strains of BCMV and other quarantine diseases. In addition, detail surveys are required to assess the frequency and distribution of the new strain.

Table 1. Symptoms induced differential varieties by the isolate on bean from *cv* Nicaragua 35 & ELISA reaction

Differential host		Reaction	
Group	Variety	Symptom	ELISA
1	Stringless green refuge & Sutter Pink	S_M	+
2	Pure Goldwax & Redlands Greenleaf C	S_M	+
3	Great Northern 59 & 123	S_M	+
4	Sanilac & Michelite	S_M	+
5	Pinto 114	S_M	+
8	Black Turtle Soup & Widusa	S_N, L_{VN}	+
9a	Jublia	S_N, L_{VN}	+
9b	Top Crop & Improved Tender Green	S_N, L_{VN}	+

*S_M=systemic mosaic/mottling, S_{MW}=systemic mosaic/mottling weak (mild). L_{VN}=systemic veinal necrosis, S_N=systemic necrosis, +=positive reaction.

Tables and illustrations: These must be relevant to the article and referred to in the text. Each table should have a descriptive title and each column an appropriate heading. Illustrations should be numbered in the order in which they appear in the text. The captions to any illustrations should be typed separately following the text.

References: References must be cited in the text in the following form: (King 1952, Abebe & Olana 1990, Uloro et al. 1995) and "The work of Assefa (1985) shows that .... ". Conventionally, Ethiopian names are not reversed, but authors have the options to use the more standardized format (Megenasa 1982) or stick to their traditional appellation (e.g. Tessema Megenasa or Tessema). Entries should be in alphabetical order. The names of all authors, including initials, should be provided. The names of journals cited and book titles should be given in full, not abbreviated. See following examples.

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