Bean yellow mosaic and other viruses in bean (*Phaseolus vulgaris*) in western Asia, south-eastern Europe and northern China.

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A collaborative research project (1987-1991) between the Centro Internacional de Agricultura Tropical of Cali, Colombia, and the Istituto di Fitovirologia Applicata CNR (IFA) of Torino, Italy, was aimed at evaluating the presence and incidence of bean yellow mosaic potyvirus (BYMV) in bean (*Phaseolus vulgaris*) in western Asia, south-eastern Europe and northern China. Leaf samples from single plants showing virus symptoms were collected, either by IFA staff or by virologists from the countries concerned. The samples were dried over calcium chloride and brought to IFA, where they were inoculated to indicator plants and, in some cases, checked directly by ELISA for BYMV, bean common mosaic virus (BCMV) and cucumber mosaic virus (CMV). Diagnostic tests were repeated on the experimentally infected plants, using serology and electron microscopy. A total of 822 samples were analyzed and viruses were isolated from 356 of them (Table 1).

BYMV was isolated from 41 samples, 30 from bean and 11 from broadbean, geographically distributed as indicated in Table 1. In the material from China, 34 more samples, negative by infectivity tests, were positive for BYMV by ELISA done directly on field samples; in some of these, fragments of elongated particles were seen in the EM, suggesting that the virus was present but no longer infectious.

Thirty-six BYMV isolates, 29 from bean and 7 from broadbean, were studied in more detail. No significant serological difference was found among virus samples using the slide precipitin test with antisera to a standard Italian BYMV isolate (BYMV-1V) (1) and to the Chilean BYMV Orfeo-Inia (BYMV-OI) isolate (2). In host range comparisons done on the commonly used test plants (3), the bean isolates behaved homogeneously and in conformity with known data, while those from broadbean infected fewer hosts. Biological differentiation of the virus isolates was achieved by inoculation of a set of bean cultivars chosen from those used to differentiate BCMV pathotypes (4). The cvs used - Dubbele Witte, Redlands Greenleaf (RG) B and C, Great Northern (GN) 31, GN123, Sanilac, Michelite, Pinto 114, Monroe, Widusa, Jubila, Top Crop, Amanda, Black Turtle Soup (BTS) 1, BTS 2 and Saxa - were inoculated twice with the BYMV isolates, systemic reaction was checked by ELISA and, when negative, by back inoculation to test plants. Only the systemic response of the differential bean cvs was considered. Nine cvs (Dubbele Witte, Sanilac, Michelite, Widusa, Jubila, Top Crop, BTS 1, BTS 2 and Saxa) were susceptible to all the bean isolates while the remaining 7 cvs (RGB, RGC, GN 123, GN 31, Pinto 114, Monroe and Amanda) were infected by some isolates only. Considering the response of these last cvs, the 29 virus isolates from bean could be separated into 15 pathotypes, that were tentatively ranked in 6 groups of increasing pathogenicity. Most isolates did not infect cvs GN 31 and Monroe, one isolate only, from China, infected all cvs tested and was similar to the highly pathogenic isolate BYMV-OI. Isolates able to

infect cv GN 31 or Monroe induced mild or transient symptoms only, indicating that these cvs might be used as sources of resistance or tolerance in breeding.

The BYMV isolates from broadbean were poorly pathogenic to the bean cvs tested and none of them infected the 7 cvs used to differentiate the isolates from bean; the response of the susceptible cvs could be symptomless, or mosaic or apical necrosis. These isolates appear similar to BYMV isolates from broadbean previously reported (5) and should not constitute a serious threat to bean crops.

Field disease associated with BYMV was generally severe, particularly in dwarf bean. However, our study indicated that, in the areas and in the years considered, BYMV was a local problem rather than a general factor capable of limiting bean production.

We isolated four other viruses from bean: BCMV, CMV, alfalfa mosaic virus (AMV) and broadbean wilt virus II (BBWV-II) (Table 1). Rhabdovirus-like particles were observed in one sample from Turkey, but the virus could not be isolated. Mixed infections of two or more viruses were common and generally associated with severe field disease. BCMV was frequent in the samples from Bulgaria, Iran and Turkey but less common in those from China. A "necrotic" type of BCMV, identified in two cases as strain NL3 (D.G.A. Walkey and N. Spence, Wellesbourne, U.K., pers. comm.) was found in Bulgaria and in Iran. CMV was particularly frequent in samples from Bulgaria and China. Different CMV strains, varying in the symptoms induced on test plants, were detected.

Table 1. Distribution of the viruses isolated

Country	No. samples	Viruses isolated				
		BYMV	BCMV	CMV	AMV	BBWV-II
Bulgaria	59	-	22	34	4	-
China	251	6	18	97	-	1
Iran	83*	12**	13	18	-	-
Turkey	427	22	119	24	-	-
Yemen	2	1***	1	-	-	-

* Sixty-eight from bean, 15 from broadbean and 2 from other legumes

** Ten of these from broadbean

*** From broadbean

\- Absent

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