

Differentiation of Strains of Bean Common Mosaic Virus

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The complete text of this work will be published shortly in the Netherlands Journal of Plant Pathology.

Seventeen described isolates of bean common mosaic virus (BCMV) and five previously unreported isolates were compared for pathogenicity and symptom expression on many bean cultivars (Phaseolus vulgaris L.). From these cultivars, a standard set of differentials were assigned to nine groups with different disease reactions. The twenty-two virus isolates comprised seven strain (pathotype) groups, three of which were divided into two subgroups each. To promote international standardization in BCMV research, recommendations are given concerning test conditions and procedures, criteria for strain differentiation, and maintenance of differential cultivars and virus strains.

Once it is established that a disease is caused by an isolate of BCMV, the test procedures and differential cultivars we propose can be used to determine if the isolate is a pure culture (or mixture), and whether it is similar to or different from previously reported strains. Internationally comparable results can best be obtained in the future if authors use the same procedures, conditions, differential cultivars and virus isolates used in the present study to compare against potential new virus strains, and/or new differential cultivars. To this end, the present authors propose to take responsibility for seed and/or strain distribution to researchers concerned with identification of strains of BCMV. Small seed samples will be sent on request for further propagation by the receiver in his greenhouse.

Seed samples of the differentials will also be deposited in the National Seed Storage Laboratory at Fort Collins, Colorado, USA, where they will be available for future researchers. The virus isolates (in seed) will be deposited in the American Type Culture Collection, 12301 Parklawn Drive, Rockville, Maryland, 20852, USA, where they will also be available for future virus workers.

Table 1. Strains of bean common mosaic virus arranged according to pathogenic and symptomological groups identified in this report

Strain Group	Isolate	Reference	Origin
I	<u>Type</u>	Richard & Burkholder (1943)	USA-Washington
	Westlandia (NL1)	van der Want (1954)	Netherlands
	Puerto Rico (PR9M)	Alconero & Meiners ('72, '74)	Puerto Rico
	Iran	Kaiser (unreported)	Iran
II	<u>NL7</u>	Drijfhout & Bos (1977)	Peru
	R-220	Burke (unreported)	USA-Washington
	S-74	Drijfhout (unreported)	Netherlands
	PV-25	Goth (unreported)	USA-New York
III	<u>NL8</u>	Drijfhout & Bos (1977)	Netherlands
IVa	<u>Florida</u>	Zaumeyer & Goth (1964)	USA-Florida
IVb	<u>Idaho 123</u>	Dean & Wilson (1959)	USA-Idaho
	Western	Skotland & Burke (1961)	USA-Washington
	Colana (NL6)	Hubbeling (1972)	Netherlands
	Bailif	Burke (unreported)	USA-Washington
Va	<u>NY-15</u>	Richards & Burkholder (1943)	USA-New York
Vb	<u>RM (NL2)</u>	van der Want (1954)	Netherlands
	Imuna	Hubbeling (1963)	"
VIa	<u>Michelite (NL3)</u>	Hubbeling (1963)	Netherlands
VIb	<u>Jolanda (NL5)</u>	Hubbeling (1972)	Netherlands
VII	<u>Great Northern (NL4)</u>	Hubbeling (1963)	Netherlands
	Mexican	Silbernagel (1969)	Mexico
	Chile A-5	Alconero (unreported)	Chile

Table 2. Bean host groups used for differentiation of BCMV strains.

Host Group	Cultivar	Origin
<u>1</u> <sup>1/</sup>	*Dubbele Witte	Netherlands
	Sutter Pink	USA
	Stringless Green Refugee	USA
2	*Redlands Greenleaf C	Australia
	Puregold Wax	USA
	Imuna	Germany
3	*Redlands Greenleaf B	Australia
	Great Northern U.I. 123	USA
4	*Sanilac	USA
	Red Mexican U.I. 34	"
	Michelite 62	"
5	*Monroe	USA
	Great Northern U.I. 31	"
	Red Mexican U.I. 35	"
<u>6</u> <sup>2/</sup>	*Jubila	Germany
7	*Topcrop	USA
	Improved Tendergreen 40031	"
8	*Widusa	Netherlands
	Black Turtle Soup	Mexico
9	*Amanda	Netherlands

1/  
Cultivars of host groups 1 to 5 with presumed recessive inhibitor gene I.

2/  
Cultivars of host groups 6 to 9 with presumed dominate inhibitor gene I.

\* Preferred differential cultivar.

Table 3. Host group x strain group interactions <sup>1/</sup>

Host Groups	BCMV Strain Groups						
	I	II	III	IV	V	VI	VII
1 <sup>2/</sup>	+ <sup>3/</sup>	+	+	+	+	+	+
2	-	+	-	+	+	+	+
3	-	-	-	+	-	+	+
4	-	-	+	-	+	+	-
5	-	-	-	-	-	-	+

<sup>1/</sup> Greenhouse, 16 hr daylight, mean temp 23-26°C (range 20-30°C)

<sup>2/</sup> Cultivars of host groups 1 to 5 presumably carry the recessive alleles of the inhibitor gene I (Ali, 1950).

<sup>3/</sup> - = Resistant; not recoverable by assay from new tip growth  
 + = Sensitive or tolerant, recoverable by assay of new growth

Table 4. Host group x strain group interactions <sup>1/</sup>

Host Groups	BCMV Strain Groups									
	I	II	III	IV		V		VI		VII
				a	b	a	b	a	b	
6 <sup>2/</sup>	- <sup>3/</sup>	-	-	-	+	-	+	+	+	-
7	-	-	-	-	+	-	+	+	+	-
8	-	-	+	-	+	-	-	+	+	-
9	-	-	-	-	-	-	-	-	+	-

<sup>1/</sup> Greenhouse 16 hr daylight, mean temp 23-26°C (range 20-30°C)

<sup>2/</sup> Cultivars of host groups 6 to 9 presumably carry the dominant inhibitor gene I (Ali, 1950).

<sup>3/</sup> - = Resistant at the temperatures mentioned. No systemic symptoms. Virus usually not recoverable by indexing from plant tips.

+ = Necrotic tip kill of some to all plants in the used temperature range. Virus usually not recoverable by indexing tips of symptomless plants (sensitive or variably sensitive).