

Inheritance of Resistance to Tobacco Etch and Cucumber Mosaic Viruses in *Capsicum frutescens*

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ABSTRACT

Several hundred plant introduction accessions of *Capsicum* spp. and two *C. frutescens* cultivars, LP-1 and Almeda, were evaluated for resistance to both tobacco etch virus and cucumber mosaic virus. LP-1 was resistant to both viruses. Almeda and the P.I. accessions were susceptible. Under conditions of this study, resistance to each virus followed the pattern of simple Mendelian inheritance with TEV resistance being dominant and CMV resistance recessive. *Phytopathology* 61:1318.

Two virus diseases commonly found in commercial peppers grown in south Louisiana are caused by the tobacco etch virus, TEV, and cucumber mosaic virus, CMV (4, 5). The Tabasco cultivar, *Capsicum frutescens* L., is susceptible to both viruses. Tobacco etch virus causes Tabasco plants to wilt and die, while CMV infection causes severe leaf distortion and stunting. There is need for a pepper possessing the qualities of Tabasco which can be grown successfully in areas where these viruses are prevalent. Previous studies have shown that resistance to TEV and CMV in *Capsicum* spp. does occur (1, 2, 3, 6). In this study, a search for new sources of resistance to TEV and CMV in *Capsicum* spp. was made. Germ plasm resistant to both viruses was found in a single source, and genetic analyses of parental crosses were made to determine the mode of inheritance.

Virus inoculum was prepared with leaves from bell pepper plants, *C. annuum* L., by grinding young leaves with mosaic symptoms in a mortar and pestle with water. Fifty 6-week-old plants of each cultivar or accession to be evaluated for resistance were inoculated by the Carborundum leaf-wiping method with TEV, and another similar group with CMV. Plants were rated for disease resistance on the basis of symptoms for 4 to 6 weeks after inoculation. The classification for TEV and CMV infection was (i) symptomless; (ii) mild mottling; (iii) severe mottling and/or leaf curl; and (iv) wilting of plants. Plants placed in groups i and ii were considered resistant. Two *C. frutescens* cultivars, LP-1 and Almeda, and numerous P.I. *Capsicum* accessions were inoculated and evaluated for TEV and CMV resistance. The P.I. group included 341 accessions of *C. annuum*, 43 of *C. frutescens*, and 36 of *C. sinense* Jacques.

Tobacco etch virus.—All TEV-inoculated plants of the cultivar LP-1 remained symptomless, while those of Almeda and the P.I. accessions showed severe leaf

mottling or leaf-curling symptoms, with none showing the wilt symptom characteristic of Tabasco. These data indicate that LP-1 is homozygous for resistance to the mosaic and wilt symptoms, while Almeda and all of the P.I. accessions are wilt-resistant and mosaic-susceptible.

Crosses were made between LP-1 × Tabasco and Almeda × LP-1 to study the mode of inheritance of resistance to TEV. Fifteen F₁ plants of the cross LP-1 and Tabasco were resistant to TEV, showing no mosaic or wilt symptoms. Of 140 F₂ plants tested, 98 were mosaic and wilt resistant, and 42 were wilt-susceptible to TEV. The chi-square value of 1.86 was obtained for a 3:1 test with one degree of freedom, which had a probability (*P*) of .20-.10. Eighteen F₁ plants of the Almeda × LP-1 cross were resistant to TEV, showing no mosaic or wilt symptoms. Both parents of this cross are resistant to the wilt symptom. Of 225 F₂ plants inoculated, 160 were mosaic-resistant and 65 were mosaic-susceptible. A chi-square analysis for a goodness of fit for a 3:1 ratio gave a 1.81 value with a *P* of .20-.10 with one degree of freedom. Results from this study show that LP-1, a *C. frutescens* cultivar, possesses resistance to both wilt and mosaic symptoms of TEV. Under conditions of this study, resistance was dominant over susceptibility, indicating simple Mendelian inheritance.

Cucumber mosaic virus.—The pepper cultivar, Almeda, and 420 P.I. accessions were considered to be susceptible, as all showed severe leaf mottling and/or brown discoloration on the stems within 2 weeks after inoculation. The inoculated LP-1 plants had only slight leaf mottling, indicating a high degree of tolerance to the virus. A cross was made between Almeda and LP-1 to study the mode of inheritance of resistance. Eighteen inoculated F₁ plants of this cross exhibited severe leaf mottling symptoms. Of 89 inoculated F₂ plants, 74 were susceptible, with severe mosaic symptoms, and 15 were classified as resistant because they were only slightly mottled. This segregation fitted a 3:1 ratio of susceptible to resistant plants. A chi-square value of 3.149 was obtained. The probability value from the chi-square for goodness of fit was .10-.05. These data show that resistance to CMV in this cross followed a pattern of simple Mendelian inheritance, with resistance being recessive. However, definite conclusions as to mode of inheritance cannot be drawn on the basis of these data.

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