

**Short Communication**

**GARLIC MOSAIC VIRUS DISEASE:  
OCCURRENCE AND SCREENING FOR TOLERANCE**

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Exotic and indigenous germplasm of garlic, an important spice crop, is maintained and evaluated at NBPGR for eventual exploitation in developing high yielding and disease free promising varieties. The present note deals with occurrence of garlic mosaic virus (GMV) disease in the germplasm collection and identification of promising tolerant lines to this virus disease through field screening.

A total of 897 germplasm accessions of garlic were grown for evaluation at NBPGR Experimental Farm, Issapur during *rabi* 1989-90. These accessions comprised 10 entries from coordinated trials, 31 exotic accessions mainly from Taiwan and Egypt and 856 indigenous collections. Six to eight week-old plants of many lines started revealing viral disease symptoms on the leaves. These symptoms were found to be mainly of two kinds i.e. either faint to clear mosaic on the leaves (Fig. 1) or longitudinal chlorotic streaks of a few mm width, often extending along the entire leaf length. In a few lines, both these symptoms could be simultaneously observed on different plants. The number of plants revealing such disease symptoms increased with time and eventually at 10-12 week growth stage, the entire field appeared pale and diseased from a distance. The earlier infected plants had reduced growth as compared to those of the same accession infected at a later stage in the growing season in many accessions.

In order to carry out sap transmission study, diseased leaves (with both mosaic and chlorotic streak symptoms) were ground in phosphate buffer (0.1M, pH-7.2) and inoculated on certain indicator hosts, viz; *Chenopodium album*, *C. quinoa*, *Nicotiana tabacum* and *Vinca rosea*. None of these plants showed symptoms on inoculation. Sap inoculation on garlic plants was not done due to non-availability of completely symptom free plants. Randomly collected leaf samples showing mild to severe mosaic and chlorotic streak

symptoms when subjected to electron microscopy (at IARI, New Delhi) by the adopting dip method revealed virus particles as long flexuous rods of about 600 nm size. The samples from leaves with two different types of symptoms (i.e. mosaic and chlorotic streak) revealed virus particles of similar shape and size under electron microscope. Also leaves with both mosaic & streak symptoms gave positive serological reaction with antiserum of Garlic Mosaic Virus (supplied by Dr. Y.S. Ahlawat, IARI, New Delhi) in a microprecipitation test. Based on these results the virus under study was presumed to be garlic mosaic virus.



Fig. 1: Mosaic symptom on garlic leaves infected with garlic mosaic virus.

In India, garlic mosaic virus disease was first reported from Darjeeling hills on the basis of symptoms, transmission studies and physical properties (Ahlawat, 1974). The identification of the virus and prevalence of this disease in India has been recently reported (Ahlawat & Chakraborty, 1990). It has been reported from many other countries also and yield losses of more than 50 per cent have been recorded (Messiaen *et al.*, 1981). There are conflicting reports about the mode of transmission and spread of GMV in the field as it is reported to be transmitted by the aphids, *Myzus persicae* and *Aphis gossypii* (Ahlawat, 1989), *Neotoxoptera formosana* (Abiko *et al.*, 1980) and eriophyid mite, *Aceria tulipae* (Ahmed & Benigno, 1984). In order to screen the available germplasm for resistance, incidence of GMV was recorded in

the field based on symptoms of the disease. The observations were recorded twice (at one month interval) in order to ensure recording of susceptible types having delayed infection during the growth period. None of the 897 garlic accessions were found to be immune or resistant to the disease. However, 9 lines which revealed very mild symptoms were not easily distinguishable from healthy plants. These tolerant lines with near absence of symptoms were: IC-32662, -35325, -49345, -49364, -49373, -49383, G-41, T-84/10 and T-96/13. Mild or faint symptoms were recorded on plants of 239 lines whereas moderate to severe symptoms were noted on plants of 639 lines. These included the otherwise promising accessions of the All India co-ordinated trial namely, EC-158250, G-1, G-50, T86/Sel-1, Sel-2, Sel-10 and Pusa Sel-10. During 1990-91 growing season, heavy incidence of GMV disease was again observed in the germplasm collections in the same field. The 9 lines recorded to show very mild symptoms during 1989-90, were again evaluated for their reaction to GMV. Six of these 9 lines (viz., IC-32662, -35325, -49364, -49473, -49383 and T-84/10) revealed clear symptoms of GMV either in the form of mosaic or streaks or both on different plants. However, plants of 3 lines, viz., IC-49345, G-41 and T-96/13 were again found to be apparently disease-free as observed in the previous year under high natural incidence of disease outbreak in the field. At a later growth stage just before drying up of plants, the younger leaves of few plants of these lines also started revealing mild mosaic symptoms whereas the older leaves still remained symptomless or had very mild symptoms. Nonetheless, the 3 promising tolerant lines, viz., IC-49345, G-41 and T-96/13, all from Maharashtra state, could serve as a good source of GMV tolerant material in the absence of resistant or immune lines in the garlic germplasm collection in India. Further evaluation of these 3 lines at different locations would be useful in assessing their tolerance to different strains of GMV. The tolerant line G-41 is already a released variety of garlic and could be a variety of choice for minimising the damage to the crop from GMV at present.

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