Asian Journal of Plant Pathology

ISSN 1819-1541

Academic Journals Inc.

www.academicjournals.com

Asian Journal of Plant Pathology 5 (4): 163-165, 2011
ISSN 1819-1541 / DOI: 10.3923/ajppaj.2011.163.165

First Report of *Cucumber mosaic virus* Infecting Geraniums (*Pelargonium* spp.) in Iran

Abbas Saidi and Mehdi Safaeizadeh
Department of Biotechnology, Faculty of New Technologies and Energy Engineering, Shahid Beheshti University, G.C., Tehran, Iran

Corresponding Author: Safaeizadeh Mehdi, Department of Biotechnology, Faculty of New Technologies and Energy Engineering, Shahid Beheshti University, G.C., Tehran, Iran Fax: +982122431781

During the winter and spring of 2010, 28 samples of geraniums showing symptoms of virus infection were collected from commercial greenhouses located in the Hamedan province, of Iran (Fig. 1a and b). Using double-antibody sandwich enzyme-linked immunosorbent assay

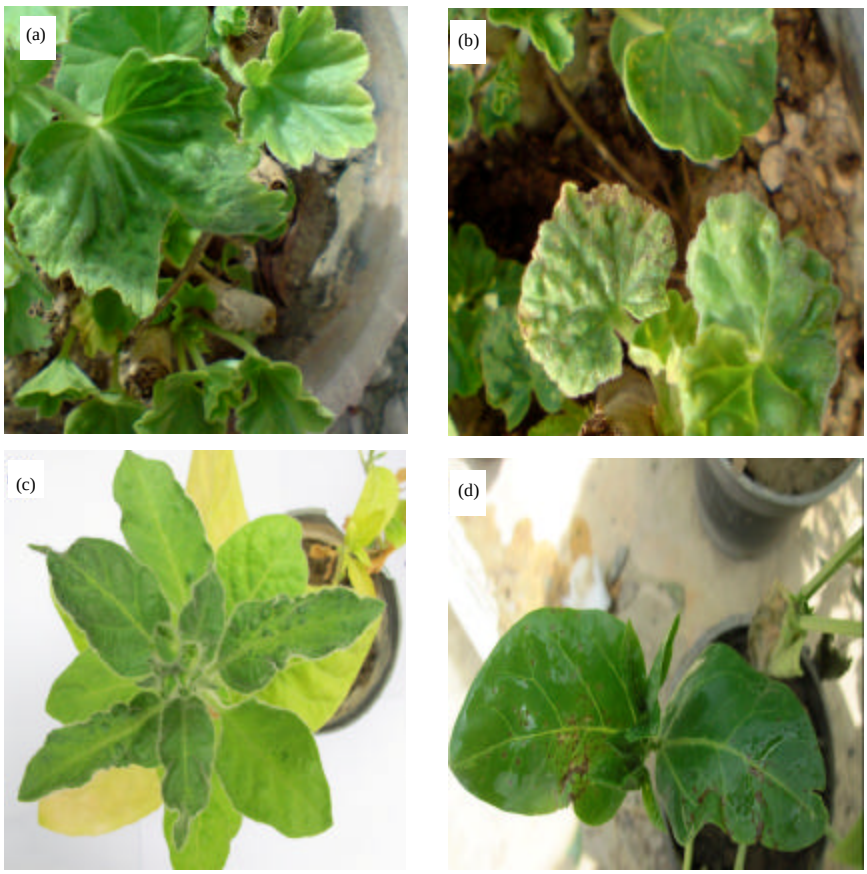

Fig. 1(a-d): (a and b) Symptomatic samples of geraniums infected with Cucumber mosaic virus (CMV). (c) serve systemic mosaic and leaf malformation on *Nicotiana tabacum* cv. Samsum; (d) Chlorotic local lesions on *vigne unguicolata*

(DAS-ELISA; Clark and Adams, 1977), the leaf samples were indexed for seven viruses. The presence of Arabis mosaic virus (ArMV), Cucumber mosaic virus (CMV), Papaya ring spot virus (PRSV), Squash leaf curl virus (SLCV), Tomato leaf curl virus (TYLCV), Tomato ring spot virus (ToRSV) and Tomato spotted wilt virus (TSWV), with specific polyclonal antibodies purchased from Bioreba (CH-4153 Reinach BL1, Switzerland) were checked. According to DAS-ELISA tests, 4 samples strongly reacted with CMV-IgG. These samples were used to mechanically inoculate the experimental host species and produced mosaics and stunting on *Cucumis sativus*; chlorotic local lesions on *Chenopodium amaranticolor*; severe systemic mosaic and leaf malformations on *Nicotiana tabacum* cv. Samsun and chlorotic local lesions on *Vigna unguicolata* (Fig. 1c and d) resembling symptoms described previously for CMV (Kaper and Waterworth, 1981) and the symptoms of CMV previously isolated from geranium (Verma *et al*., 2006). ELISA results showed that the original leaf samples and inoculated indicator plants reacted positively with CMV antibodies but not with antibodies for any of the other viruses listed above. In addition, using TRI-Reagent (Sigma, Chemical, St Louis, MO, USA) total RNA were extracted from the original leaf samples and indicator plants according to the manufacturer's protocol. Use of reverse transcription-polymerase chain reaction (RT-PCR) with specific primers for CMV (Blas *et al*., 1994) yielded amplification of one fragment of the expected size, approximately 540 bp (Fig. 2). As a member of the genus *Cucumovirus* in the family Bromoviridae, CMV has the widest host range of any known plant virus (Palukaitis *et al*., 1992). CMV was first observed on *Cicer arientinum* in Iran (Kaiser and Danesh, 1971). To our knowledge, this is the first report of natural infection of CMV on Pelargonium in Iran.

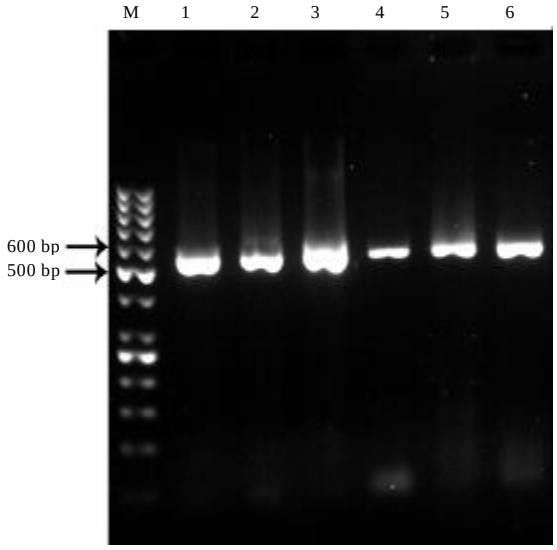

Fig. 2: Assay for specific detection Cucumber Mosaic Virus (CMV) infected geraniums. M, molecule weight marker (50 bp DNA ladder; Fermentas, Germany); 1-4, RT-PCR products form total RNA extracts prepared from geraniums that reacted positively in DAS-ELISA to CMV; 5, positive control (RT-PCR products from total RNA extracts prepared from tomato infected with CMV); 6, *Nicotiana tabacum* cv. Samsun as indicator test plant re-infected with geranium infected with CMV. DNA bands were visualized and photographed with UV illuminator (Proxima 10 phi).

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