SOLANUM MICRODONTUM (PI 558098): A DIAGNOSTIC HOST PLANT FOR POTATO VIRUS A

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Abstract

*Solanum microdontum* (PI 558098) develops diagnostic symptoms when inoculated with plant sap containing potato virus A (PVA). The symptoms consist of local lesions (2-4 mm), followed by systemic necrosis of leaf veins, bronzing of leaf surface, and leaf drop. Symptoms develop in a temperature range of 20-29 °C with 4 to 8 Klux light intensity of 14 h daylength. Local lesions are visible within 1 wk of inoculation and can be caused by PVA containing sap dilutions of up to 1:100. Plants multiplied by shoot cuttings as well as those produced from true potato seed are equally sensitive. True potato seed production occurs under normal greenhouse conditions in cross-pollinated plants.

Introduction

Potato virus A is a member of the potyvirus group, possessing filamentous virus particles of about 730 nm. PVA causes mild symptoms in most potato varieties. However, in combination with potato virus X (PVX), it may cause a severe disease known as potato crinkle (1, 2). In combination with potato virus Y (PVY), it also gives rise to a severe mosaic disease. PVA spreads in the field by various aphid species. PVA occurs in plants in very low concentrations and is weakly antigenic (1). Therefore, reliable antisera without cross-reaction with other potyviruses are not readily available.

The host range of PVA is restricted to *Solanaceae* (1, 2). A number of test plants have been reported (1, 2); among them are *Lycopersicon pimpinellifolium* (1, 2), a local and systemic host, and *Physalis angulata* L., a local lesion host (4). *Nicandra physaloides* reacts with a severe systemic mottle, necrosis and stunting (1, 2). During an evaluation of Plant Introductions of tuber-bearing *Solanums* when inoculated with PVA, it was observed that *Solanum microdontum* plants developed local lesions which were distinct from other potato viruses. Since *S. microdontum* developed diagnostic symptoms

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under a wide range of temperature and light conditions, it appears to be a suitable diagnostic host for PVA.

**Materials and Methods**

*Virus Sources and Test Plants*

Tuber and true potato seed (TPS) of *Solanum microdontum*, Plant Introduction # (PI) 500035, 558097, 558098, 558099, 558100 and 558101, were obtained from the NRSP-6 Potato Introduction Project (formerly IR-1), Sturgeon Bay, Wisconsin. TPS were treated with gibberellic acid prior to germination (5). Seedlings were raised in 12.5 cm clay pots containing a commercial Nova Mix, and grown in a greenhouse at 18-22°C or at 20-29°C with light intensity of 4 to 8 Klux. Plants were used for inoculation when they had 3 to 5 fully developed leaves. Plants from tuber sources were further multiplied by shoot cuttings. The PVA source was a locally-isolated strain, used in previous studies (3) and maintained in *Nicandra physaloides* by mechanical transfer. Inoculum was prepared using a buffer solution (0.01 M sodium phosphate and 0.4% sodium sulphite, pH 7.5).

*S. microdontum* plants were also tested for susceptibility and symptom expression for PVYO, necrotic strain of PVY (PVYN), PVX, potato virus M (PVM), and potato virus S (PVS). Five *S. microdontum* plants were inoculated with each virus, and two indicator plants for each virus were inoculated to serve as controls. Confirmation of virus infection was carried out using enzyme-linked immunosorbent assay (ELISA) as described previously (6).

**Results and Discussion**

Plants of *S. microdontum* (PI 558098) developed local lesions (Fig. 1), mosaic, veinal necrosis and leaf bronzing following PVA inoculation. Symptoms appeared within 6-8 days and progressed to new leaves throughout the life of the plant. The newer leaves became progressively smaller and developed bronzing of the leaf lamina. Infected plants were slightly dwarfed and lighter in color compared to healthy plants, but they produced flowers and berries as did healthy plants.

Local lesions were more abundant with a partially purified PVA preparation (1 ug/ml) (ranging over 100/leaf), while an average of 9.8 to 15.5 local lesions/leaf developed with crude sap (1:5 dilution) as inoculum. When PVA-containing crude sap was diluted with buffer from 1:10 to 1:250, all five plants were infected up to a dilution of 1:100.

*S. microdontum* plants were also inoculated with the commonly occurring potato viruses M, S, X and YO and recently detected necrotic strain, PVYN. There were no symptoms incited by PVM, PVS and PVX. However, symptoms consisting of veinal necrosis and leaf drop were observed with