Sources of Resistance to Peanut Mottle Virus in *Arachis* Germ Plasm

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ABSTRACT

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The following peanut accessions were not susceptible to peanut mottle virus (PMV) as determined by the absence of local lesions on inoculated plants of the bean cultivar Topcrop: Rhizomatosae section PI 468171, PI 468174, PI 468363, PI 468366, and PI 468371; Arachis section PI 468141 and PI 468142 (both *A. diogoi*); and PI 468169 (*Arachis* sp.). Leaves on shoots of these peanut entries and of the susceptible cultivar Tamnut 74 were mechanically inoculated with a severe PMV strain. Leaves from each shoot were tested for virus infection 3–4 wk after inoculation. All entries were negative for the virus on the basis of symptoms, local-lesion assays on Topcrop bean, serology, and electron microscopy. The control Tamnut 74 shoots were infected in each case. This is the first report of PMV resistance in any species within the Arachis section.

Peanut mottle virus (PMV) is widely distributed in cultivated peanut (*Arachis hypogaea* L.) throughout the world (1–3,10). In the southeastern United States, PMV infection causes economic losses in peanut (3). Previously, we found that PI 276235 (*A. chacoense* Krap. et Greg. nom. nud.) was a potential reservoir for PMV (11).

PMV was frequently present in the peanut germ plasm collection maintained by the USDA Agricultural Research Service and Oklahoma Agricultural Experiment Station at Stillwater. This was determined by using the bean (*Phaseolus vulgaris* L.) cultivar Topcrop as a local-lesion host.

No immunity to PMV was found in cultivated peanuts (6). However, seven rhizomatous resistant peanut accessions were previously reported (4) and tolerance to a mild strain of PMV was reported in two cultivated peanut introductions (7). Identifying resistance to PMV in accessions from the Arachis taxonomic section would be of importance because they are cross-compatible with cultivated peanuts.

Several additional sources of PMV-resistant germ plasm from the Arachis and Rhizomatosae sections are now reported.

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MATERIALS AND METHODS

Peanut accessions were selected on the basis of absence of PMV symptoms and local lesions on Topcrop bean leaves. Test entries were obtained from the taxonomic sections of Arachis and Rhizomatosae. Entries were vegetatively propagated and maintained in the greenhouse among other peanut accessions susceptible to PMV.

The PMV isolate was obtained from the wild peanut (*A. chacoense*) accession PI 276235 and maintained in Tamnut 74. Topcrop bean was used for local-lesion assays. Leaflets from each peanut entry were ground in 0.01 M phosphate buffer (pH 7.2) containing 0.01 M diethyldithiocarbamate (1:2, w/v). Primary leaves of Topcrop bean were rubbed with the inoculum plus Carborundum (400 mesh).

Stems with 4–5 fully expanded leaves were detached from each peanut accession and from the susceptible cultivar Tamnut 74, immersed in Hoagland's solution (5) in 1 × 14 cm test tubes in racks placed in clear polyethylene chambers on a greenhouse bench, and maintained as previously described (8). Leaves were inoculated with PMV as outlined earlier (11). Inoculated shoots were placed in the growth chamber for 3–4 wk, then symptoms were recorded.

Table 1. Indexing of peanut entries for peanut mottle virus on the bean cultivar Topcrop[a]

Entry	Taxonomic section	Origin, collectors[b]	Number of tests	Number of tests with local lesions
PI 468141 (*Arachis diogoi* Hoehne)	Arachis	Brazil, GK 30001	4	0
PI 468142 (*A. diogoi*)	Arachis	Brazil, GK 30005	9	0
PI 468169 (*Arachis* sp.)	Arachis	Brazil, GK 30037	2	0
PI 468171 (*Arachis* sp.)	Rhizomatosae	Brazil, GKPSc 30127	2	0
PI 468174 (*Arachis* sp.)	Rhizomatosae	Brazil, GKPSc 30131	2	0
PI 468363 (*Arachis* sp.)	Rhizomatosae	Paraguay, GKPSc 30116	3	0
PI 468366 (*Arachis* sp.)	Rhizomatosae	Paraguay, GKPSc 30119	3	0
PI 468371 (*Arachis* sp.)	Rhizomatosae	Paraguay, GKPSc 30125	2	0
PI 276235 (*A. chacoense* Krap. et Greg. nom. nud.)[c]	Arachis	Paraguay, GKP 10602	9	9

[a]Two shoots of each entry tested individually.
[b]Collectors' initials: G = W. C. Gregory, K = A. Krapovickas, P = J. Pietratrelli, Sc = A. Schinini.
[c]Included to check reliability of virus assay.

Table 2. Reaction of eight resistant peanut entries and one susceptible cultivar 3–4 wk after inoculation with a severe strain of peanut mottle virus (PMV)

Entry	Number of shoots inoculated	Number of shoots positive for PMV			
		Symptoms	Local-lesion assays[a]	Serology[b]	Electron microscopy[c]
Resistant					
PI 468141	5	0	0	0	0
PI 468142	5	0	0	0	0
PI 468169	5	0	0	0	0
PI 468171	3	0	0	0	0
PI 468174	5	0	0	0	0
PI 468363	5	0	0	0	0
PI 468366	5	0	0	0	0
PI 468371	4	0	0	0	0
Susceptible					
Tamnut 74	5	5[d]	5	5	5

[a]Inoculum mixed with Carborundum rubbed onto upper surface of bean cultivar Topcrop leaves.
[b]Reaction with PMV-specific antiserum in capillary ring-interfacial test.
[c]Uranyl acetate negative-stained preparations of PMV from leaflets.
[d]Observed 2–3 wk after inoculation with PMV.

The presence or absence of PMV in inoculated shoots was determined by local-lesion assays, electron microscopy, and reaction with PMV-specific antiserum in capillary ring-interfacial tests as previously described (11).

RESULTS AND DISCUSSION

Indexing of 156 peanut entries from the germ plasm collection at Stillwater, OK, for the presence of PMV by local-lesion assay showed the virus to be widely distributed. However, eight entries were consistently free from the virus—five (PI 468171, PI 468174, PI 468363, PI 468366, PI 468371) in the Rhizomatosae section and three (PI 468141, PI 468142, PI 468169) in the Arachis section (Table 1). All eight entries were negative for the virus, as determined by symptoms, local-lesion assays, serology, and electron microscopy, 3–4 wk after mechanical inoculation (Table 2).

Although resistance to PMV was found in seven wild rhizomatous peanut introductions by other investigators (4), this is the first report of PMV resistance for species in the Arachis section. This is significant because the wild peanut species in the Arachis section are cross-compatible with cultivated peanut. In addition, *A. diogoi* Hoehne is also resistant to early leaf spot caused by *Cercospora arachidicola* Hori (9). Consequently, it should be possible to transfer PMV resistance to cultivated peanut.

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