Survey of Wild *Ipomoea* spp. as Potential Reservoirs of Sweet Potato Feathery Mottle Virus in Louisiana

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ABSTRACT

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The growth habit and incidence of infection by sweet potato feathery mottle virus (FMV) of commonly occurring species of *Ipomoea* were monitored from March through June for three successive years. Seedlings and perennial plants of *I. trichocarpa* were observed each year. FMV was detected in perennial plants soon after emergence in March to April. *I. pandurata* was exclusively perennial in habit and was not a host for FMV, because the virus was not detected in plants from field collections or after graft inoculation with several different strains of FMV. *I. hederacea* and *I. wrightii* occurred only as annuals. FMV was not detected in either species until 2 mo after seedling emergence. Because infected *I. trichocarpa* plants are present throughout the sweet potato growing season, they may be an important perennial reservoir of FMV in Louisiana.

Sweet potato (*Ipomoea batatas* (L.) Lam.) is vegetatively propagated and is almost universally infected with sweet potato feathery mottle virus (FMV). As a result, there has been considerable interest in developing programs to eliminate FMV from propagating material. However, there is a lack of information on the potential for reinfection of virus-indexed sweet potatoes in the field. The host range of FMV, a potyvirus, is limited, with a few exceptions, to plants in the family Convolvulaceae (6). Several of the susceptible plants in this family are commonly found as weeds in cultivated fields, hedge rows, or ditch banks near sweet potato plant beds or fields. This study was conducted to determine if wild *Ipomoea* spp. are potential sources of inoculum for infection of sweet potato in Louisiana. A preliminary report has been published (1).

MATERIALS AND METHODS

During late summer 1980, 12 sites in Baton Rouge with naturally occurring stands of various *Ipomoea* spp. were selected for study on the basis of the presence of FMV-infected plants. All 12 sites were in an area about 0.5 mi. in radius on ditch banks or in hedge rows not subjected to cultivation. *I. trichocarpa* Ell. (cotton morning glory), *I. hederacea* Jacq. (ivy-leaf morning glory), and *I. wrightii* (Wall.) Choisy (palm-leaf morning glory) were present at 10 of the 12 sites; *I. hederifolia* L., *I. lacunosa* L. (pitted morning glory), and *I. pandurata* (L.) G. F. W. Mey (big-root morning glory) were present at only one site. During 1981, 1982, and 1983, each site was examined at 1- to 2-wk intervals from the beginning of March to the end of June. The occurrence of true seedlings, perennial growth, stage of plant development, and incidence of FMV symptoms were recorded. Leaves were collected from plants with and without symptoms and were assayed for FMV by serologically specific electron microscopy (SSEM) (2) using antiserum to the common strain of FMV provided by J. W. Moyer, North Carolina State University.

One perennial, *I. pandurata* (3), occurs in widely scattered locations and as a result was not adequately represented in this survey. Therefore, this species was collected from different locations and established by propagation from fleshy root pieces in the greenhouse for further study. Each collection was assayed for FMV by approach grafting to *I. setosa* Kerr, a commonly used FMV indicator plant (6). In a separate experiment, *I. nil* 'Scarlett O'Hara' infected with FMV was wedge-grafted into the *I. setosa* stock, and after symptoms appeared on new growth of the *I. setosa*, leaves of the *I. setosa* stock and *I. pandurata* scion were assayed by SSEM for FMV.

RESULTS

Both seedlings and perennial growth of *I. trichocarpa* were observed in each of the 3 yr of this study. Seedlings first appeared in early March to early April but did not show FMV symptoms for several weeks after emergence (Table 1). Perennial growth of *I. trichocarpa* first appeared 1–2 wk after seedling emergence, and FMV symptoms were evident 1–2 wk later. FMV symptoms in perennial growth included chlorotic spotting and mild chlorotic veinbanding (CVB). Symptoms in seedlings included chlorotic spotting, severe CVB, leaf distortion (LD), and stunting.

I. hederacea and *I. wrightii* grew exclusively as annuals, with seedlings appearing at the same time as observed for *I. trichocarpa*. FMV symptoms, however, did not appear until June, when mild CVB developed on *I. wrightii* and CVB and LD developed on *I. hederacea*. FMV was not detected in symptomless leaves except in instances where symptoms developed immediately after assaying. *I. hederifolia* and *I. lacunosa* were not sufficiently represented in the sites surveyed to make definitive observations regarding their status as hosts of FMV, but they were only observed to grow as annuals as has been previously reported (3).

I. pandurata did not produce true seed but grew exclusively as a perennial both at the site in Baton Rouge where it was routinely monitored and at the four other locations from which it was collected (Table 1). FMV was not detected in plants

Table 1. Dates of first recorded observation of true seedling emergence, perennial growth, and feathery mottle virus (FMV) symptoms (confirmed by positive SSEM assay) for *Ipomoea* spp. observed at 12 sites in Baton Rouge, LA, for the years 1981–1983

	Date first observed								
	True seedlings			Perennial growth			FMV symptoms[a]		
Species	1981	1982	1983	1981	1982	1982	1981	1982	1983
I. hederacea	5 Apr.	15 Mar.	11 Mar.	NO[b]	NO	NO	17 Jun.	8 Jun.	NO
I pandurata	NO	NO	NO	7 Jul.	1 Apr.	11 Apr.	NO	NO	NO
I. trichocarpa	5 Apr.	2 Mar.	11 Mar.	8 Apr.	15 Mar.	10 Apr.	15 Apr.[c]	26 Mar.[c]	28 Apr.[c]
I. wrightii	5 Apr.	23 Mar.	11 Mar.	NO	NO	NO	17 Jun.	8 Jun.	18 May

[a] Confirmed by positive SSEM assay to FMV-common strain antiserum.
[b] NO = not observed.
[c] Date symptoms were first observed on perennial growth.

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from the field by either graft transmission to indicator species or by SSEM. When either the common strain or Louisiana isolates SPV-6 or SPV-22 of FMV were graft-transmitted into *I. setosa* stocks onto which *I. pandurata* had previously been grafted as a scion, FMV was readily detected by SSEM in leaves of *I. setosa* but not in leaves of *I. pandurata*.

DISCUSSION

This work indicates that at least one species, *I. trichocarpa*, can serve as a perennial reservoir of FMV under southern Louisiana climatic conditions. Furthermore, the virus can be detected in perennial growth early in the spring, when sweet potato sprouts are emerging in plant production beds and before the onset of peak flights of known aphid vectors of FMV (4). Because *I. trichocarpa* is widely distributed throughout the state and continues to grow actively throughout the sweet potato growing season, it appears to be an ideal inoculum source. The other common perennial morning glory in sweet potato growing regions of Louisiana, *I. pandurata*, has not been included in previous FMV host range studies because seed is rarely available. The accessions of *I. pandurata* used in these tests were not susceptible to several strains of FMV.

True seedlings of *I. hederacea, I. hederifolia, I. lacunosa, I. trichocarpa,* and *I. wrightii* emerge early in the spring before perennial growth of *I. trichocarpa* but do not harbor FMV until several weeks after it can be found in perennial *I. trichocarpa*. This suggests that such annual plants are not important sources of primary inoculum of FMV. Apparently, they become infected only after the virus is transmitted into healthy seedlings from other sources such as perennial *I. trichocarpa* or infected sweet potatoes.

Attempts to develop seed certification programs to control FMV in sweet potato must take into consideration the potential for FMV-indexed plants to be reinfected by transmission of the virus from weed reservoirs. Because perennial survival of *I. trichocarpa* occurs primarily outside cultivated fields, sweet potatoes can be grown in locations isolated from perennial morning glory populations. Because FMV is transmitted in a nonpersistent manner, it is possible that such isolated sweet potatoes may be kept free of FMV. This approach was used to maintain internal cork-free stocks of susceptible sweet potatoes but has not been evaluated for control of FMV (5).

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