SOYBEAN YELLOW VEIN VIRUS, A NEW VIRUS OCCURRING ON SOYBEAN IN THAILAND

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Abstract

A virus was isolated from soybean plants showing yellow vein symptoms that were collected in the central part of Thailand in 1982. The virus was a new virus of soybean based on particle morphology, host range, stability in crude sap, etc. It was designated as soybean yellow vein virus (SYVV). The occurrence and distribution of SYVV disease were limited. Numerous rod-shaped virus particles (about 500-550 nm in length and 15-20 nm in width) were detected in the dip preparations of soybean leaves infected with the virus. *Chenopodium amaranticolor* and *C. quinoa* showed chlorotic local lesions on the inoculated leaves and only soybean was recognized as a systemic infectious host of the virus showing yellow vein symptoms. *Aphis glycines* and *Bemisia tabaci* failed to transmit the virus. The dilution end point, thermal inactivation point and longevity in vitro of the virus were 10^{-3} -10^{-4}, 35-40°C (10 min) and 2-3 hr at 4°C, respectively.

1. Introduction

Soybean plants showing yellow vein symptoms were observed and collected in a field of Praphutabat Field Crop Experimental Station located in the central part of Thailand in 1982. The virus isolated mechanically from these plants was a new virus of soybean based on particle morphology, host range, stability in crude sap, etc. This paper presents some results of studies on the virus which was designated as soybean yellow vein virus.

2. Materials, methods and results

1) Virus

The virus was isolated by sap inoculation from naturally infected soybean plants showing yellow vein symptoms, and maintained by sap inoculation and grafting on soybean for tests in the laboratory.

2) Host range and symptoms

Diseased soybean plants showed yellow vein banding or mottling symptoms in the field.

In the glasshouse, inoculated soybean plants showed mottling or slight yellow vein banding symptoms on the upper leaves at three weeks after inoculation. Later on, the

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diseased plants showed more distinct yellow vein symptoms, occasionally with vein necrosis. In the tests of susceptibility to the virus of three soybean cultivars, namely, 'Tsurunoko', 'SJ 4', and 'SJ 5', 'Tsurunoko' soybean was shown to be most susceptible (24% infection ratio).

Host range tests of SYVV were performed by sap inoculation to 16 plant species of 6 families and back inoculation to *Chenopodium amaranticolor* which was the local lesion host of SYVV.

The virus infected three plant species of two families among them (Table 1). *Chenopodium amaranticolor* (Fig. 1) and *C. quinoa* showed distinct chlorotic local lesions at 6 to 7 days after inoculation. *C. amaranticolor* was useful as a assay host plant of the virus. Only soybean was recognized as a host showing systemic infection.

Table 1. Host range of soybean yellow vein virus

Plant	Symptoms	
	Inoculated leaf	Non-inoculated leaf
Chenopodium amaranticolor	L	—
C. murale	—	—
C. quinoa	L	—
Gomphrena globosa	—	—
Glycine max	1	YV
Vigna mungo	—	—
V. radiata	—	—
V. sesquipedalis	—	—
Datura metel	—	—
D. stramonium	—	—
Nicotiana glutinosa	—	—
N. tabacum	—	—
Physalis floridana	—	—
Solanum melongena	—	—
Sesamum indicum	—	—
Cucumis sativus	—	—

L: Local lesion, 1: symptomless infection, YV: yellow vein, —: no infection.

Fig. 1. Local lesions on leaves of *Chenopodium amaranticolor* inoculated with soybean yellow vein virus.

3) Insect transmission

Insect transmission tests were carried out by using aphid, *Aphis glycines* Matsumura, and whitefly, *Bemisia tabaci* Genn. These insects which were allowed an acquisition access of 2 days on the infected soybean plants were transferred to healthy soybean seedlings for an inoculation access of one week. Then, these insects were removed by spraying with insecticides.

In these experiments, *A. glycines* (0/60) and *B. tabaci* (0/50) failed to transmit the virus.

4) Stability in crude sap

Stability of the virus in crude sap of soybean leaves infected with the virus was determined by conventional procedures using *C. amaranticolor* as assay plant. The dilution end point, thermal inactivation point and longevity in vitro of the virus were 10^{-3}-10^{-4}, 35-40°C (10 min), and 2-3 hr (4°C), respectively.

5) Particle morphology

Attempts to detect the virus particles of the causal agent were carried out by electron microscopy using the dipping method.

Numerous rod-shaped virus particles (about 500-550 nm in length and 15-20 nm in width) were detected in the preparations (Fig. 2).

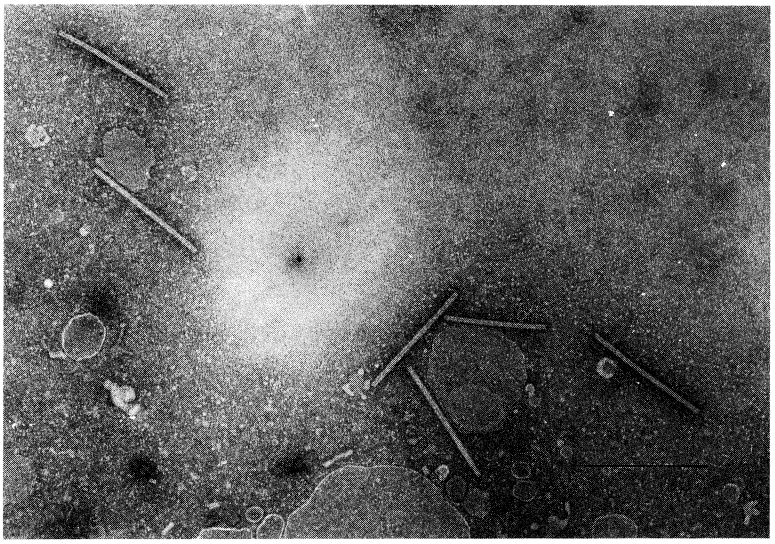

Fig. 2. Virus particles of soybean yellow vein virus obtained by dip method. Bar = 500 nm.

3. Discussion

Occurrence and distribution of SYVV disease was found to be limited to an area in which soybean was cultivated in rotation with sorghum. It is thus necessary to conduct further surveys in soybean fields.

Although *Aphis glycines* and *Bemisia tabaci* failed to transmit SYVV, the vectors transmitting the virus in the field have not been identified.

The virus consists of elongated particles (500–550 nm × 15–20 nm) whose infectivity was found to be unstable. Particle morphology of SYVV is similar to that of some viruses of possible members in tobamovirus group (2), namely, peanut clump virus (4), soil-borne wheat mosaic virus (1), broad bean necrosis virus (3) that are soil-borne viruses.

Further investigations about the soil transmissibility of SYVV and serological relationships with these viruses are under way.

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