

Difference in Pathogenicity of *Phialophora gregata* Isolates from Adzuki Bean in Japan and from Soybean in the United States

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ABSTRACT

Kobayashi, K., Kondo, N., Ui, T., Tachibana, H., and Aota, T. 1983. Difference in pathogenicity of *Phialophora gregata* isolates from adzuki bean in Japan and from soybean in the United States. *Plant Disease* 67:387-388.

Pathogenicity tests of the isolates of *Phialophora gregata* from adzuki beans (*Phaseolus angularis*) in Japan and from soybeans (*Glycine max*) in the United States were conducted in naturally infested fields in Japan and in the United States in 1980 and 1981. An adzuki bean isolate in Japan and a soybean isolate in the United States differed in their ability to infect and incite brown stem rot in each host.

Phialophora gregata (Allington & Chamberl.) W. Gams causes brown stem rot of soybeans (*Glycine max* (L.) Merr.) in the United States and of adzuki beans (*Phaseolus angularis* (Willd.) W. F. Wight) in Japan. There are no differences in the morphological and cultural characteristics and in the production of Gregatins (2) or wilt-inducing toxins of the isolates of *P. gregata* from soybeans and adzuki beans (3). This report describes experiments in Japan and the United States to compare the pathogenicity of a soybean isolate from the United States and an adzuki bean isolate from Japan.

MATERIALS AND METHODS

Seeds of American and Japanese soybean cultivars were planted in May 1980 in an adzuki bean field at the Tokachi Agricultural Experiment Station in Hokkaido, Japan, in a field naturally infested with the adzuki bean strain of *P.*

gregata. At the same time, five cultivars of adzuki beans were also planted in the same field. At maturity in mid-October, the stems of all plants were split longitudinally and checked for discoloration of vascular bundles and pith tissues, and the length of discolored stems was measured.

In another experiment, soybean cultivars were planted at the University Farm in Sapporo, Japan, where no brown stem rot (BSR) had previously been observed. Seven weeks after planting, the plants were inoculated with an adzuki bean isolate by using a method described previously (1). About 200 μ L of an inoculum suspension (2×10^7 conidia per milliliter) was injected into the hypocotyl wound, which had been made with a sterile hypodermic needle. Twenty plants from each cultivar, with three replicates of a 3-m row length, were inoculated. At the end of the summer, all inoculated plants were checked for discoloration of the vascular bundle and pith tissues.

In a soybean field naturally infested with a soybean strain of *P. gregata* in Ames, IA, soybean and adzuki bean cultivars were planted in May of 1980 and 1981. Ten plants from each of four

replicates of a 6-m row length were checked for BSR symptoms, and the length of the discolored stems was measured in September.

RESULTS AND DISCUSSION

Results obtained in Japan. Data obtained shows that all soybean cultivars were not infected by the adzuki bean strain of *P. gregata*, whereas all adzuki bean cultivars became diseased (Table 1), but with wounding and inoculation, all

Table 1. Pathogenicity of an adzuki bean strain of *Phialophora gregata* in Japan to U.S. and Japanese soybeans and Japanese adzuki beans in a naturally infested field at Tokachi, Hokkaido, Japan, in 1980

Cultivar	Plants diseased (%) ^a	Mean height of internal stem discoloration (cm) ^a
U.S. soybeans		
BSR-301	0	0
BSR-302	0	0
Oakland	0	0
A77-116013	0	0
Clark	0	0
Weber	0	0
Ontario	0	0
A-3	0	0
Japanese soybeans		
Toyosuzu	0	0
Yuzuru	0	0
Kitami-shiro	0	0
Wase-midori	0	0
Adzuki beans		
Chagara	100	19.0
Takara	100	18.0
Kotobuki	100	17.5
Maruba	100	18.7
Wase-dairyu	100	16.0

^aTen plants were examined from each of three replicates of a 3-m row length.

Accepted for publication 11 September 1982.

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Table 2. Pathogenicity of an adzuki bean isolate of *Phialophora gregata* from Japan to U.S. soybeans in an inoculation experiment at Sapporo, Hokkaido, Japan, in 1980

Cultivar	Maturity group	Reaction obtained in the United States ^a	Reaction obtained in Japan ^b	
			Plants diseased (%)	Mean height of internal stem discoloration (cm)
U.S. soybeans				
Ontario	0	Susceptible	25	1.5
A-3	I	Resistant	70	18.5
Weber	I	Susceptible	22	2.2
A77-116013	I	Resistant	75	12.4
Oakland	III	Susceptible	82	21.3
BSR-301	III	Resistant	50	8.7
BSR-302	III	Resistant	70	13.2
Clark	IV	Susceptible	80	22.3

^aBrown stem reaction obtained by C. C. Kusek and H. Tachibana in 1981 in Iowa does not correlate with reaction obtained in Japan.

^bTwenty inoculated plants were examined from each of three replicates of a 3-m row length.

soybean cultivars were infected and developed BSR symptoms (Table 2). The lengths of discolored portions of the stems, however, were limited to about 1.5–22.3 cm (Table 2). From the data presented (Tables 1 and 2), it appears that the adzuki bean isolate of *P. gregata* cannot enter the vascular systems of soybean plants through the unwounded roots in naturally infested fields unless the plants are wounded and inoculated.

Results obtained in the United States.

All Japanese cultivars became diseased when subjected to the soybean strain of *P. gregata* in the United States, whereas all adzuki cultivars were not infected (Table 3). Japanese soybean cultivar Kosodefuri

was judged to be relatively resistant to *P. gregata*, compared with the other Japanese soybean cultivars.

From the results of these two field experiments conducted in Japan and in the United States, we have concluded that the adzuki bean isolate of *P. gregata* in Japan and the soybean isolate in the United States differ in their capacity to infect and incite brown stem rot in each host.

LITERATURE CITED

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Table 3. Pathogenicity of a soybean strain of *Phialophora gregata* in the United States to Japanese soybeans and adzuki beans in a naturally infested field at Ames, IA, in 1980 and 1981

Cultivar	Plants diseased (%) ^a	Mean height of internal stem discoloration (cm) ^a
Japanese soybeans		
Toyosuzu	57.7	29.5
Yuzuru	95.0	49.5
Kitamumume	75.0	29.6
Kitami-shiro	100.0	54.6
Wase-midori	85.0	50.0
Okuhara	100.0	44.4
Chusei-hikarikuro	100.0	32.5
Sodefuri	95.0	48.7
Kosodefuri	30.0	12.9
Adzuki beans		
Chagara	0	0
Takara	0	0
Kotobuki	0	0
Maruba	0	0
Wase-dairyu	0	0

^aTen plants were examined from each of four replicates of a 6-m row length.

antibiotic compounds produced by *Cephalosporium gregatum*. Physiol. Plant Pathol. 11:55-60.

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