

# 静岡県から分離された *Phytophthora megasperma* var. *sojae* に対するダイズ品種の反応

|       |                                                              |
|-------|--------------------------------------------------------------|
| 誌名    | 日本植物病理學會報 = Annals of the Phytopathological Society of Japan |
| ISSN  | 00319473                                                     |
| 著者名   | 鈴木, 孝仁                                                       |
| 発行元   | 日本植物病理學會                                                     |
| 巻/号   | 49巻1号                                                        |
| 巻号補足  |                                                              |
| 掲載ページ | p. 63-65                                                     |
| 発行年月  | 1983年1月                                                      |

農林水産省 農林水産技術会議事務局筑波産学連携支援センター  
Tsukuba Business-Academia Cooperation Support Center, Agriculture, Forestry and Fisheries Research Council  
Secretariat



## Reactions of Soybean Cultivars to *Phytophthora megasperma* var. *sojae* Isolated from Shizuoka

Takahito SUZUI\*

鈴木孝仁\*: 静岡県から分離された *Phytophthora megasperma*  
var. *sojae* に対するダイズ品種の反応

**Key Words:** *Phytophthora megasperma* var. *sojae*, cultivars reaction.

Phytophthora root rot of soybean (*Glycine max* (L.) Merr.), caused by *Phytophthora megasperma* var. *sojae*, was first reported by Suhovecky *et al.*<sup>1)</sup> in Ohio in 1955. In Japan, Tsuchiya *et al.*<sup>2)</sup> reported the occurrence of Phytophthora root and stem rot in Hokkaido in 1978. The disease was also recognized in Shizuoka Prefecture during 1978 and 1979, particularly on drained paddy fields and upland fields. This report deals with the reaction of different soybean cultivars to 3 isolates of *P. megasperma* var. *sojae* from Shizuoka.

Soybean cultivars affected in field by the root and stem rot were Enrei, Tozan 112, Nakahata, Hamamatsu-Zairai and Fujimusume. *Phytophthora* sp. was successfully isolated from diseased tissues when PDA or BNPR+HMI supplemented PDA media<sup>3)</sup> were used. Morphological features of sporangia, oogonia, antheridia and oospores, and cardinal temperatures of isolate N5 (IFO 31015) from cv. Enrei, isolate G 3 (IFO 31014) from Nakahata and isolate H 12 (IFO 31016) from Hamamatsu-Zairai, were identical with those of *P. megasperma* var. *sojae* described by Hildebrand<sup>4)</sup>.

Inoculation of soybean and other leguminous plants was made by the hypocotyl method<sup>5)</sup>. Alfalfa (*Medicago sativa* L. subsp. *sativa*) was inoculated by either hypocotyl or soil drench methods<sup>6)</sup>. Soybean cv. Tamanishiki was killed by inoculation with *Phytophthora* isolate N5, G3 and H12. No symptoms, however, appeared on alfalfa cv. Moapa, kidney bean (*Phaseolus vulgaris*), broad bean (*Vicia faba*), pea (*Pisum sativum*), cowpea (*Vigna sinensis*) and peanut (*Arachis hypogaea*) when these were inoculated with either one of three isolates. On the basis of the above results, the fungus was identified as *Phytophthora megasperma* var. *sojae* Hildebrand 1959. Kuan and Erwin<sup>7)</sup> proposed that *P. megasperma* can be subdivided into two speciales, *P. megasperma* f. sp. *medicaginis* for the isolates that attack alfalfa and *P. megasperma* f. sp. *glycinea* for the isolates that attack soybean. Accordingly the isolates N5, G 3 and H 12 were considered to belong to the *P. megasperma* f. sp. *glycinea*, since the isolates attacked only soybean.

\* Shizuoka Agricultural Experiment Station, Toyoda-cho, Shizuoka 438, Japan 静岡県農業試験場

1) Suhovecky, A. J. and Schmitthenner, A. F. (1955). Ohio Farm Home Res. 40: 85-86. 2) Tsuchiya, S., Kodama, F., Akai, J. and Muramatsu, Y. (1978). Ann. Phytopath. Soc. Japan 44: 351. 3) Masago, H., Yoshikawa, M., Fukada, M. and Nakanishi, N. (1977). Phytopathology 67: 425-428. 4) Hildebrand, A. A. (1959). Can. J. Bot. 37: 927-957. 5) Laviolett, F. A. and Athow, K. L. (1971). Phytopathology 61: 439-440. 6) Erwin, D. C. (1966). Ibid. 56: 653-657. 7) Kuan, T-L. and Erwin, D. C. (1980). Ibid. 70: 333-338.

In an attempt to identify the races for the isolates, inoculation test to different soybean cultivars was carried out by the hypocotyl method<sup>5)</sup> keeping inoculated plants in phytotron for 6 days at the temperatures of 25 and 21 C during the day and night time respectively. After inoculation wilting and dying of the plants were observed. The soybean cultivars used for inoculation were the United States differential cultivars (Harosoy, Sanga, Harosoy 63, Mack, Altona, PI 103091, PI 171442, Tracy) and Japanese cultivars (Tamanishiki, Enrei, Fukuyutaka, Tozan 112, Tozan 113, Hokyoku, Akiyoshi, Fujimusume, Akisengoku, Hamamatsu-Zairai). The test was repeated 4 times.

The isolate G 3 attacked all of the 10 Japanese cultivars used, whereas isolate N 5 and H 12 killed the 7 Japanese cultivars but not Fukuyutaka, Tozan 112 and Tozan 113 (Table 1). The three isolates killed all of the U. S. differential cultivars (Table 2). These results may indicate the existence of physiological races of *P. megasperma* var. *sojae* in Japan as reported by Kodama *et al.*<sup>8)</sup> Keeling<sup>9)</sup> added 4 new physiological races of *P. megasperma* f. sp. *glycinea* and have been identified 20 races. However, the isolates in Shizuoka were different from them of *P. megasperma* f. sp. *glycinea*. Also the results obtained differed from those reported by Komada *et al.*<sup>8)</sup> in Hokkaido and by Sato *et al.*<sup>10)</sup> in Yamagata. Three isolates from Shizuoka are probably new races. Recently, Tsuchiya *et al.*<sup>11)</sup> reported that *P. megasperma* var. *sojae* collected from Hokkaido and Yamagata could be divided into 9 groups from the pathogenicity test using Japanese soybean cultivars. It is suggested that investigations on the physiological races of *P. megasperma* var. *sojae* require the use of a larger number of isolates collected over wide areas and numerous Japanese soybean cultivars for the establishment

Table 1. Pathogenicity of *Phytophthora megasperma* var. *sojae* isolates N5, G3 and H12 from soybean in Shizuoka to Japanese soybean cultivars

| Japanese soybean cultivars | Wilt of plants <sup>a)</sup> |    |     |
|----------------------------|------------------------------|----|-----|
|                            | Isolate N5                   | G3 | H12 |
| Tamanishiki                | +                            | +  | +   |
| Enrei                      | +                            | +  | +   |
| Fukuyutaka                 | —                            | +  | —   |
| Tozan 112                  | —                            | +  | —   |
| Tozan 113                  | —                            | +  | —   |
| Hokyoku                    | +                            | +  | +   |
| Akiyoshi                   | +                            | +  | +   |
| Fujimusume                 | +                            | +  | +   |
| Akisengoku                 | +                            | +  | +   |
| Hamamatsu-Zairai           | +                            | +  | +   |

a) +: wilt, —: healthy

Table 2. Pathogenicity of *Phytophthora megasperma* var. *sojae* isolates N5, G3 and H12 from soybean in Shizuoka to the United States differential soybean cultivars

| U. S. soybean differential cultivars | Wilt of plants <sup>a)</sup> |    |     |
|--------------------------------------|------------------------------|----|-----|
|                                      | Isolate N5                   | G3 | H12 |
| Harosoy                              | +                            | +  | +   |
| Sanga                                | +                            | +  | +   |
| Harosoy 63                           | +                            | +  | +   |
| Mack                                 | +                            | +  | +   |
| Altona                               | +                            | +  | +   |
| PI 103091                            | +                            | +  | +   |
| PI 171442                            | +                            | +  | +   |
| Tracy                                | +                            | +  | +   |

a) +: wilt

8) Kodama, F. and Tsuchiya, S. (1979). Ann. Phytopath. Soc. Japan 45: 529. 9) Keeling, B. L. (1982). Plant Dis. 66: 334-335. 10) Sato, T., Kobayashi, N. and Komada, H. (1981). Ann. Rept. Plant Prot. North Japan 32: 115-116. 11) Tsuchiya, S., Tanaka, F. and Kodama, F. (1982). Ann. Phytopath. Soc. Japan 48: 348.

of races in Japan.

The author wishes to thank Dr. E.E. Hartwig, Delta Branch Experiment Station, Stoneville, Mississippi, Dr. R.L. Bernard, U.S. Regional Soybean Laboratory, Seed Stock Laboratory, Institute of National Agriculture Sciences, Japan, Dr. K. Hashimoto, Tohoku National Agriculture Experiment Station, Messrs. K. Kitazawa and N. Matsumoto, Hokkaido National Agriculture Experiment Station, for the collection of seeds.

(Received March 18, 1982)