*Plant Pathol. J. 21(4) : 406-408 (2005)*

Note

The Plant Pathology Journal


# Occurrence of Web Blight in Soybean Caused by *Rhizoctonia solani* AG-1(IA) in Korea

**Wan Gyu Kim[1]*, Sung Kee Hong[2] and Seong Sook Han[3]**

[1]*Applied Microbiology Division, National Institute of Agricultural Science and Technology (NIAST), Rural Development Administration (RDA), Suwon 441-707, Korea*

[2]*Plant Pathology Division, NIAST, RDA, Suwon 441-707, Korea*

[3]*Crop Environment and Biotechnology Division, National Institute of Crop Science, RDA, Suwon 441-857, Korea*

*(Received on November 8, 2005; Accepted on November 22, 2005)*

**Web blight symptoms were frequently observed on soybean plants grown in a farmer's fields located in Jincheon in Korea during a disease survey in August, 2005. Incidence of the disease was 5-20% infected plants in two of four soybean fields investigated. A total of 31 isolates of *Rhizoctonia* sp. were obtained from leaves, leaf petioles, and pods of diseased soybean plants. The isolates were identified as *Rhizoctonia solani* AG-1(IA) by anastomosis test and based on the morphological and cultural characteristics. Three isolates of *R. solani* AG-1(IA) were tested for pathogenicity to five cultivars of soybean by artificial inoculation. All the isolates induced blight symptoms on the leaves of soybean and formed sclerotia on the lesions, which were similar to those observed in the field. The pathogenicity tests revealed that all the soybean cultivars tested were susceptible to the pathogen. There was no difference in the pathogenicity among the isolates. The present study first reveals that *R. solani* AG-1(IA) causes web blight of soybean in Korea.**

***Keywords*** : anastomosis group, pathogenicity, *Rhizoctonia solani*, soybean, web blight

Soybean [*Glycine max* (L.) Merr.] is grown in most parts of the world as a primary source of vegetable oil and protein as well as food, feed, and industrial uses. In Korea, the crop is cultivated in all provinces. Foliage blight symptoms were frequently observed on soybean plants (cultivar Daepung) grown in a farmer's fields located in Jincheon in Korea during a disease survey in August, 2005. The symptoms began on the lower parts of the plants and moved up to upper parts (Fig. 1). Under humid conditions, infected leaves showed water-soaked spots at the early stage, and the lesions turned grayish brown to reddish brown irregular spots in a few days after initial appearance of the symptoms. During the disease development, symptoms were characterized by web-like mycelia overgrown on the plants. Severely infected leaves and pods were wholly blighted. A lot of sclerotia were produced on the diseased plant parts at the late stage. Incidence of the disease was 5-20% infected plants in two of four soybean fields investigated.

A total of 31 isolates of *Rhizoctonia* sp. were obtained from leaves, leaf petioles, and pods of diseased soybean plants. All the isolates were identified as *Rhizoctonia solani* Kühn based on the morphological characteristics according to the descriptions of previous workers (Parmeter and Whitney, 1970; Sneh et al., 1991). The isolates were tested to classify anastomosis groups and cultural types using the tester isolates of *R. solani* as previously conducted (Kim et al., 1994). All the isolates tested were classified as AG-1(IA) of *R. solani*.

Three isolates of *R. solani* AG-1(IA) were tested for pathogenicity to five cultivars of soybean by artificial inoculation. Mycelial disks of 6 mm in diameter obtained from the margins of actively growing cultures of each isolate on potato dextrose agar were placed between the stems and the leaf petioles of 22-day-old plants grown in circular plastic pots (29 cm in height and 21 cm in diameter) in the greenhouse. The inoculated plants were incubated and cultivated in the same way of the method conducted by Kim (1996). All the isolates of *R. solani* AG-1(IA) induced blight symptoms on the leaves of soybean and formed sclerotia on the lesions. The symptoms on the leaves induced by artificial inoculation were similar to those observed in the field. The isolates which induced symptoms on the leaves were re-isolated from the symptoms. The pathogenicity tests revealed that all the soybean cultivars tested were susceptible to the pathogen (Table 1). There was no difference in the pathogenicity among the isolates.

*R. solani* was reported to cause aerial blight, damping-off, root rot, and stem rot in soybean (Farr et al., 1989; Tu et al., 1996). Foliage blight was the typical symptom observed in the field by the present authors. As previously described

*Corresponding author.
Phone) +82-31-290-0363, FAX) +82-31-290-0209
E-mail) wgkim@rda.go.kr

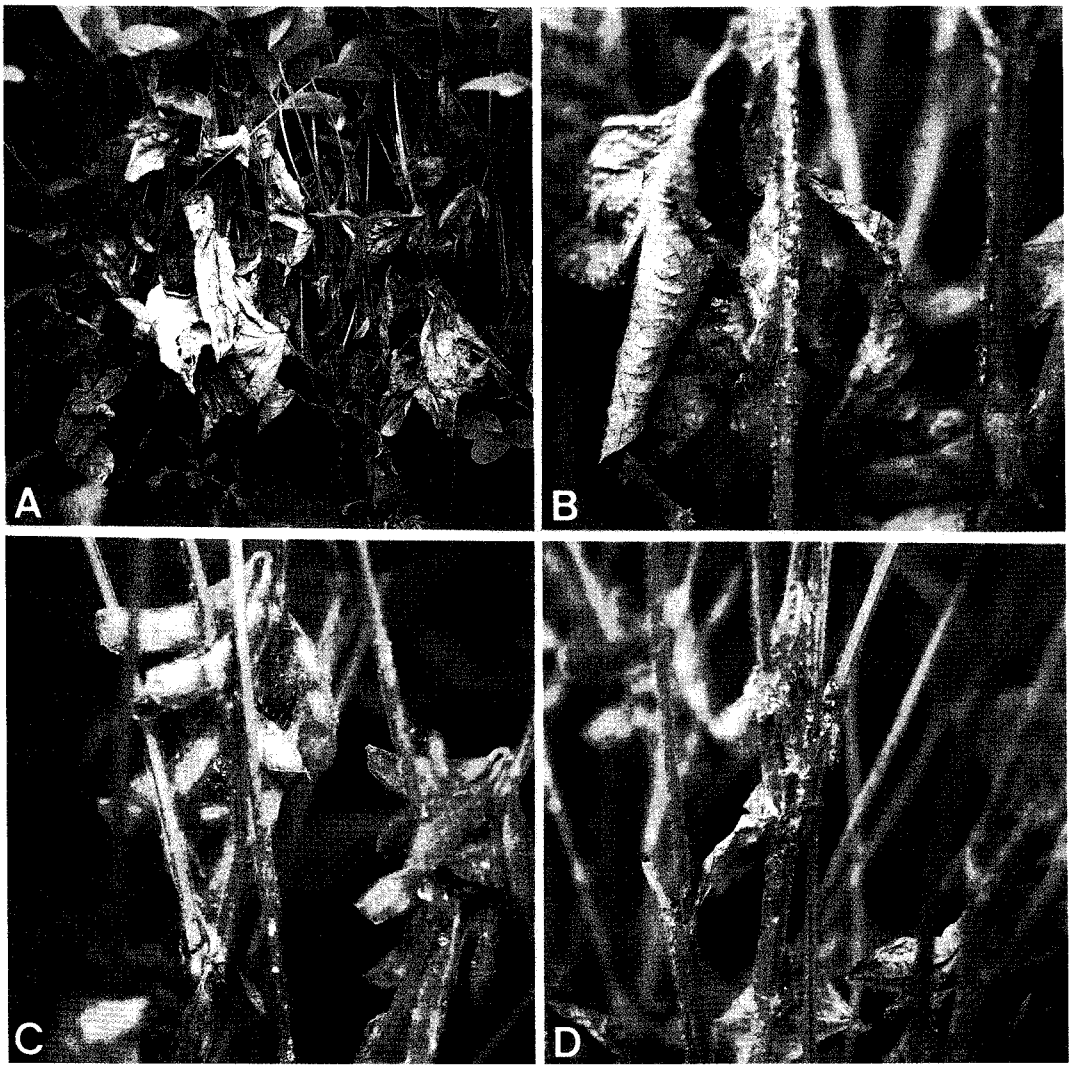


**Fig. 1.** Web blight symptoms on soybean plants caused by *Rhizoctonia solani* AG-1(IA) in the field. A, diseased plants; B, sclerotial formation on leaves and leaf petioles; C, web-like mycelial growth on pods; D, sclerotial formation on diseased pods and stems.

**Table 1.** Pathogenicity of *Rhizoctonia solani* AG-1(IA) isolates to five cultivars of soybean by artificial inoculation

| Cultivar tested | Virulence of isolates[a] | | |
|---|---|---|---|
| | R05-01 | R05-24 | R05-30 |
| Daepung | + | + | + |
| Hwanggeum | + | + | + |
| Ilpum | + | + | + |
| Sowon | + | + | + |
| Taegwang | + | + | + |
| Control | − | − | − |

[a] Disease severity was rated 7 days after inoculation. + = severe blight symptoms were produced on the leaves; − = no symptom.

(Sinclair, 1982), web blight is a characteristic disease name for blight symptoms of soybean because the causal fungus forms web-like mycelia on the infected plants. In the present study, other symptoms except the web blight were not observed in the fields surveyed. *R. solani* has a variety of hosts (Kim et al., 1994; Sneh et al., 1991), and anastomosis groups or cultural types of the fungus cause various symptoms even on the same plant (Kim, 1996; Tu et al., 1996). Accordingly damping-off, root rot, and stem rot caused by other anastomosis groups or cultural types of *R. solani* besides *R. solani* AG-1(IA) could occur on soybean plants in Korea. It has been reported that cultural types IA and IB of *R. solani* cause web blight in soybean in foreign countries (Tu et al., 1996). The present study first reveals that *R. solani* AG-1(IA) causes web blight of soybean in Korea.

*R. solani* AG-1(IA) mostly attacks gramineous crops including rice (*Oryza sativa* L.) (Kim, 1996). The fungus usually causes severe sheath blight of rice in Korea. Therefore, if soybean is cultivated in paddy fields for crop

rotation, web blight might severely occur on the soybean plants.

## References

Farr, D. F., Bills, G. F., Chamuris, G. P. and Rossman, A. Y. 1989. *Fungi on Plants and Plant Products in the United States.* APS Press. The American Phytopathological Society, St. Paul, Minnesota, USA.

Kim, W. G. 1996. Pathogenicity of anastomosis groups and cultural types of *Rhizoctonia solani* isolates on crops. *Korean J. Plant Pathol.* 12:21-32.

Kim, W. G., Cho, W. D. and Lee, Y. H. 1994. Anastomosis groups and cultural characteristics of *Rhizoctonia solani* isolates from crops in Korea. *Kor. J. Mycol.* 22:309-324.

Parmeter, J. R. Jr. and Whitney, H. S. 1970. Taxonomy and nomenclature of the imperfect state. In: *Rhizoctonia solani, Biology and Pathology*, ed. by J. R. Jr. Parmeter, pp. 7-19. University of California Press, Berkeley, Los Angeles and London.

Sinclair, J. B. 1982. *Compendium of Soybean Diseases.* Second edition. The American Phytopathological Society, St. Paul, Minnesota, USA.

Sneh, B., Burpee, L. and Ogoshi, A. 1991. Identification of *Rhizoctonia* Species. APS Press, The American Phytopathological Society, St. Paul, Minnesota, USA.

Tu, C. C., Hsieh, T. F. and Chang, Y. C. 1996. Vegetable diseases incited by *Rhizoctonia* spp. In: *Rhizoctonia Species: Taxonomy, Molecular Biology, Ecology, Pathology and Disease Control.* ed. by B. Sneh, S. Jabaji-Hare, S. Neate, and G. Dijst, pp. 369-377. Kluwer Academic Publishers, Dordrecht, The Netherlands.