

## Occurrence of Clubroot on Shepherd's-purse Caused by *Plasmodiophora brassicae*

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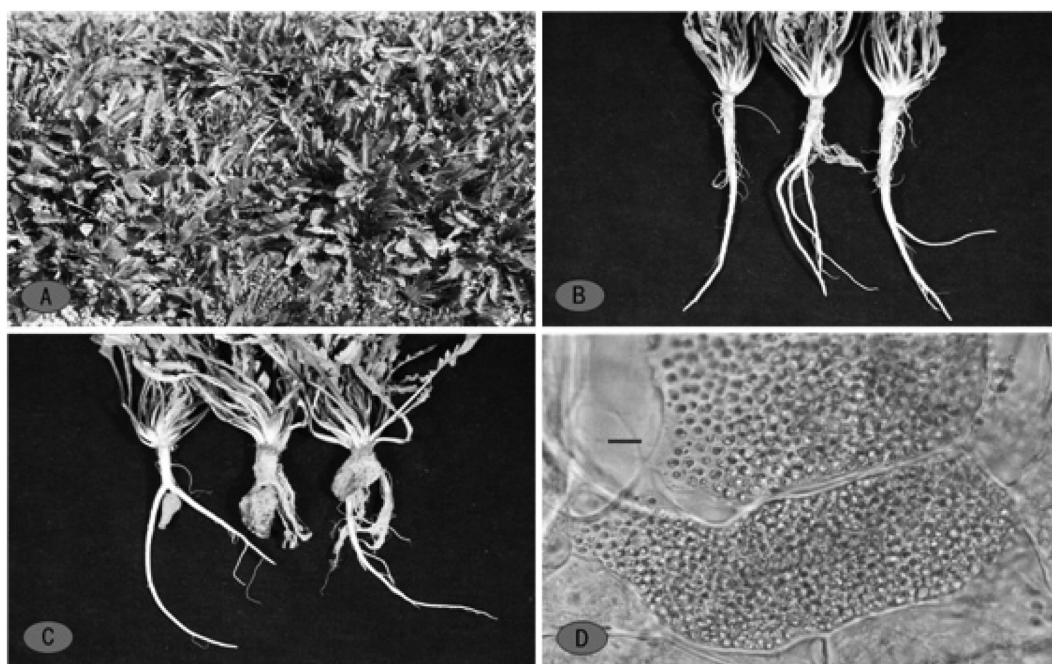
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Clubroot symptoms were frequently observed on roots of shepherd's-purse (*Capsella bursa-pastoris*) grown in a field in Nonsan, Chungnam province, Korea in March, 2009. Many resting spores were found in the cells of the root gall tissues collected from the field. The clubroot pathogen was identified as *Plasmodiophora brassicae* based on its morphological and pathological characteristics. This is the first report that *P. brassicae* causes clubroot of shepherd's-purse in Korea.

**KEYWORDS :** Clubroot, Identification, *Plasmodiophora brassicae*, Shepherd's-purse

Shepherd's-purse [*Capsella bursa-pastoris* (L.) Medicus] is a wild plant distributed globally. The plant is a popular vegetable in Korea. Clubroot symptoms were frequently observed on roots of the plant grown in a field in Nonsan, Chungnam province, Korea during a disease survey performed in March, 2009. There was no distinct

difference between the aerial parts of healthy plants and infected plants during the growing period (Fig. 1A). The symptoms of infected plants appeared as galls on the roots, whereas healthy plants have no galls (Fig. 1B and 1C). The infected plants were retarded in growth and slightly wilted at the late stage of growth. The average



**Fig. 1.** Clubroot symptoms on shepherd's-purse plants observed in the field and observation of root tissue sections by light microscopy. A, Aerial parts of shepherd's-purse plants; B, Healthy plants; C, Infected plants with root galls; D, Resting spores in the host cells (scale bar = 10  $\mu$ m).

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incidence of the disease symptoms was 6.4% in the field investigated.

Root galls of shepherd's-purse were collected from the field for examination and inoculation experiments. The root galls were sectioned using a scalpel and observed by light microscopy. Many resting spores were found in the cells of the root gall tissues (Fig. 1D). The resting spores were hyaline, spherical and measured 2.5~4.0  $\mu\text{m}$  in diameter.

Root galls of shepherd's-purse collected were used for inoculum preparation of the pathogen. Suspension of resting spores was prepared from each of the collected root galls [1]. The suspension was adjusted to a concentration of  $5\sim6 \times 10^6$  spores/mL using a hemocytometer. The 20 mL suspension prepared from each gall was inoculated to roots of young shepherd's-purse plants grown in circular plastic pots (29 cm in height and 21 cm in diameter) in a greenhouse at 18~28°C. The same quantity of sterile distilled water was used as the control. Disease ratings were made based on the degree of gall formation on the roots 50 days after inoculation. The inoculation test was performed in three independent replicates.

Each of three resting spore suspensions caused clubroot symptoms on the roots, which were similar to those observed during the field survey. Resting spores of the pathogen were observed in the cells of the affected roots. The clubroot pathogen was identified as *Plasmodiophora brassicae* Woronin based on its morphological and pathological characteristics, which were consistent with those described by Buczacki [2].

*P. brassicae* causes clubroot of crucifers [2, 3]. The disease has been a major problem in areas where Chinese cabbage and some other cruciferous crops are cultivated in Korea [1, 4]. Shepherd's-purse is a cruciferous wild plant and cultivated rarely as a vegetable in the country. There was a record on the disease occurrence of the plant in the United States [5]. This is the first report that *P.*

*brassicae* causes clubroot of shepherd's-purse in Korea.

Various physiologic races based on the pathogenicity of *P. brassicae* isolates have been reported attacking crucifers [6, 7]. Further study is needed to identify races of the pathogen isolates from shepherd's-purse.

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