

Black Stem: A Fungal Disease of Common Purslane in California

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ABSTRACT

Klisiewicz, J. M., Clement, S. L., and Norris, R. F. 1983. Black stem: A fungal disease of common purslane in California. *Plant Disease* 67:1162.

A disease of purslane, a common weed in California, causes stem blackening and constriction at the soil line. Black lesions occasionally develop on upper stem parts. Infected roots become dark and constricted. Spread of the pathogen *Dichotomophthora portulacae* in the stems and root may result in death of purslane plants.

Common purslane (*Portulaca oleracea* L.) is a succulent annual weed distributed throughout the temperate United States. It is a troublesome weed that thrives under dry soil conditions and is competitive with irrigated vegetable and field crops.

Dichotomophthora portulacae Mehrlich & Fitzpatrick ex M. B. Ellis reported on purslane in Hawaii, Jamaica, Sudan, and Venezuela (3,4) and *D. indica* P. N. Rao in India (6) and Ontario (1) are endemic-occurring pathogens of the weed. Epiphytotic were reported on purslane in Hawaii (4). In India (6), the disease was lethal during the winter. Disease symptoms were described as leaf spots.

In assessing damage to purslane by sawfly (*Schizocerella pilicornis* (Holmgren)) and weevil (*Hypurus bertrandii* Perris) larvae and weevil adults, a malady was observed on stems of purslane plants, particularly at the soil line, that did not appear to be associated with insect damage (2). Stems showed dark discoloration and constriction (Fig. 1). Progression of the disease in the main stem and branches resulted in subsequent death of some plants, particularly when young. Dark lesions occasionally developed in other stem parts that were in contact with the soil and less frequently in stem parts not in contact with the soil. Roots were also attacked but were usually invaded by the pathogen spreading from infected stems. Black sclerotia were abundant in diseased tissues and conidia formed on stem lesions under moist soil conditions. The disease and damage to leaves by weevil and sawfly larvae had a devastating effect on purslane plants, resulting in death.

Accepted for publication 24 June 1983.

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Stem pieces with dark lesions were surface-sterilized in 1% sodium hypochlorite for 30–60 sec, rinsed in sterile distilled water, and plated on water agar. Tips of hyphae originating from tissue pieces were transferred to potato-dextrose agar (PDA). Cultures of 35 isolates were established on PDA. Sclerotia and branched conidiophores bearing several 0–6 septate dark cylindrical conidia at apices formed in the cultures. Some isolates were prolific producers of sclerotia, whereas other isolates produced fewer sclerotia but produced abundant conidia. Isolates showed variable growth and stability on PDA. Morphological characteristics of the fungus in culture conformed to the description of the type species *D. portulacae* (3).

D. portulacae grown in vermiculite saturated with V-8 juice solution (800 ml of water, 200 ml of V-8 juice, and 2 g of CaCO₃) formed abundant sclerotia and some conidia. Cultures in the medium were mixed (1:3, v/v) with autoclaved soil for inoculum. One-hundred milliliters of inoculum was applied per pot on the soil surface around the stems of 4-wk-old purslane plants grown in controlled-temperature chambers and illuminated for 14 hr daily. In some pots, the inoculum was in contact with the lowest lateral branches. Water was supplied in



Fig. 1. Blackening and constriction of stems of common purslane caused by *Dichotomophthora portulacae* in the field.

trays under the pots. Lesions became evident on stems of plants about 8 days after inoculation. Four weeks after inoculation, 16, 45, and 63% of the plants were dead at 18, 27, and 36 C, respectively. The fungus was reisolated from diseased tissues.

Four-week-old plants were sprayed with a suspension of conidia (5,000/ml) from cultures on PDA and enclosed in plastic bags for 24 and 72 hr. Necrotic spots became evident on leaves within 24 hr of inoculation. Infected leaves turned yellow and dropped from the plant. Dark lesions developed at branch nodes and at apices of the main stem and branches, resulting in dieback. Disease severity was enhanced by extending the time the plants were kept in a moist environment. Inoculated plants not enclosed in plastic bags did not develop disease symptoms on leaves and stems. Plants sprayed with sterile distilled water and enclosed in plastic bags were symptomless.

Use of *D. portulacae* to control purslane was suggested in Hawaii (4); however, we are not aware of literature that documents research of that nature. Research with *D. portulacae* as an agent for biological control of purslane in New York State led to the conclusion that, under dry summer conditions, the fungus was of little value in controlling the weed (5). To our knowledge, this is the first report on the natural occurrence of *D. portulacae* on purslane in the mainland United States. Distribution of the disease in the western United States has not been determined. Studies have been initiated on the biological characteristics of *D. portulacae* and the evaluation of the pathogen for use in biological control of purslane.

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