

Cocklebur: A New Host for Several *Sclerotinia* Species

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ABSTRACT

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Sclerotia were observed for the first time within the stems of cocklebur (*Xanthium pensylvanicum*) growing in a Maryland soybean (*Glycine max*) field. No previous record of cocklebur as a host of any *Sclerotinia* sp. has been found. Experiments showed that *S. sclerotiorum*, *S. minor*, and the field isolate from cocklebur were equally virulent on cocklebur, whereas *S. trifoliorum* was less virulent.

Sclerotinia spp. are common throughout many parts of the United States. In the mid-Atlantic region, *Sclerotinia* spp. usually cause minor diseases of soybeans (*Glycine max* (L.) Merr.), but contamination of soybean seed by even a few sclerotia lowers seed quality and hence price. This article reports the finding of 1-3% seed contamination caused by sclerotia in a new host species *Xanthium pensylvanicum* Wallr., a common weed in soybean fields.

During the summer of 1981, a field planted with soybean cultivar Ware also contained a high population of cocklebur (100-300/m²). This field, located in Talbot County, MD, was selected for weed control studies. In late June about 3 wk after planting, apothecia of a discomycetous fungus were observed. At harvest in late November 1981, sclerotia were found mixed with the harvested soybean seed at a level of 1-3% by weight. Stems and seeds of both soybeans and cocklebur were examined for presence of sclerotia. No sclerotia were found in the soybean tissue, but sclerotia were readily found in the pith of 10-20% of the cocklebur stems. The fungus had no apparent effect on the infected cocklebur plants because they were robust (up to 2 m tall) and had apparently normal levels of seed production.

MATERIALS AND METHODS

Sclerotia retrieved from the pith of naturally infected field-grown cocklebur were surface-sterilized in 0.5% sodium hypochlorite and placed on a modified

potato-dextrose agar (PDA) (1). The cultures were incubated in the dark at 20 C. Within 4-6 days, the fungus was isolated and transferred to PDA.

To obtain the apothecia of the fungus, sclerotia from the pith of field-grown cocklebur were placed on unsterile moist quartz sand in 9-cm storage dishes. The dishes were incubated in a refrigerator (5 C) for 30 days and then moved to a growth chamber at 20 C with a 12-hr light cycle.

To test for pathogenicity of the unidentified fungus, known isolates of *Sclerotinia minor* Jagger, *S. sclerotiorum* (Lib.) de Bary, *S. trifoliorum* Eriks., and the cocklebur isolate were grown on autoclaved oats (*Avena sativa* L.) for 7 days. The oat seed inoculum was placed at the base of the cocklebur stem and at three different heights on the stem. The inoculum was held in place on the stem with masking tape for 7 days.

Seeds of cocklebur were collected from the field in which the infected cockleburs

Table 1. Infection of cocklebur (*Xanthium pensylvanicum*) by species of *Sclerotinia* 7 days after inoculation in a growth chamber^x

<i>Sclerotinia</i> species	Average no. infections per plant ^y
<i>S. trifoliorum</i>	0.5 a ^z
<i>S. sclerotiorum</i>	2.5 b
Cocklebur isolate of <i>Sclerotinia</i> sp.	3.0 b
<i>S. minor</i>	3.2 b

^x Plants were maintained in a growth chamber at 20 C and a 12-hr day length.

^y Each plant was inoculated with oat-seed inoculum previously colonized for 7 days by each species and taped in place at four sites on each stem. Six plants were inoculated with each pathogen. Each plant was rated from 0 to 4: 0 = no infection at any site, 1 = one site infected, 2 = two sites infected, 3 = three sites infected, and 4 = all sites on the stem infected.

^z Means followed by the same letter are not significantly different ($P=0.01$) according to Duncan's multiple range test.

were originally found. The seeds were germinated in a potting mix (equal parts by volume of sandy loam, peat moss, and perlite) in the greenhouse and transplanted into 12.5-cm pots also containing this mix. The plants were grown in a growth chamber at 25 C and a 12-hr day length. They were inoculated 4-5 wk after they were transplanted to the pots. After inoculation, each pot containing one plant was covered with a clear plastic bag to maintain a high relative humidity around the plant. Seven days later, the plastic bags were removed and disease severity was assessed at each inoculation point as either positive or negative. The plants were incubated for seven additional days without the plastic bags and disease severity was assessed a second time.

RESULTS

Cocklebur from the field had (in the

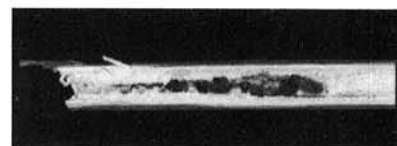


Fig. 1. Sclerotia of *Sclerotinia sclerotiorum* in the pith of field-grown cocklebur.

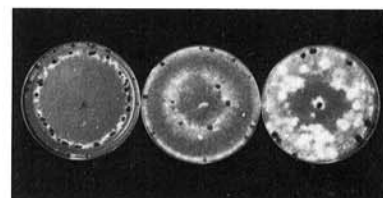


Fig. 2. Six-day-old cultures of (left) *Sclerotinia trifoliorum*, (center) cocklebur isolate, and (right) *S. sclerotiorum* grown on potato-dextrose agar at 20 C in the dark.

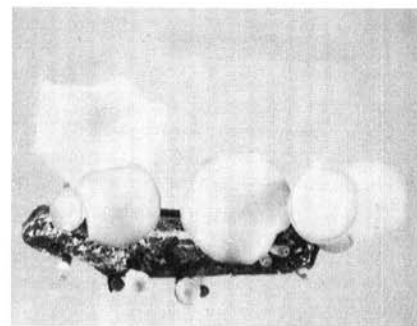


Fig. 3. Apothecia of the cocklebur isolate produced on a sclerotium obtained from a field-grown cocklebur plant.

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pith of infected plants) sclerotia close in size to those normally associated with *S. sclerotiorum* (Fig. 1). An isolate of the fungus obtained from cocklebur, cultured on PDA and compared with known isolates of *S. sclerotiorum* and *S. trifoliorum*, was very similar to that described by Willetts and Wong (4) for *S. sclerotiorum* (Fig. 2). Sclerotia of the cocklebur isolate produced apothecia similar to those produced by *S. sclerotiorum* (Fig. 3).

All three species of *Sclerotinia* as well as the isolate from cocklebur caused infection on cocklebur (Table 1). Each of the fungi caused the typical water-soaked lesions characteristic of *S. sclerotiorum* on bean (*Phaseolus vulgaris* L.). The cocklebur isolate, *S. sclerotiorum*, and *S. minor* were equally virulent on cocklebur, whereas *S. trifoliorum* was less virulent. Sclerotia of *S. minor*, *S. sclerotiorum*, and the cocklebur isolate were formed in the pith of the plants, whereas *S. trifoliorum* failed to form sclerotia.

DISCUSSION

Purdy (2) reported that species of *Sclerotinia* are among the most non-specific, omnivorous, and successful pathogens of plants. He reported that they attack 361 plant species in 225 genera in 64 families. As far as we know, this is the first record of the genus *Xanthium* and the species *pensylvanicum* as host for any species of *Sclerotinia*. In North America, *X. pensylvanicum* is widespread from southern Canada through most of the United States.

It is important to know all of the hosts of all plant pathogens, especially of *Sclerotinia* species, for several reasons. First, weed hosts are a means for many pathogens to increase in numbers and affect the yield of current or subsequent crops. Second, with such sclerotia-producing pathogens as *Sclerotinia* spp., sclerotia produced on the weed hosts can contaminate the crop yield as occurred in the soybeans described in this paper. In such cases, if the seed lot containing

sclerotia would be used to seed new fields, it would serve as a means for dispersal of the pathogen to disease-free fields. The presence of sclerotia mixed in with the seed would also lower the quality of the seed and cause the grower to accept a lower dollar return on his harvest. Some countries have a zero tolerance for sclerotia in cereals and oilseeds but will normally accept sclerotia in the commodity up to 0.001% by weight. Thus, commodities contaminated with sclerotia may be excluded from the export market (3).

LITERATURE CITED

1. Adams, P. B. 1975. Factors affecting survival of *Sclerotinia sclerotiorum* in soil. Plant Dis. Rep. 59:599-603.
2. Purdy, L. H. 1979. *Sclerotinia sclerotiorum*: History, diseases and symptomatology, host range, geographic distribution, and impact. Phytopathology 69:875-880.
3. Sinclair, J. B., and Shurtleff, M. C., eds. 1975. Compendium of Soybean Diseases. American Phytopathological Society, St. Paul, MN.
4. Willetts, H. J., and Wong, J. A.-L. 1980. The biology of *Sclerotinia sclerotiorum*, *S. trifoliorum*, and *S. minor* with emphasis on specific nomenclature. Bot. Rev. 46:101-165.