Diseases of Potato:

Rhizoctonia Stem Canker and Black Scurf

M. L. Lacy and R. Hammerschmidt
Department of Botany and Plant Pathology

INTRODUCTION

Rhizoctonia stem canker and black scurf are found in most potato-growing areas of Michigan. The fungus limits growth by forming cankers on sprouts, underground stems, and stolons, and makes tubers unsightly by forming black scurf (sclerotia) on tuber surfaces. In some years the fungus causes significant yield reductions (up to 34%) and can cause a significant change in size distribution of tubers (too small or too large). The fungus is present in many soils and is quite persistent once established. Although no single practice controls the disease by itself, the effects of the disease can be reduced by following the recommendations set forth in this bulletin.

CAUSAL ORGANISM

The disease is caused by the fungus Rhizoctonia solani (also known by the name of its sexual stage *Thanetophorus cucumeris*). It is a member of the class Basidiomycetes. The fungus is characterized by right-angle branching of the hyphae (the microscopic thread-like body of the fungus) (Fig. 1), which is visible only under a microscopic. The hyphae are clear when young, but turn brown with age.

The fungus forms small black sclerotia (a hard body resistant to environmental extremes) which are appressed to tuber surfaces (Fig. 2). These sclerotia overwinter in the absence of a crop, and begin the disease cycle in spring. Sclerotia may be as small as a period on this page, or as large as the end of a pencil eraser. They do not come off when tubers are washed, and are often called "the dirt that won't wash off" or black scurf. Although they do not cause the tuber to rot in storage, and their effect is mainly cosmetic, they cause extensive culling of tubers during packing.

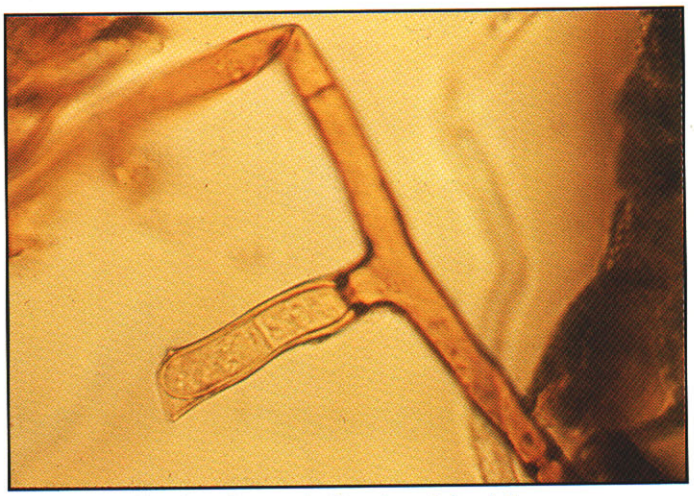

Figure 1. Hypha (vegetative body) of the *Rhizoctonia solani* fungus (magnified 400X) showing right-angle branching and brown coloration.

Figure 2. Sclerotia (black scurf) attached to the skins of potatoes.

The sexual stage of the causal fungus consisting of basidiospores may appear on lower stems of potato during especially humid weather. This stage appears as a white to gray mat just above ground level (Fig. 3). The mat is easily rubbed off and the stem tissue below the mat appears healthy.

SYMPTOMS

In spring, brown sunken lesions form on sprouts or on basal stems just below the soil surface (Fig. 4). Stems that become girdled by these lesions are weakened or even killed. Upward rolling of leaf margins may occur because of restricted translocation of water to leaves (this symptom is also associated with Fusarium and Verticillum wilts and with virus leafroll). A white mold growth may appear on the bases of stems later in the season (Fig. 3). At harvest, there may be a high incidence of cracked or misshapen tubers, tubers may be few in number, or aerial tubers may form. Tubers will have a few to many hard, black, flattened sclerotia (black scurf) appressed to the tuber skins (Fig. 2) which detract from the appearance of tubers, but which are removed if tubers are peeled.

Figure 3. Mat of fungal growth on basal stems of potato

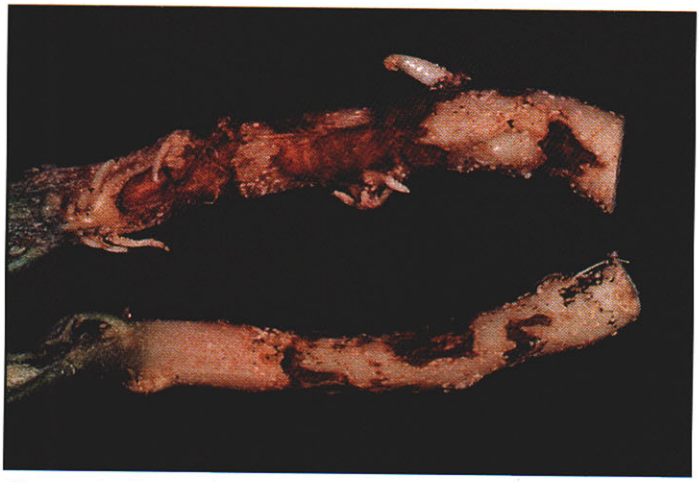

Figure 4. Brown lesions formed on basal stems of potato soon after planting.

DISEASE CYCLE AND CONTROL

Rhizoctonia solani is a soil-inhabiting fungus found in almost all soils. However, there are apparently many types of the fungus, and isolates infecting potato may not infect other crops and vice versa. The populations of types pathogenic to potato in soils appears to be the most important factor in disease development. Most of the types virulent on potato fall into the AG3 group. Sclerotia introduced on seed tubers seem to be less important than indigenous populations, but can contribute to disease expression. Managing the soil populations of virulent types so they remain at a low level and minimizing the level of infection through cultural practices are the main methods of control available. The following control methods should be used where possible:

1. Rotate one year of potatoes with two years of wheat, barley, corn, or onions, which normally are not attacked by Rhizoctonia; avoid planting potatoes following red clover, alfalfa, oats, or sugar beets.

2. Plant good quality potato seed that is clean and free from sclerotia; tuberborne sclerotia reduced yields in some plantings up to 35%. If seed has superficial sclerotia, treating seed with a labeled fungicide may help.

3. Plant seed pieces at a depth of two inches or less when soil temperatures are at least 55° F. to encourage rapid germination and emergence. Maximum disease development occurs at temperatures of 45-50° and decreases with increasing temperatures.

4. Harvest tubers as soon as vines are killed and skins are set; leaving tubers in the ground longer, especially when soils are moist and cool, encourages development of black scurf on tubers.

MICHIGAN STATE UNIVERSITY EXTENSION

MSU is an Affirmative-Action/Equal-Opportunity Institution. Extension programs and materials are available to all without regard to race, color, national origin, sex, disability, age or religion. ■ Issued in furtherance of Extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gail L. Imig, extension director, Michigan State University, E. Lansing, MI 48824. ■ This information is for educational purposes only. References to commercial products or trade names does not imply endorsement by the MSU Extension or bias against those not mentioned. This bulletin becomes public property upon publication and may be printed verbatim with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company. Produced by Outreach Communications and printed on recycled paper using vegetable-based inks.

NEW-1:94-2M-TCM-HP-PRICE $1.00. **FILE 27.325 (FIELD CROPS-POTATOES)**