RHIZOCTONIA AND BLACK SCURF MANAGEMENT

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INTRODUCTION

Rhizoctonia canker and black scurf of potato are caused by the fungus *Rhizoctonia solani*. The disease is characterized by brown to black cankers that can girdle and "burn off"stems and stolons. By girdling stolons, rhizoctonia can cause young tubers to abort, which may influence tuber size by the end of the season by reducing tuber numbers. Foliar symptoms in the form of plant stunting, downward leaf rolling and purpling of the leaves may also be seen. The black scurf stage of the disease affects tubers and is caused when the black survival structures of the fungus, which are called "sclerotia," form on tubers. Sclerotia on tubers are often described as "dirt that won't wash off."

OVERWINTERING

The rhizoctonia fungus has three principal means of overwintering. One means is for the vegetative mycelium of the fungus to be harbored in plant debris in and on soil. Much more common are sclerotia on seed tubers or in the soil. The fungus becomes active in the spring as soil and seed tubers are warming up. Stems and sprouts are usually invaded early on but both roots and stolons are susceptible all season long. As soon as plants emerge and turned green, they become less susceptible to invasion, and the disease is usually of much less consequence. New sclerotia typically form after vine kill, late in the season.

DISEASE CHARACTERISTICS / TEMPERATURE RELATIONSHIPS

Rhizoctonia can build up quickly in the soil under short rotations. It is also generally assumed to be favored by low soil temperatures and moist conditions at or just after planting but, as we will discuss below, this is not the whole story. The appearance and severity of the disease can be somewhat erratic, meaning that it may be severe in some parts of a field and nearly impossible to find in others. This is because a number of factors must occur together or the disease may be nonexistent or of only minor importance. A more in depth examination of the temperature/moisture relationship should help to clarify this point.

Field plot data on disease levels from two contrasting years are presented in Figure 1.

Rhizoctonia disease severities were relatively light in 1998 and ranged from moderate to severe in 2000. Figure two contains information on soil temperatures at the four-inch depth from the Aberdeen Agrimet station.

Presented at the University of Idaho Potato Conference January 18, 2001.

Figure 1. Rhizoctonia disease severities during 1998 and 2000

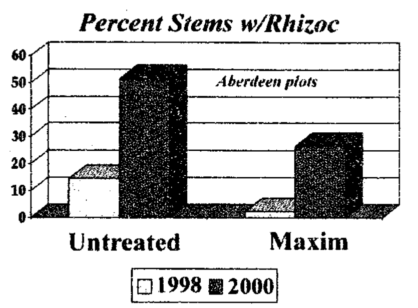
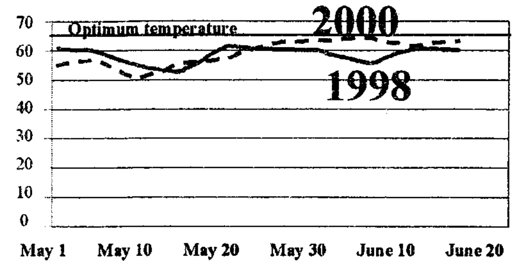


Figure 2. Average 4" soil temps, Aberdeen, ID



Probably the most important feature of the graph in Figure 2 is the increase in soil temperature in late May during the 2000 season. It is important to note that young, white, non-emerged stem tissues are much more susceptible to rhizoctonia canker than are the older, established tissues. Also important is the fact the optimum temperature for rhizocotnia is actually 65°F.

Can this relatively high optimum temperature be reconciled with the common view that low temperature/ high soil moisture favors rhizoctonia? Yes, but these temperatures must occur under the proper circumstances. Low soil temperature/high soil moisture doesn't necessarily favor rhizoctonia as much as it disadvantages the young, developing potato sets. Soil conditions like these delay development of the new plant and lengthen the time required for emergence. If soil temperatures warm up while young plants are still not emerged, as was probably the situation in much of Idaho in early 2000, rhizoctonia can be severe. In contrast, the soil did not warm up during that critical time period in 1998 and may be one reason why rhizoctonia severities were not as high in our field plots that season.

To sum up, rhizoctonia occurrence and severity is greatly influenced by a combination of soil temperature and soil moisture factors that come together to create conditions favorable for the pathogen while the host is in a susceptible state. If this combination of factors can be avoided, disease management becomes less difficult.

YIELD EFFECTS

Rhizoctonia often does not affect total yield, but can change the tuber size profile. Figure 3 contains data on total yield and marketable yield data for the same plots described above. Maxim is a seed treatment labeled for rhizoctonia management and a slight increase in yield can be seen in both years of the study, although these differences were not significant. Rhizoctonia most probably influences tuber size profiles by pruning some tubers early and reducing the total number of tubers per plant. This effect can be seen in Figure 4 where a seed piece treatment effective for rhizoctonia control has allowed the plants to retain more small tubers during 1998.

Figure 3. Yield and Grade Data

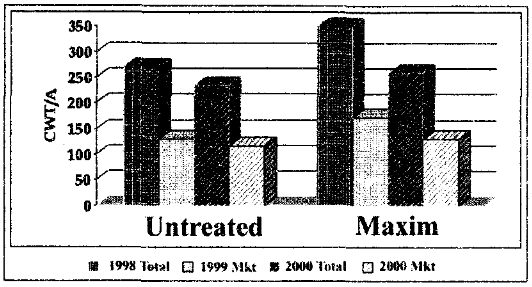
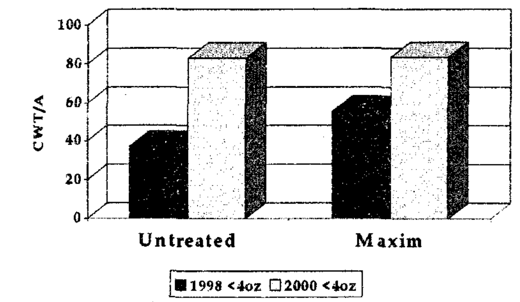


Figure 4. Yield and Grade Data, Small tubers



MANAGEMENT RECOMENDATIONS

Management recommendations for rhizoctonia include use of effective seed piece treatments, which can help reduce the impact of seed-borne rhizoctonia and use of in-furrow treatments for soil-borne rhizoctonia. Cultural practices that can help include delaying planting to avoid early, cool, wet conditions and management of seed to favor rapid emergence by such practices as shallow planting or dragging down hills after planting and hilling up later.