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Corn stalk rot in Colorado

R.L. Gilbertson, W.M. Brown, Jr. and E.G. Ruppel[1]

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Quick Facts

Stalk rots in Colorado are caused primarily by soil-borne fungi, which also can be seed-borne.

The fungi carry over in soil, corn stubble and in seed.

Stalk rot is a stress-favored disease, enhanced by cool, wet weather at planting time, excessive nitrogen (ammonium N) and low potassium, overplanting, moisture stress and insect damage.

Control presently is approached through good cultural practices, including seed treatment, balanced soil fertility, proper plant spacing, insect control, timely harvest and proper water management.

Resistant varieties have not been adequately defined for Colorado conditions and locations.

Figure 1: Stalk rot symptoms in corn stalk.

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Corn stalk rot can be a serious problem in Colorado. Losses may be due to actual yield losses and/or production of certain toxins by fungi in corn tissue causing toxicosis in livestock. Recent observations suggest that stalk rot is more widespread in Colorado than previously recognized.

1. R.L. Gilbertson, former Colorado State University Cooperative Extension Integrated Pest Management (IPM) specialist; W.M. Brown, Jr., Cooperative Extension plant pathologist, professor, and IPM coordinator, plant pathology and weed science; E.G. Ruppel, USDA-ARS plant pathologist. 10/94. ©Colorado State University Cooperative Extension. 1994. For more information contact your county Cooperative Extension office.

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Symptoms

Plant leaves infected with stalk rot turn brown prematurely, as if killed by frost. At first, scattered plants begin to die and show symptoms. The most severe symptoms appear after pollination and will be seen late in the season (August-September). Dark lesions may be seen at nodes, and the fungus may be seen growing on leaf sheaths, giving the tissue a pinkish appearance. Sections of infected stalks reveal a breakdown of pith tissue, leaving vascular strands more or less intact. Pink-red discoloration usually is evident in infected stalks (see Figure 1).

Roots of infected plants show red discoloration and root rot. The crown area appears tan to dark instead of white. Ultimately, plants become brown and may lodge and break. Corn ears infected by stalk rot fungi may appear red or pinkish in color, and the fungi may be visible on infected ears.

Cause

A number of fungi cause stalk rot in the United States. In Colorado, major fungi involved in the disease appear to be *Fusarium* spp., including *Fusarium moniliforme*, *F. moniliforme* var. *subglutinans*, and *Fusarium roseum* var. *graminearum* (also known as *Gibberella zeae*). Other fungi also may be involved. Isolations from diseased plants must be made to determine which fungi are involved.

Infection and Disease Development

The stalk rot fungi over-winter on or in seed, but more importantly in soil. Infection of corn plants can occur by infection of roots or by infection of above-ground plant parts. Above-ground infections initially occur via leaf sheaths by air-borne, wind-borne or insect-borne spores that penetrate nodes. The fungus then moves up and down the stalk. Roots can be penetrated directly by the fungus, which then grows up into the crown and stalk.

Cool, moist conditions at planting time and during germination favor infection by soil-borne fungi. Stresses on plants throughout the season, but especially after pollination and during grain fill, favor disease development. Factors that cause stress include: extreme temperatures, moisture stress, fertility imbalances, overplanting and insect damage. *Fusarium moniliforme* also can contaminate corn ears and kernels, whereas *F. roseum* attacks kernels less often and causes a distinct red discoloration of infected kernels.

Insect damage, especially by corn rootworms and European corn borers, can provide points of entry for these fungi and can favor epidemics of stalk rot.

Control

Control of stalk rot is difficult, but may be achieved through good cultural practices (avoiding stress). Control involves the use of resistant varieties where locally adapted lines are available. More research is needed on resistant varieties suitable for Colorado.

Local seed sources or Colorado State University Cooperative Extension agents should have information on the best available varieties for Colorado, but no varieties are immune to stalk rot. Plant treated seed during favorable weather conditions. Soil fertility is important; avoid high levels of nitrogen (especially ammonia forms) and low levels of potassium. A soil fertility test is suggested to determine fertilizer requirements.

Plant spacing also is important. Plants too densely planted are more susceptible, therefore carefully follow recommended spacing. Overplanting results in stress from competition for water, nutrients and growing space.

Maintenance of adequate soil moisture prevents water stress, especially during grain development. Chisel plowing of fields may enhance moisture penetration and soil aeration and bury plant debris harboring the fungi. Deep plowing also may be beneficial in turning under debris and exposing it to microbial breakdown, though this may not be economically feasible.

Timely harvest of the crop prevents spread and buildup of the disease, stalk lodging and ear drop. Overmature plants become ideal for fungal growth and waiting one to two weeks past maturity to harvest can result in ear drop and yield loss. Crop rotation with small grains, alfalfa, and possible sugar beets and beans, can reduce stalk rot problems. If *F. roseum* is causing stalk rot, avoid rotation to small grains because the fungus also can cause scab of wheat and barley.

Finally, insect control is very important. Corn rootworm larvae feed on the below-ground parts of the corn plant and can cause root and crown infection, whereas damage from adults can lead to infection of above-ground plant parts, like stalks and ears. European

corn borer damage facilitates above-ground plant infestation by stalk rotting fungi, which can result in lodging and stalk breakage. Plant parasitic nematodes also may provide infection sites on roots.

In summary, practices that favor a healthy corn crop, especially during pollination and grain development, decrease stalk rot problems. These practices also result in a better crop overall, and do not favor buildup of stalk rot fungi in corn fields.