

## Plant Pathology Fact Sheet

# Take-all of Wheat

by Donald E. Hershman and Paul R. Bachi

## INTRODUCTION

“Take-all” is the common name of a root, crown, and basal stem (foot) rot that primarily affects wheat, but can also affect barley, oats, rye, as well as other grass crops and weeds. The disease has been known to destroy entire stands of wheat, thus the name. Barley, oats, rye, and other grass crops, however, have not been seriously impacted in Kentucky. Take-all is most common where susceptible crops are grown continuously without adequate rotation, or in fields where weedy grass hosts were not controlled in non-host crops, and were subsequently sown to wheat. The disease is rarely a serious problem in Kentucky due to excellent weed control practices, as well as the widespread adoption of cropping systems where wheat is produced, at most, every other year.

## SYMPTOMS AND SIGNS

Initially, infected plants may appear slightly stunted and off-color in the fall or early spring. Plantings thus affected may appear to be thin, with limited tillering. Early symptoms frequently go unnoticed or they may be confused with other conditions, such as low soil fertility or insufficient soil moisture.



TAKE-ALL SYMPTOMS AND SIGNS ON THE LOWER STEMS.

The most obvious symptoms occur about the time of heading and thereafter. Infected plants die prematurely, generally within roughly circular patches in the field ranging from a few feet in diameter to several hundred feet, depending on severity of infection. Affected plants appear bleached or straw-colored prior to normal maturity. Tillering is also reduced, frequently resulting in only one head per plant, or under severe conditions, none. If a head forms, it is bleached white and either completely empty of grain or the kernels are severely shriveled. The main roots, crown, and basal culm tissue of these plants show a dry rot. This is accompanied by a key diagnostic feature of take-all: the presence of a shiny, dark-brown to black

surface mat of fungal tissue underneath the leaf sheath at the base of the plants. Diseased plants usually pull up easily because of rotted roots.

## **CAUSE AND DISEASE DEVELOPMENT**

Take-all is caused by the soil-borne fungus *Gaeumannomyces graminis* var. *tritici*. This fungus survives from season to season in debris of susceptible crop and weed hosts. Take-all is favored in early fall-sown crops. Plants become infected when developing roots come into contact with infested debris or with roots of infected plants. The fungus is not seed-borne. Infections are favored by temperatures between 54°F and 64°F. Soils with a neutral to alkaline pH, poor fertility (especially low nitrogen and phosphorus), and poor drainage also promote disease development.

## **DISEASE MANAGEMENT**

Resistant varieties are not available; seed treatment and foliar fungicides are ineffectual. Control, therefore, is achieved using several cultural practices.

### ***Crop rotation***

Take-all is more severe where wheat follows wheat or barley. Crop rotations of 2 to 4 years with corn or soybeans are recommended for problem fields. However, as indicated earlier, even one year away from wheat or barley can significantly reduce the potential for take-all to damage subsequent wheat crops. It is important to remember that crop rotation reduces the incidence and severity of take-all, but it will not eliminate the causal fungus from a field. The fungus commonly survives on non-symptomatic crops, such as barley, oats, rye, and many grasses.

### ***Nitrogen fertility***

More severe symptoms are usually found on plants under nitrogen stress. The common practice of splitting nitrogen applications in the spring may reduce damage from take-all due to more consistent nitrogen fertility. Similarly, use of slow release nitrogen products may reduce the incidence of disease. High soil pH, low levels of phosphorus, and fast release forms of nitrogen (i.e. nitrate nitrogen) all favor take-all.

### ***Date of planting***

Early fall planting usually leads to more severe take-all problems. Warmer soils during seedling growth apparently increase the incidence of early infection. Plant as late as practical in the fall and no deeper than necessary.

## **ADDITIONAL RESOURCES**

- Comprehensive Guide to Wheat Management in Kentucky: Disease Management (Section 7), ID-125 (2009) <http://www.ca.uky.edu/agc/pubs/id/id125/07.pdf>
- Kentucky Integrated Crop Management Manual for Small Grains, IPM-4 (2009) <http://www.uky.edu/Ag/IPM/manuals/ipm4smgr.pdf>
- Kentucky Plant Disease Management Guide for Small Grains, PPA-10c (1993) <http://www.ca.uky.edu/agc/pubs/ppa/ppa10c/ppa10c.pdf>
- No-Till Small Grains Production in Kentucky, ID-136 (2000) <http://www.ca.uky.edu/agc/pubs/id/id136/id136.htm>

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*Photo by Donald Hershman, University of Kentucky*