

COMMON RUST

FUNGAL CAUSAL AGENT

Puccinia sorghi

SIGNS AND SYMPTOMS

Rusts are specialized parasites with a limited host range. Common rust on sweet corn appears in the field as oval to elongate cinnamon brown pustules scattered over upper and lower surfaces of the leaves. The pustules rupture the epidermis, and expose dusty red spores (urediniospores), which are spread by wind and have the ability to infect other corn leaves directly. As the pustules mature, they turn brownish black and release the dark-brown overwintering spores (teliospores). Pustules may also appear on the ears and tassels. Partial resistance is expressed as chlorotic or necrotic hypersensitive flecks with little or no sporulation.

Yield losses - quality and quantity

- * delayed silking
- * poor pollination
- * poor tip fill
- * shriveled kernels
- * reduced ear weight
- * reduced ear length and diameter
- * reduced sugar accumulation
- * orange pustules on flag leaves

DISEASE CYCLE AND EPIDEMIOLOGY

The complete life cycle of *P. sorghi* includes 5 different spore types and two hosts, corn and species of wood sorrel (*Oxalis* spp.). Teliospores, basidiospores, and pycniospores all infect *Oxalis*, while aeciospores and urediniospores infect corn. In Mexico and some of the southern areas of the United States, the teliospores overwinter and produce basidiospores that infect *Oxalis* (picture of *Oxalis*).

The spore types involving *Oxalis* are of little importance in the life cycle of the fungus as it occurs in temperate areas of the United States. The urediniospores are the most important spore type in the northern United States. Urediniospores occur on corn leaves throughout the growing season and continue cyclic infections. Urediniospores are unable to overwinter in northern climates. Each spring, urediniospores move with wind and storm patterns north from the southwestern United States and Mexico and probably Florida. The disease follows sequential plantings of corn from the southern states to Canada.

Rust is a “compound interest disease”. A few initial pustules may produce thousands of spores if the environmental conditions are conducive to disease spread and development. These spores are blown to susceptible leaf tissue and the cycle is rapidly repeated causing an epidemic. Three major factors interact to influence the outbreak of rust epidemics on sweet corn:

- The quantity of urediniospores available to initiate rust epidemics and how early spores arrive in New York.
- Environmental factors: Temperatures of 60-75F and heavy dews, rain, irrigation, and prolonged wet weather or high relative humidity favor rust development. Moisture is required for spore germination.
- The level of rust susceptibility varies in the sweet corn varieties in use. In 1999, there were widespread reports of rust occurring on formerly rust resistant sweet corn varieties. In 2000, New York experienced epidemic proportions of rust on resistant (Rp1D) and susceptible sweet corn varieties. In 2001 there was little rust, but the resistant rust strain was present in the State. For the past 20 years Rp resistance has controlled common rust on sweet corn in North America. Nearly 150 commercial sweet corn hybrids have Rp genes. More than 25 different Rp genes occur in corn, but most Rp sweet corn hybrids (such as Bold) have the gene Rp1D. The Rp1D resistance gene that has worked so well for many years, has been rendered ineffective by a new strain of *Puccinia sorghi*. Varieties are being developed that will have resistance to the new strain of rust.

MANAGEMENT

- Good weed control and wider row spacings will allow air to circulate and promote drying of the leaves. Moisture is required for spore germination, so the dryer the leaves are, the less disease will develop.
- Use resistant and/or tolerant varieties. Varieties resistant to the new rust strain may be available (ask your seed supplier). Resistant varieties should be used for late plantings (after June 25) because the fungal spore density in the air is likely to be high as a result of infections of earlier planted sweet corn. The increased production of winter corn crops in southern areas (like Florida) also provides an early source of initial inoculum.
- If necessary, control can be achieved with applications of registered fungicides. Timing is critical because the first application needs to be applied early enough to reduce the rate of epidemic development. Because rust spores arrive from outside the immediate planting area, it is difficult to predict when this spray should be applied. In New York, we recommend that fungicides be applied prior to tassel. No more than 3 applications should be made in order to maintain profitability.
- Research in Illinois has shown that sweet corn hybrids have some level of 'adult plant resistance': the hybrids become more resistant as plant age increases. Plants were most resistant to rust when inoculated at the late silk stage and most susceptible when inoculated at the five to six leaf stage.

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