SDSU Extension

agronomy

SEPTEMBER 2018

SOUTH DAKOTA STATE UNIVERSITY®
AGRONOMY, HORTICULTURE & PLANT SCIENCE DEPARTMENT

Tan Spot of Wheat

Collins Bugingo | SDSU Graduate Research Assistant **Emmanuel Byamukama** | Assistant Professor & SDSU Extension Plant Pathologist
Shaukat Ali | SDSU Small Grains Pathologist

Tan spot is a devastating disease of wheat in South Dakota and the rest of the wheat producing regions world over. It causes an estimated yield loss of about 5 percent in South Dakota but this loss can go up to 30 percent in individual fields. Tan spot is most problematic in no-till and wheat on wheat fields because the tan spot pathogen survives on wheat stubble (Figure 1).

Figure 1: Wheat planted into a previously wheat field with high wheat residue. Lower leaves are already showing tan spot symptoms.

Tan spot also develops on other cereals such as triticale, rye, and barley and many non-cereal crops including smooth brome grass and intermediate wheatgrass. These additional hosts can contribute to the increase in the pathogen inoculum levels and its genetic variability.

Tan spot causal organism and symptoms

Tan spot is caused by a homothallic ascomycete fungus *Pyrenophora tritici-repentis*. The fungus produces toxins and it is these toxins that cause either chlorosis (leaf tissue discoloration), necrosis (tissue death) or both. The distinctive tan spot symptom is the diamond, oval or lens-shaped leaf spot, which has a dark center surrounded by a yellow halo (Figure 2). Sometimes this disease is refered to as yellow leaf spot or yellow spot because of the distinct yellow lesions. The tan spot fungus also affects spikes causing a red discoloration on the grains, a condition known as red smudge. Infection of the spikes makes seed a potential source of inoculum. However, wheat stubble, by far, is the main source of inoculum.

Figure 2: Tan spot symptoms, oval shaped tan necrotic lesions with a chlorotic halo, on a susceptible wheat cultivar.

Disease cycle

The tan spot pathogen survives on wheat stubble. The survival structures called psuedothecia (black raised hair-like bodies; Figure 3) are formed on the stems late in the wheat growing season and remain attached to the wheat straw during winter. These structures release spores called ascospores and these cause infection on newly emerged wheat seedlings (Figure 4). The ascospores are the primary inoculum

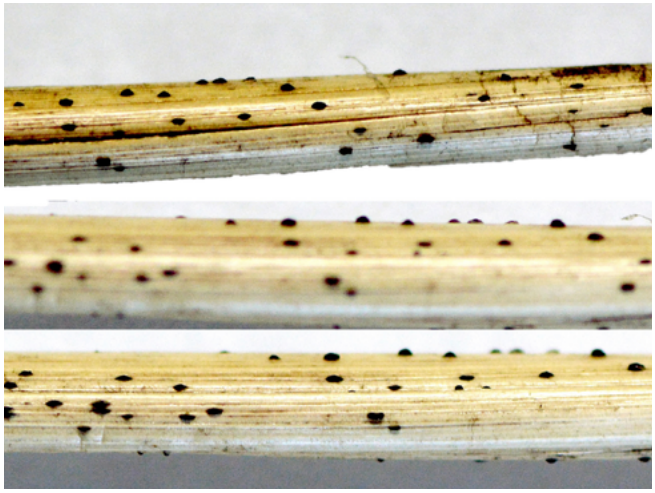

Figure 3. Black raised structures (Pseudothecia) on wheat straw which are the overwintering structures of tan spot pathogen.

that infect young plants adjacent to the wheat stubble since these do not travel long distances.

As symptoms from initial infection progress, the production of secondary inoculum (conidia, Figure 4) takes place. The conidia are produced in large numbers especially in the presence of moisture. The conidia travel long distances by wind and hence are responsible for the distant wheat canopy infections. The infection process is favored by the wet weather (Figure 5). Tan spot pathogen can infect wheat under a wide range of temperatures (50-77°F), the reason tan spot can be found in wheat throughout the growing season.

Management practices for tan spot in wheat

Tan spot is the most common fungal leaf spot in South Dakota because of the abundance of wheat stubble. Effective tan spot management is achieved through integration of various practices that include the use of cultural methods like burying wheat stubble (where practical), crop rotation, planting disease free seed, use of resistant varieties, and application of fungicides.

Good agronomic practices: Tan spot disease is more severe and highly prevalent in fields where no-till is practiced as growers aim at conserving soil moisture and control soil erosion. Therefore, rotation of wheat with broadleaf crops should be done to reduce tan spot development. Ensure adequate but not excessive fertilization to reduce the disease severity. Chisel ploughing will reduce wheat residue and consequently

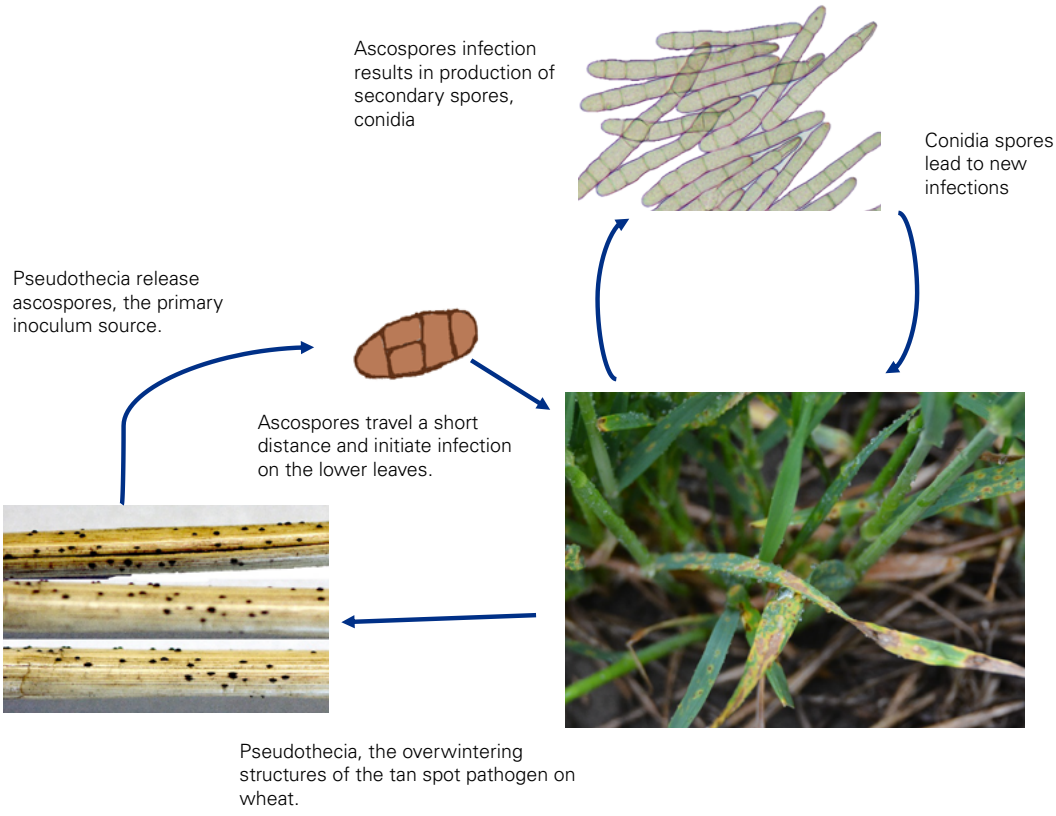

Figure 4: Life cycle of tan spot pathogen, *Pyrenophora tritici-repentis*.

Figure 5: Lower canopy tan spot symptoms arising from prolonged leaf wetness and heavy residue from previous season.

lessen inoculum build up with less soil disturbance. However this should be done where practical in order to conserve moisture and soil.

Use of resistant cultivars: This is the most effective and affordable way of managing the disease. Cultivars that are resistant/tolerant to tan spot are available. Information on the performances of different wheat cultivars can be found on iGrow on this link: http://igrow.org/agronomy/wheat/.

Use of fungicides: Fungicides in the class strobilurin and triazoles like pyraclostrobin, picoxystrobin, propiconazole, and prothioconazole and others have proved effective in the management of tan spot. Foliar applications should target protection of the flag leaf. This is because the flag leaf contributes the most to grain fill. Although earlier foliar fungicides can be done, these alone do not result in yield loss protection since protection is only on the leaves present at the time of fungicide application. However, for no-till wheat on wheat fields, foliar fungicides tank-mixed with the herbicide may be beneficial in reducing the disease pressure.

Growers should note that the excessive and unwarranted use of fungicides risks creating a selection pressure on the pathogen which can result in fungicide resistance development, hence foliar fungicides should be used judiciously. Rotation of fungicides with different modes of action is recommended to prevent the risk of fungicide resistance development. Growers are encouraged to follow instructions for applying the chemicals as indicated on the product labels. A list of the recommended fungicides effective against tan spot can be found on this link: https://igrow.org/up/resources/03-3008-2012.pdf.

Use of tan spot prediction tool: Studies have indicated the optimal weather conditions like prolonged moisture favor tan spot to develop (Figure 5). These can be used to determine the likelihood for this disease to develop in wheat and hence help growers to discern the need for a fungicide application. The Small Grains Disease Prediction tool is helpful in tracking favorable weather for tan spot and other diseases to develop in wheat. Growers are encouraged to check on this tool during the wheat growing season to assess the risk for tan spot. https://climate.sdstate.edu/tools/smallgrains/.