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Red Crown Rot of Soybean: The Latest Disease of Agronomic Concern in Missouri

Red Crown Rot of Soybean, also known as Cylindrocladium Black Rot (CBR) was officially confirmed in Northeastern Missouri for the first time in August of 2024 in Marion County. This disease is caused by the fungal pathogen ***Calonectria ilicicola.*** Yield losses can be significant in areas with symptoms of the disease. Infested areas of fields have been observed to have estimated yield losses ranging from 15 to 75%, with 100% yield loss estimates occurring occasionally.

Red crown rot (RCR) is normally thought of as a disease of southern states that grow soybean in rotation with peanut such as the Carolinas, Georgia, Florida, Louisiana and Mississippi. The disease has steadily pushed into the midwestern United States, starting in Pike County, Illinois in 2018 and Kentucky in 2021.

Infection commonly occurs early in the growing season around planting time; however, disease symptoms typically display once the plant enters the reproductive growth stages. Sporadic patterns of symptoms develop throughout infested fields, with diseased areas ranging in size from small car to football field in dimension. Leaf symptoms start as interveinal (in between leaf veins) chlorotic (yellow) flecking (spotting). The yellow flecking will progress to interveinal chlorosis (yellowing) with bright green leaf veins. Eventually, leaves will develop interveinal necrosis (tissue death). Lower stem and root symptoms tend to develop prior to leaf symptoms. Red discoloration of the lower stem and root epidermis (skin) occurs. Shortly after this, white flecks of fungal mycelial growth develop in the reddened areas. This is followed by development of small red spheres the size of the head of a pencil lead. These red spheres are the fungal fruiting bodies of the RCR pathogen and are called perithecia. As the fungal disease progresses, stems and roots may begin to display a grey pith and will rot, making the plants easy to pull from the soil.

Disease symptomologies of RCR share similar, yet distinctly different root and stem disease characteristics with Rhizoctonia root rot, charcoal rot, and Phytophthora root rot. Leaf symptomatologic characteristics of RCR disease share similarities with effects produced by sudden death syndrome (SDS), southern stem canker, and brown stem rot; as well as the effects on leaf tissue by the application of Group 3 triazole fungicides (prothiocanozole and tebucanozole) when daily average temperature is 85 degrees and above. Red crown rot produces plant mobile phytotoxins in the roots that translocate to leaf sink tissues, and this ultimately produces the observed leaf disease symptomologies. It is quite possible to observe several plant disease pathogens such as SDS and RCR in the same plant at the same time, however detecting this in the field without laboratory confirmation can be somewhat difficult due to the similarities of disease symptomologies.

While soybeans are not grown in rotation with peanuts in North and Central Missouri, other agronomic host crops include alfalfa and clover. Common weed species which pose as alternative hosts for the fungal disease include coffeeweed

and beggarweed. Warm and wet conditions at planting favor disease infection. Specifically, soil temperatures during and following the first week of planting in the 77 to 86 degrees range encounter the greatest rate of root infestations.

Certain agronomic pests such as nematodes like the soybean cyst nematode (SCN) have been loosely linked to root rot diseases such as SDS and RCR. Nematodes and root feeding insects may create wounding on the root systems of soybeans through feeding and reproductive activities, leading to the occurrence of secondary infestations of plant pathogens. The wound channels on root systems allow pathogens access into internal plant tissues.

Best management practices for dealing with RCR are still in development, but there are some actions that can be taken in general to alleviate disease severity and spread. Crop rotation to a non-host crop is a wise management practice, but a typical rotation to one year of corn is not sufficient. A two-year non-host crop rotation is the minimum time duration needed. For many row crop producers in Northeast Missouri, this means rotating to corn and then possibly grain sorghum the following year before returning to beans on the third year. For those with livestock enterprises in addition to their cropland, these off years may present the opportunity to grow some alternative annual warm season forages for grazing, haying, and/or ensiling. It should be noted grazing animals can possibly spread this disease by transporting soil to other field locations on hooves and bodies.

The goal of growing non-host crops is to decrease the amount of soil-bound inoculum. Two years of non-host crop rotation will not completely relieve a field site of the disease inoculum, only lower its levels, as the RCR fungus can overwinter for multiple years in hardy structures called microsclerotia. Environmental conditions may also lead to differences in disease symptom severity from season to season.

Another soil-related management practice is containing the disease and not spreading it. Tillage equipment sanitization, working infested fields and problematic areas last, and washing equipment between field locations can reduce spread. Pay special attention to wash water runoff, as fields downhill of wash areas will receive field soil contaminants carried in the runoff water.

Planting when soil temperatures are above 86 degrees or below 77 degrees is another soils-based management practice which aids with disease pressure management for RCR. Red crown rot favoring wetter soil conditions can result in higher RCR disease severity and incidence in soil sites with higher clay and/or organic matter content (heavier soils).

Seed treatments labeled for RCR may help with early season disease infection suppression and/or control. As of now, there is no known varietal resistance to RCR on the market. University of Missouri has partnered with Missouri Soybean Merchandising Council to conduct on-farm research and evaluate seed treatments on root rot disease (SDS and RCR) and yield. Since RCR is a root rot disease, foliar fungicides are not an effective management option.

Producers who have observed RCR symptoms in their soybean fields, or are interested in participating in MU Strip Trials, should contact the local Field Specialist in Agronomy through the county MU Extension Office.

Source: *Nick Wesslak, agronomy specialist*

Fall is the Best Time of Year for Lawn Care

Reseeding, fertilization, weed and thatch control, establishment of new lawns, and renovation of poor-quality lawns should be done over the next few weeks. The ideal time for planting grass seed to either establish a new lawn or renovate a poor-quality one is September through mid-October in Missouri. During this time, grass grows well in the cool fall weather and has less competition from germinating weeds.

The key to long term lawn quality is proper soil preparation and fertility. Soil should be tilled 4-6 inches deep. Incorporate organic matter, such as compost or peat, when tilling. If soil test results indicate a soil pH problem, sulfur or lime should be added at this time. After tilling, smooth with a rake and apply starter fertilizer. A fescue blend, which is a blend of different fescue cultivars, is recommended for northern Missouri. Top quality grass seed will germinate better and be more disease resistant over time. Newly seeded lawns must have adequate moisture for seed germination and seedling growth. It is important to keep the lawn watered for at least six weeks after germination.

For regular maintenance of an established lawn, apply a lawn fertilizer such as 28-0-3, or a similar analysis in September. Hold off on applying "winterizer" fertilizers until November. More people are opting for natural lawn control, meaning they do nothing and let the lawn grow naturally, or are using organic lawn care products. Lawns and other plants in shade, grow slower and do not need as much nitrogen as plants in full sun.

Therefore, shady lawns should be fertilized at half the recommended rate.

September and October are the best months to control perennial broadleaf weeds like dandelions and clover. In autumn the weeds prepare for winter by pulling nutrients and starches from leaves into roots. This also draw herbicides into the root systems, thus more effectively killing the weed. Actively growing grass will quickly fill in the bare spots created after the weeds die.

Source: *Jennifer Schutter, horticulture specialist*

Important Financial Terminology in Agriculture

Communication is important for all businesses including farms and ranches. The foundation of communication is an understanding of terminology. When working with others, (lenders, other businesses) it is very important to comprehend the terms and not just assume an understanding.

Terminology can be confusing at times especially if words have multiple meanings. For example, in agriculture AI typically refers to artificial insemination, but for people outside of agriculture AI is commonly known as artificial intelligence.

Some of the terms below are common and used often and others may be used rarely. All the terms are important. The terms below are in alphabetical order. Additional terms will appear in future issues of *NEMO Ag Connection*.

Acceleration clause: A common provision of a mortgage or note providing the lender with the right to demand that the entire outstanding balance be immediately due and payable in the event of default.

Administrative costs: A lender's operating and fixed costs charged for completing and servicing a loan.

Amortized loan: A loan with a series of regularly scheduled payments that include both interest and partial repayment of principal.

- Equal payments – Payments are of equal size with declining interesting and increasing principal.
- Equal principal payments – Equal principal payments with declining interest payments. Interest decreases because the unpaid balance decreases. Because the interest payment decreases, the total payment also decreases over the term of the loan.
- *Reverse amortization* – The annual payment is less than the interest obligation during the early years of the debt obligation so that the outstanding balance on the debt actually increases rather than decreases over the term of the loan.

Assets: The items and property owned or control by an individual or business that commercial or exchange value. Items may also include claims against others. All assets are reported on a balance sheet at market or cost value less accumulated depreciation. Assets are normally divided into categories based on their useful life.

- Current assets – Assets that will be used or converted into cash within one year. Also called liquid assets.
- Intermediate assets – Assets with useful lives of more than one year but not more than ten years. Their sale will affect the future income potential of the business.
- Long-term assets – Assets with useful lives of more than ten years. Long-term assets include real estate. Sometimes both intermediate and long-term assets are combined and called fixed assets.
- Financial assets – Intangible assets including cash and savings.
- Real assets – Assets that are tangible or physical including land, machinery and livestock.

Balance sheet: A listing of all assets and liabilities at a given point in time. The amount by which assets exceed liabilities is called net worth or owner's equity. A balance sheet may also be called a net worth statement or financial statement.

Capital: Used with terms like capital assets, capital investments and capital improvements. It describes money invested in anticipation of a return over a long period of time.

- Human capital – Human assets consisting of items such as skilled workers.
- Physical capital – Consists of financial assets and real assets.

Cash flow: Cash money flowing in and out of the business. Cash flow is not the same as profitability

- Cash flow budget – A projection of all cash income and expenditures for a given period of time, normally one year. It shows when additional funds will need to be borrowed, and when funds will be available for repayment of debt.

Closing: Process by which all fees and documents required by a lender prior to disbursing loan proceeds are executed and filed. Usually used in reference to the completion of a real estate transaction that transfers rights of ownership in exchanged for monetary considerations.

Closing costs: The costs incurred by borrowers and sellers in completing a loan transaction. Included are origination fees, inspections, title insurance, appraisals, attorney's and realtor's fees, and other costs of closing a loan.

Collateral: Property pledged to assure repayment of debt.

Co-signer: An individual, in addition to the borrower, who signs a note and thus assumes responsibility and liability for repayment.

Cost of funds: Refers to the interest and non-interest cost of obtaining equity and debt funds.

Correspondent bank: – A bank that performs specific functions for another bank (respondent bank). Functions may include loan participation, check clearing, data processing, cash management and consulting services.

Credit: Money borrowed with the understanding that it will be repaid.

- Creditworthiness – The ability, willingness and financial capability of a borrower to repay debt.
- Credit verification – The process involved in confirming the credit worthiness of borrower.Credit scoring – A quantitative approach used to measure and evaluate the creditworthiness of a loan applicant. Measurements of profitability, solvency, management ability and liquidity are commonly included in a credit scoring model.
- Line of credit – Commitment by a lender to provide up to a set amount of funds during a specific period of time. Funds are drawn against this commitment as they are needed. Also called a budget loan.
- Non-revolving line of credit – A line of credit in which the maximum amount of a loan is the total of loan disbursements. Repayments do not make loan funds available again as in a revolving line of credit.
- Revolving line of credit – A loan in which a maximum loan balance is set. As a borrower repays during the term of the loan, they can again borrow up to the loan limit without applying for a new loan.
- Split line of credit – Using a number of lenders to finance various enterprises within a business. Normally refers to short and intermediate term credit.

Reference: Johanns, A., 2020. Financial Terms. Ag Decision Maker. Iowa State University Ext. Ames, IA

Source: *Mary Sobba, ag business specialist*

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