Pathology 101

Plants can also develop diseases, which are defined as "anything that prevents a plant from preforming at its maximum potential." For in the corn yield challenge this will be anything that prevents that corn from producing its maximum yield potential. However, plant diseases are typically considered to be caused by **plant pathogens**. There are primarily four plant pathogens observed in corn production and these are: fungal, bacterial, virus and nematodes.

Fungal – This type of disease is caused by fungi which are capable of residing in crop residue during the winter months or are blown in from the southern US every growing season. Fungi are primarily move through spores which are the asexual or sexual reproductive structures of the organism. When fungal spores are present they will germinate and force an entry point into the plant.

Bacterial – Diseases caused by bacteria are overwinter in crop residue or insect gut systems. Bacterial diseases are not capable of forcing entry into the plant, instead will enter through opening in the leaf surface which include stomata's (natural opening) or in wounds caused by hail, sandblasting and high winds.

Virus – Viruses are small particles of genomic material (DNA or RNA) that are encased in a protein capsule. They are transmitted primarily by insects and use the plants framework to create copies of itself.

Nematodes – Nematodes are transparent microscope worms that feed on above and below ground parts. In corn production systems, all nematodes feed on the roots which impact water and nutrient uptake in the plant.

For diseases to develop there are three factors that must be present for disease develop and are referred to as the **disease triangle** (Figure below). The first item is the pathogen which is listed above, second item is a susceptible host and the third is favorable environmental conditions.

Susceptible host – plant pathogens are specific on the host which they can infect for example gray leaf spot can only infect corn. There is also resistance present in some corn hybrids which allows the plant to defend itself from the pathogen if infection occurs. Resistance capabilities are rated in seed catalogs to allow produces to select for these traits if certain disease issues have been present before.

Environmental conditions – this refers to specific weather conditions that make it favorable for disease development. This is really necessary when examining fungal diseases. The spores behave similarly to a seed and need water present so it can germinate and then penetrate into the plant. Most fungal pathogens need approximately 8 hours of leaf wetness to provide enough water for germination to occur. The other major weather component in disease develop is temperature. Air temperatures are been determine where the pathogen is most likely to cause infection and reproduce. At the low and high end of this temperature scale, activity of the pathogen is slowed down.

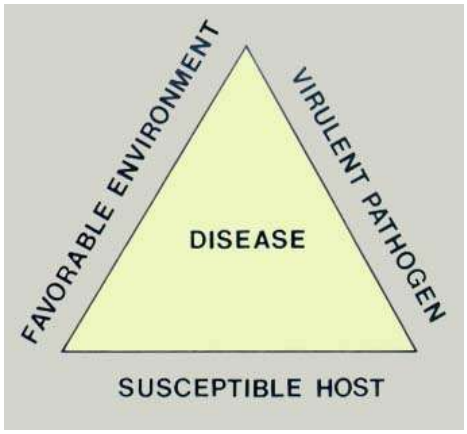

Figure from: http://www.apsnet.org/edcenter/intropp/topics/Pages/PlantDiseaseManagement.aspx

(Compiled by Amy Timmerman)