Trees are an important component of the landscape and have been preserved or planted around places where people live and work. Green ash is one of the most commonly planted trees in the United States, constituting 20 to 40% of the urban trees nationwide. Over the past two decades, there have been numerous reports of declining ash trees in both urban and woodland settings. The term ash decline has been used to include anything that can cause poor health and vigor of ash trees. Salt, high root zone temperatures, pollution, confined root zones, herbicide, and “mower blight” are just a few of the stresses that may be contributing to ash decline in Iowa. Other factors may include drought, flooding, poor soil quality, and parasitism by pathogens and insects.

ASH YELLOWS

A tree disease known as ash yellows has been suspected in contributing to the decline of ash in Iowa. Ash yellows is caused by a phytoplasma, a bacteria without cell walls, that causes slow growth and advanced decline of ash trees. A tree infected with the ash yellows phytoplasma may express symptoms such as reduced shoot growth, lack of apical dominance (branch angle), dieback, bright yellow chlorotic foliage, and witches'-brooms. Chlorosis, or chlorotic foliage, is a term often used to describe a plant condition identified by yellowing of the leaf surface where the veins remain a darker green color. Witches'-brooms are clustered or clumped simple leaves on shortened shoots creating a “broom” appearance.

ANALYZING DECLINE

A recent study was conducted at Iowa State University to determine if the ash yellows phytoplasma was causing ash decline in Iowa’s urban/community green ash trees. The study used DNA test to determine if the ash yellow phytoplasma was present in the surveyed trees and found that approximately 4% of Iowa’s urban and community green ash trees contained the ash yellows phytoplasma. However, the study found several declining green ash trees that tested negative for the ash yellows phytoplasma but expressed symptoms comparable to trees infected with the ash yellows phytoplasma: stunted growth, lack of apical dominance, chlorosis, and sparse foliage. The results from the study indicated the possibility that the observed decline symptoms may be caused by environmental damages, but the uniformity in symptoms may indicate the possibility of another causal agent causing the decline.

INDICATIONS OF A NEW PATHOGEN

Greenhouse inoculations were performed in attempts to replicate the decline symptoms: stunted growth, lack of apical dominance, sparse foliage, and chlorosis. The inoculated ash trees did decline and exhibit the symptoms that were observed in the declining ash trees in the field. All the greenhouse inoculated trees tested negative for the ash yellows phytoplasma indicating that the decline symptoms were likely caused by an unidentified pathogen. Unfortunately, the causal agent could not be identified.

DECLINE SYMPTOMS

The survey indicated variation in decline symptoms that may be used to help separate the symptoms caused by the ash yellows phytoplasma and those caused by the unknown pathogen.
1. Trees infected with the ash yellows phytoplasma have bright yellow chlorotic foliage, while the majority of declining trees that tested negative for the ash yellows phytoplasma had pale green foliage.

2. Several of the trees infected with the ash yellows phytoplasma had witches'-brooms, where the declining trees that tested negative for the ash yellows phytoplasma did not.

3. Ash trees have an opposite branch angle with a strong central leader. It was noted that the declining trees that tested negative for the ash yellows phytoplasma did not have a strong central leader. In fact, the central leader was dead leaving the lateral branches for new growth (see picture). This symptom has been found in subsequent years. The trees infected with the ash yellows phytoplasma either had large branch mortality or no branch dieback was found.

Other symptoms such as sparse foliage, lack of apical dominace, and reduced shoot growth were found on trees infected with the ash yellow phytoplamsa and the declining trees that tested negative for the ash yellows phytoplasma.

Although the study could not pinpoint a pathogen causing the decline, it did find evidence that suggests the possibility of an unidentified pathogen causing the decline; or the possibility that the test for ash yellows is producing false negatives.

In the case of ash decline, there are numerous factors contributing to decline and basing a diagnosis on symptoms may not be indicative of the true problem. The continuing development in testing methods may one day help identify what pathogens are present. Until that time, we continually learn the importance of diversifying our community forest.