



Corn Leafhopper Identification, Damage, and Management

Identification

There are many species of leafhoppers in the Cicadellidae family. They are small (1/8 to 1/4 inch long), narrow, have wedge-shaped bodies and bulging eyes, and are usually green to brown.¹ They are found worldwide on agricultural crops, vegetables, flowers, and other plants. Leafhoppers, as the name suggests, are adept at jumping and do so when approached. Their lifecycle consists of egg, nymph, and adult. The nymphs resemble adults but are wingless.

One species known as the corn leafhopper (*Dalbulus maidis*) has been an economic problem in South America— especially Argentina and Brazil—and in recent years has been found in southern coastal states and California. The adults are pale yellow to greenish yellow, have black spots between their eyes, and are wedge shaped (Figure 1).

The females live 26 to 51 days and can produce about 400 to 611 eggs during their lifetimes, which they only deposit into corn leaf tissue. When the air temperature ranges from 80 to 90 °F, nymphs emerge about 2.5 days after eggs are laid and become adults in around 10 days.² Nymphs do not hatch at temperatures below 68 °F, though the eggs remain viable.³ As a general rule, high temperatures and high relative humidity favor the population growth of *D. maidis* by reducing the time required for eggs to reach adulthood, while low temperatures prolong this cycle.

Corn Damage

Leafhopper injury to corn can come directly from feeding or indirectly through disease transmission, such as reduced photosynthesis from sooty mold on leaves. Heavy infestations of corn leafhoppers can cause premature leaf desiccation when feeding by



Figure 1. Corn leafhopper with the characteristic two black spots between the eyes. Picture courtesy of and used with the permission of Danielle Sekula, Extension Agent IPM, Texas A&M AgriLife Extension.

sucking out plant juices, causing several leaves or individual leaves to turn brown. While feeding, they also secrete a sticky substance (honeydew) that is favorable for mold growth. The black sooty mold encouraged by the honeydew can reduce a leaf's ability to photosynthesize, limiting the production of sugars and carbohydrates necessary for grain fill and resulting in lost yield potential. Note that the corn leaf aphid also produces honeydew, so it is important to identify which pest is causing the symptom in order to select an appropriate management strategy.

While feeding, the corn leafhopper can transmit *Spiroplasma kunkelii*, a bacterial pathogen that causes the disease corn stunt spiroplasma (CSS).^{4,5} The University of Florida has also documented corn leafhoppers transmitting maize rayado fino maya virus (MRFV) and the bacterial pathogen maize bushy stunt phytoplasma (MBSP).²

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The most common of the three diseases is CSS. Symptoms include stunting, short internodes, leaf streaking, multiple small ears, and poor kernel fill (Figures 2 and 3). Developed kernels are loose on the ear and are referred to as “loose tooth ears”. Additionally, young leaves at the top of the plant are yellow and turn reddish to reddish purple as plants mature.^{6,5} Late planted corn is usually more susceptible to CSS, though early planted corn can also be infected depending on the occurrence of corn leafhopper feeding.

Maize rayado fino maya (also called maize fine striping) virus symptoms include the development of small chlorotic spots at the base of the plant and along the veins of the youngest leaves.⁷ New leaves have more spots which can coalesce to form short stripes.⁷ The spots may collapse to form holes in the leaves of highly susceptible plants. Wilting and plant death can occur. The root system can be restricted, and ears may have few grains or no grain.⁷ Maize striate mosaic virus (Mastrevirus, MSMV) was also recently discovered to be transmitted by *D. maidis*. MSMV was first detected in maize in Brazil and Argentina) with marked dwarfism, plant deformation, nerval or internerval vein yellowing, chlorotic rings, chlorosis along leaf edges, and vein thickening.^{8,9}

Maize bushy stunt phytoplasma (MBSP) symptoms mimic CSS. Initial symptoms are chlorosis of whorl leaf margins while older leaves become reddish. Emerging leaves become increasingly chlorotic, and the leaf margins become tattered or torn.¹⁰ Older leaves become redder and internode length is reduced, causing the stunted appearance. The appearance of axillary and basal shoots gives the plant a bushy appearance. Tassels and ears are not formed or are barren.¹⁰ Multiple ears may develop without grain. Disease severity is more severe with high temperatures. Seedling stage infection is more severe than late season infection.¹⁰ In the field, it is not possible to differentiate the causal agent of stunt disease based solely on plant symptoms due to their similarity and due to the simultaneous infection of plants by CSS, MBSP, and streak virus.



Figure 2. Streaking between leaf veins characteristic of corn stunt disease. Picture courtesy of and used with the permission of Dr. Maria Rodrigues Duffeck, Oklahoma State University.

In addition, the manifestation of symptoms is influenced by the genetic makeup of the plants, their capacity to produce anthocyanins (pigments associated with sugar that give purple to reddish coloration), and environmental conditions. Because of these factors, although reddening of the leaves is a common characteristic of plants affected by stunt disease, some plants only present chlorosis on the margins and tips of leaves. Therefore, laboratory analysis is essential for the identification of stunt diseases.

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Management

Management of the corn stunt disease complex should involve multiple practices which together aim to reduce the sources of disease inoculum and the population of leafhoppers. Thresholds for treatment have not been determined, and in most cases are not recommended due to the high efficiency of this insect as a pathogen vector. Attempting to chemically control corn leafhoppers is both very difficult and risky, because leafhoppers lay many eggs below the epidermis of the corn plant, and because adults and juveniles are able to quickly move around and between plants. Systemic seed treatments have reduced corn leafhopper populations, but these treatments have only negligibly reduced the occurrence of CSS.⁴ Additionally, since the diseases vectored by corn leafhoppers are not fungal, fungicides are not effective for their control. However, fungicidal treatments may help with the management of other fungal diseases that are expected or present.

A management strategy that uses chemical control in addition to working with other growers in the region to synchronize planting over 20 to 30 days, interrupting the “green bridge” between corn crops, eliminating volunteer corn plants in the off-season, and planting disease-tolerant corn products can help in the efficient management of corn leafhoppers and the diseases they vector.¹¹

Scouting and awareness are the best recommendations for management, and management strategies should be based on observations of the possible sources of disease inoculum in fields in the region. However, while the absence of fields with stunt symptoms reduces the risk of disease occurrence, it does not guarantee its absence. Corn leafhoppers vectoring the stunt disease complex can migrate long distances, often by traveling on wind currents, in search of favorable environments.¹² Regionally synchronized corn planting, as mentioned above, helps prevent leafhoppers from migrating from fields in the reproductive phase to fields in early stages of development.¹¹ Migration increases the risk of damage in fields with late planting, since the disease can be transmitted early in the cycle and

doing so result in a greater impact on productivity.^{13,14} Interrupting the “green bridge”—that is, interrupting corn and other cereal cultivation during a period of the year—helps manage leafhoppers by removing their host species, particularly by eliminating potential host plants of the genus *Zea*. As such, eliminating volunteer corn is particularly important to managing leafhoppers.^{4,15,16}

If leafhopper populations are high enough to cause leaf death, labeled insecticides can reduce direct feeding, but disease transmission will likely have already occurred. Disease symptoms do not appear until about 30 days after transmission, so mid-to-late season transmissions are unlikely to have a large effect on yield potential.¹⁷



Figure 3. Characteristic shortening of internodes resulting from corn stunt. Picture courtesy of and used with the permission of Dr. Maria Rodrigues Duffeck, Oklahoma State University.

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Sources

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Legal Statements

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Performance may vary, from location to location and from year to year, as local growing, soil and environmental conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on their growing environment.

The recommendations in this material are based upon trial observations and feedback received from a limited number of growers and growing environments. These recommendations should be considered as one reference point and should not be substituted for the professional opinion of agronomists, entomologists or other relevant experts evaluating specific conditions.

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