

Corn Disease Loss Estimates From the United States and Ontario, Canada — 2016

Corn diseases annually reduce yield in the United States and Canada. Diseases of importance vary from year to year, and diseases that affect yield are based on many factors, including weather conditions, crop production practices, and hybrid selection and susceptibility to disease.

Plant pathologists representing 24 corn-producing U.S. states and Ontario, Canada, estimated the percent yield loss from corn disease in their states. These reports account for 15.1 billion bushels (97.7 percent) of the total corn produced in the United States and Ontario in 2016 (Figure 1). The yield loss estimates include root rots, seedling blights, foliar diseases, crazy top, ear and head smuts, stalk rots, and ear rots.

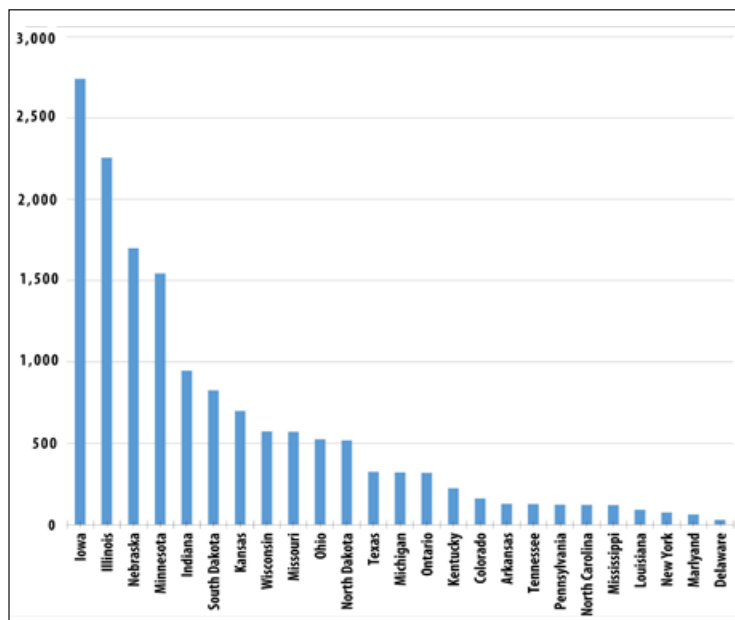


Figure 1. 2016 corn production (in millions of bushels) in 24 U.S. states and Ontario, Canada.

This publication documents the impact of major diseases on corn production during 2016. The Corn Disease Working Group (CDWG) revises disease loss estimates annually. It is important to note that methods for estimating disease loss vary by state or province. The estimates may be based on statewide disease surveys; feedback from university Extension, industry, and farmer representatives; and personal experience with disease losses. The CDWG determined disease loss values based on yield before estimated losses for each state or province:

$$\frac{(100 - \text{percent estimated disease loss}) \div 100}{\text{bushels harvested}}$$

The CDWG then formulated total bushels lost per disease (percent loss x yield before estimated losses) for each state or province.



Figure 2. Gray leaf spot is a common foliar disease of corn. It was estimated to have reduced yields by more than 235 million bushels in 2016 — more than any other disease that season.

Members of the Corn Disease Working Group are university scientists from many institutions, including: University of Arkansas, Colorado State University, Cornell University, University of Delaware, University of Guelph, University of Illinois, Iowa State University, Kansas State University, University of Kentucky, Louisiana State University, Michigan State University, University of Minnesota, Mississippi State University, University of Missouri, University of Nebraska, North Carolina State University, North Dakota State University, Ohio State University, Penn State University, Purdue University, South Dakota State University, University of Tennessee, Texas A&M University, and University of Wisconsin-Madison

2016 Conditions and Production

The United States and Ontario produced nearly 15.5 billion bushels of corn in 2016, and many areas reported record yields. Overall, temperatures were very warm across most of the Corn Belt, which contributed to an increase in diseases like gray leaf spot and southern rust.

2016 Disease Losses

In all, 10.8 percent of the total estimated corn bushels were lost in 2016 due to disease in 24 corn-producing states and Ontario, which is down from a 13.5 percent loss in 2015, but similar to what was experienced in 2014. Table 1 provides yield loss estimates for all diseases.



Figure 3. Anthracnose stalk rot was the second greatest cause of estimated yield loss due to disease in 2016.

Table 1. Estimated corn yield losses (millions of bushels) due to diseases in 24 U.S. corn-producing states and Ontario, Canada, in the 2016 growing season.

Disease	2016 Estimated Yield Loss (millions of bushels)
Root Rots and Seedling Blights	
Nematodes	58.4
Root rots	23.3
Seedling blights	17.5
Leaf and Aboveground Diseases	
Gray leaf spot	235.3
Southern rust	158.6
Northern corn leaf blight	151.3
Goss's wilt	90.8
Physoderma leaf spot	63.1
Other leaf & aboveground diseases	42.8
Eyespot	36.3
Common rust	19.0
Anthrachnose leaf blight	8.8
Carbonum leaf spot (previously northern corn leaf spot)	4.8
Holcus spot	3.6
Common smut	1.7
Crazy top	0.3
Head smut	0.3
Southern corn leaf blight	>0.1
Virus (maize dwarf mosaic)	>0.1
Stewart's disease	0.0
Other virus and virus-like diseases	0.0
Stalk Rots	
Anthrachnose stalk rot & top dieback	197.8
Fusarium stalk rot	185.1
Gibberella stalk rot	80.8
Other stalk rots	32.8
Diplodia stalk rot	29.9
Charcoal rot	10.4
Bacterial stalk rot	0.2
Ear rots	
Diplodia ear rot	173.2
Fusarium ear rot	95.9
Gibberella ear rot	61.3
Other ear rots	43.5
Aspergillus ear rot	2.1
Mycotoxins	
Loss from mycotoxin contamination	0.85% of harvested grain contaminated



Figure 4. Diplodia ear rot was estimated to be the most damaging ear rot in 2016, causing yield reductions of more than 173 million bushels.

Diseases in the Northern United States and Ontario

Gray leaf spot was the most damaging disease in the northern United States and Ontario in 2016 — nearly 214 million bushels lost. Anthracnose stalk rot was the second most damaging disease.

Warmer conditions through most of this area favored gray leaf spot development. Foliar diseases (such as southern rust and northern corn leaf blight) were also prevalent, but Goss’s wilt was less damaging than in previous years. A new bacterial disease (bacterial leaf streak) was identified in several states, but yield losses to this disease are unknown.

Table 2. Estimated disease losses in the 12 northernmost states* and Ontario, Canada, in 2016.

Disease	2016 Estimated Yield Loss (millions of bushels)
Gray leaf spot	213.9
Anthracnose stalk rot & top dieback	182.9
Diplodia ear rot	154.5
Northern corn leaf blight	145.2
Fusarium stalk rot	137.2
Southern rust	125.7
Fusarium ear rot	82.6

*Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, New York, North Dakota, Ohio, Pennsylvania, South Dakota, and Wisconsin.

Diseases in Southern States

Fusarium stalk rot caused the greatest damage in the southern United States in 2016, while nematodes were second, which is similar to 2015. Southern rust, gray leaf spot, and Goss’s wilt were the primary foliar diseases present (Table 3).

Table 3. Estimated disease losses in the 12 southernmost states* in 2016.

Disease	2016 Estimated Yield Loss (millions of bushels)
Fusarium stalk rot	47.9
Nematodes	40.4
Southern rust	32.9
Gray leaf spot	21.5
Diplodia ear rot	18.7
Anthracnose stalk rot & top dieback	14.9
Goss’s wilt	14.7

*Arkansas, Colorado, Delaware, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Tennessee, and Texas.

Mycotoxin Losses

In 2016, ear rots also caused minor losses through mycotoxin-contaminated corn grain. Plant pathologists estimated that 0.9 percent of the harvested grain in the United States and Ontario was contaminated in 2016.

Summary

Environmental conditions varied across the United States and Ontario in 2016, which affected the presence of and damage from many diseases.

The foliar disease gray leaf spot was most prevalent across northern states and Ontario in 2016, likely due to the warmer weather. Stalk rots continue to be important diseases across the United States and Ontario.

Disclaimer

The disease loss estimates in this publication were provided by members of the Corn Disease Working Group (CDWG). This information is only a guide. The values in this publication are not intended to be exact estimates of corn yield losses due to diseases. The members of the CDWG used the most appropriate means available to estimate disease losses and assume no

liability resulting from the use of these estimates.

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The Crop Protection Network (CPN) is a multi-state and international collaboration of university and provincial extension specialists, and public and private professionals who provide unbiased, research-based information to farmers and agricultural personnel. Our goal is to communicate relevant information that will help professionals identify and manage field crop diseases.

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