

Corn Disease Loss Estimates From the United States and Ontario, Canada — 2012

Each year, corn diseases reduce yields in the United States and Canada. The most important diseases vary from year to year depending on many factors, including weather conditions, crop production practices, hybrid selection, and susceptibility to disease.

Plant pathologists in each of the top 22 corn producing U.S. states and Ontario, Canada, estimate the percent yield loss from corn disease in their states (Figures 1 and 2). These reports account for 10.7 billion bushels (96.3 percent) of the total corn produced in the United States and Ontario in 2012. Root rots, seedling blights, above-ground (foliar) diseases, stalk rots, and ear rots are included in the yield loss estimates.

Although plant pathologists around the North Central region have noted the prominent diseases in their states

or provinces for years, there has been no coordinated effort to document disease-related losses in corn yields across the region — until now. This publication documents the impact of major diseases on corn production during the 2012 growing season — future publications will document the years to come.

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. These percent loss estimates are converted to total bushels lost per disease (percent loss multiplied by total bushels of corn produced) for each state or province.

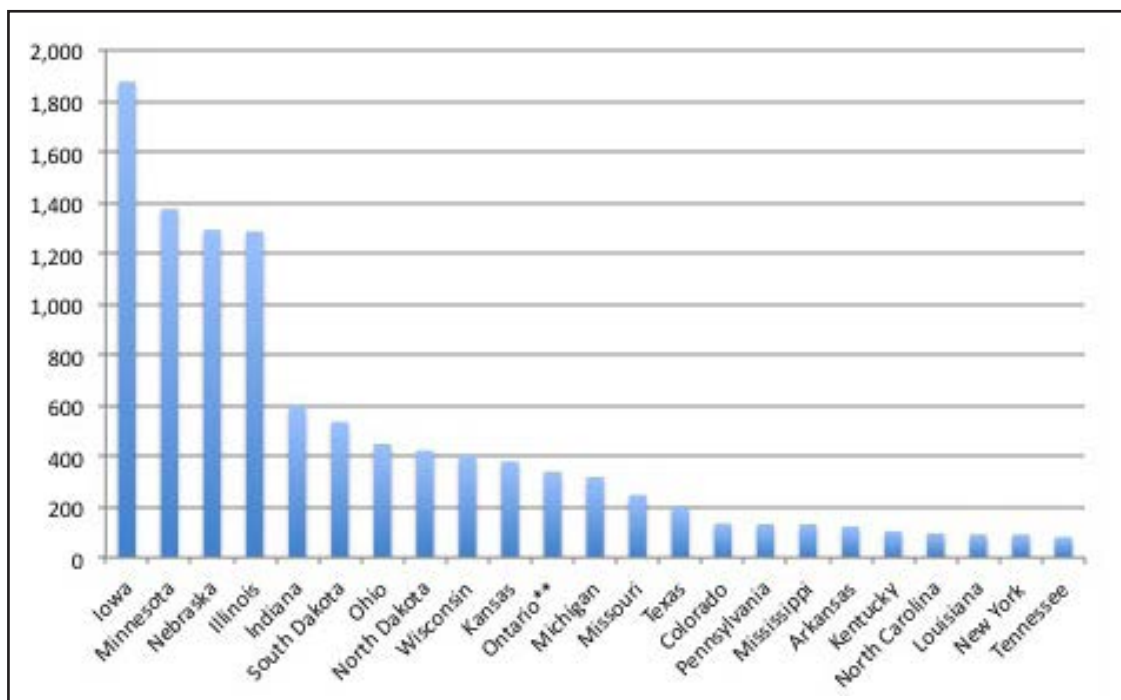


Figure 1. 2012 corn production (in millions of bushels) in 22 U.S. states and Ontario, Canada.

Members of the Corn Disease Working Group are university scientists from many institutions, including: University of Arkansas, Colorado State University, Cornell University, 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, Penn State University, Purdue University, South Dakota State University, Texas A&M University, University of Wisconsin

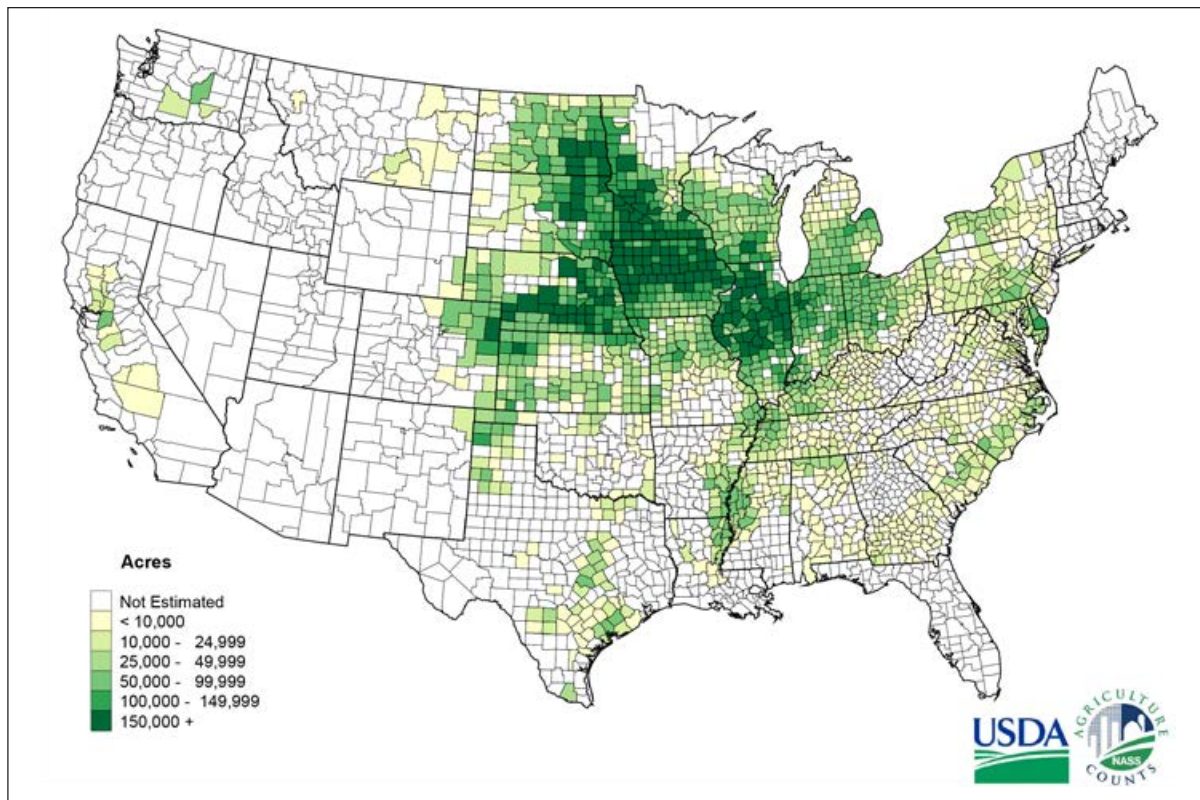


Figure 2. Map of 2012 corn acres and production (in millions of bushels) in the United States. Source: USDA-National Agricultural Statistics Service.

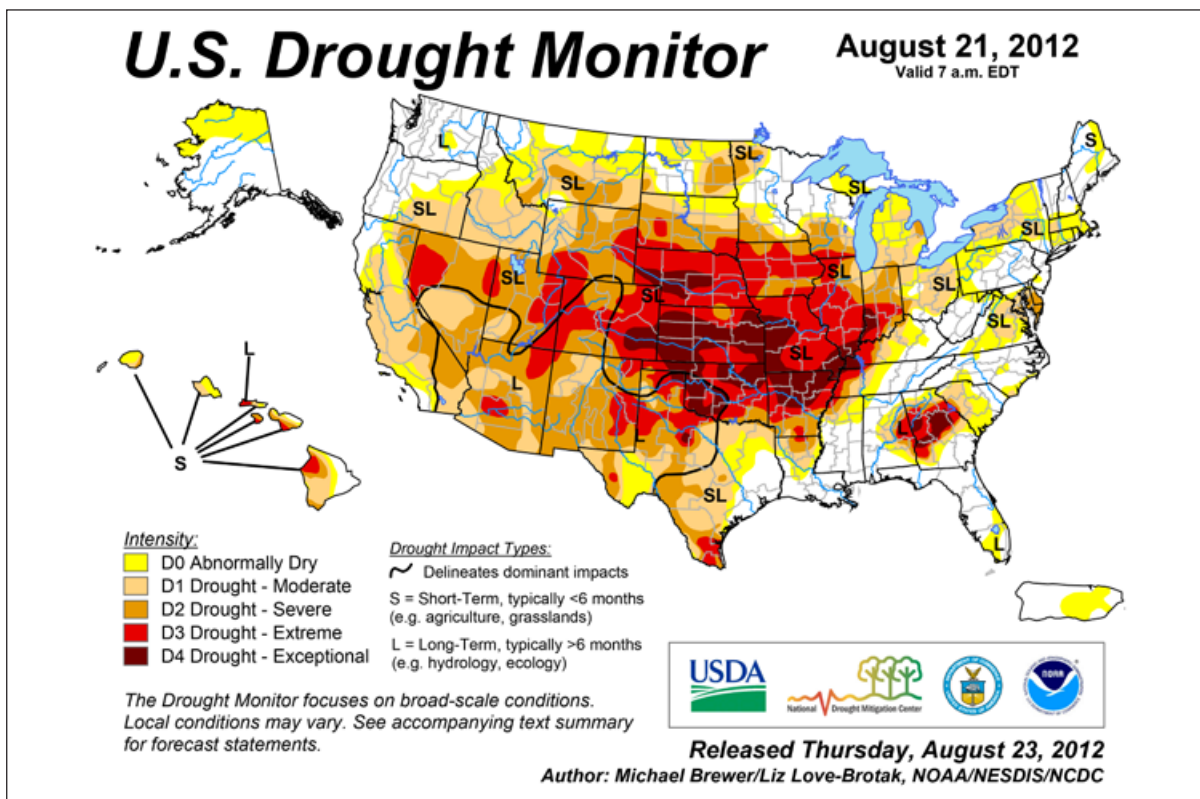


Figure 3. This map shows the intensity of drought conditions in the United States in mid-August, 2012. Source: U.S. Drought Monitor, droughtmonitor.unl.edu.

2012 Conditions and Production

The 2012 growing season was defined by very dry conditions across many corn-producing states (Figure 3). However, the United States and Ontario still produced more than 11.1 billion bushels of corn. The dry conditions affected the prevalence and severity of diseases across many areas in North America.

2012 Disease Losses

Across 22 states and Ontario, diseases caused an overall estimated 10.9 percent loss — or more than 1.3 billion bushels. Fusarium stalk rot caused the greatest loss of all diseases, with more than 124 million bushels lost. Aspergillus ear rot, Pythium damping off, Fusarium ear rot, and gray leaf spot followed in total losses. Table 1 provides yield loss estimates for all diseases.

Table 1. Estimated corn yield loss from diseases in the top 22 U.S. corn producing states and Ontario, Canada, in 2012.

Disease	2012 Estimated Yield Loss (millions of bushels)
Root Rots and Seedling Blights	
Pythium damping off	93.6
Nematodes	81.5
Fusarium seedling blight	37.5
Rhizoctonia root rot	10.5
Other root rots or seedling blights	1.0
Leaf and Aboveground Diseases	
Gray leaf spot	85.3
Northern leaf blight	74.5
Goss's wilt	61.8
Southern rust	53.4
Common rust	50.1
Eyespot	14.1
Carbonum leaf spot (northern corn leaf spot)	12.3
Stewart's disease	11.4
Holcus spot	8.2
Anthracnose leaf blight	8.2
Viruses (maize dwarf mosaic, sugarcane mosaic virus, and maize chlorotic mottle)	5.9
Diplodia leaf streak	<3.0
Physoderma leaf spot	<1.5
Southern corn leaf blight	<0.1

Other Aboveground Diseases	
Common smut	83.9
Head smut	1.7
Crazy top + sorghum downy mildew	0.2
Stalk Rots	
Fusarium stalk rot	124.6
Charcoal rot	70.7
Anthracnose stalk rot + top dieback	67.2
Gibberella stalk rot	43.9
Diplodia stalk rot	5.8
Bacterial stalk rot	2.0
Pythium stalk rot	1.4
Ear Rots	
Aspergillus ear rot	110.3
Fusarium ear rot	91.6
Gibberella ear rot	38.7
Diplodia ear rot	35.8
Other ear rots (Penicillium, Trichoderma)	16.0
Mycotoxins	
Mycotoxin contamination (estimated percent of harvested grain contaminated)	24.4%

Diseases in the Most Productive States

Illinois, Iowa, Minnesota, and Nebraska combined to produce 52.4 percent of the total corn production in the United States and Ontario in 2012. Disease losses reported in these states greatly influenced the overall importance of these diseases. Diseases in these four states caused an estimated 583 million bushels yield loss in 2012, which is approximately 9 percent of the total corn production from these states (Table 2).

Table 2. Disease losses from the top seven corn diseases in Illinois, Iowa, Minnesota, and Nebraska in 2012 .

Disease	2012 Yield Loss (millions of bushels)
Fusarium ear rot	67.6
Pythium damping off	63.3
Aspergillus ear rot	56.3
Fusarium stalk rot	50.9
Gray leaf spot	50.3

Diseases in Northern States

In the north, the greatest yield losses were from *Aspergillus* and *Fusarium* ear rots (Table 3). *Pythium* damping off was also more problematic in parts of Iowa and Illinois in 2012.

Table 3. Disease losses in the 12 northernmost U.S. states* and Ontario, Canada, in 2012.

Disease	2012 Yield Loss (millions of bushels)
<i>Aspergillus</i> ear rot	99.9
<i>Fusarium</i> ear rot	89.9
<i>Pythium</i> damping off	88.1
Common smut	83.2
<i>Fusarium</i> stalk rot	83.1
Gray leaf spot	81.3
Northern corn leaf blight	71.7

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

Diseases in Southern States

In the South, the greatest yield losses were from charcoal rot, *Fusarium* stalk rot, and nematodes that feed on corn. Plant pathologists also observed southern rust earlier than normal in southern states, which made it one of the top seven diseases in 2012 (Table 4).

Table 4. Disease losses from the 10 southernmost states* in 2012.

Disease	2012 Yield Loss (millions of bushels)
Charcoal rot	47.4
<i>Fusarium</i> stalk rot	41.5
Nematodes	25.9
<i>Aspergillus</i> ear rot	10.4
Southern rust	7.4
<i>Pythium</i> damping off	5.6
Gray leaf spot	4.1

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

Mycotoxin Losses

In 2012, ear rots also caused losses through mycotoxin-contaminated corn grain. Plant pathologists estimate that 24.4 percent of harvested U.S. grain was contaminated in 2012. Most of the contamination was from aflatoxin, which is produced by the fungus that causes *Aspergillus* ear rot.

Summary

Charcoal rot and ear rots (such as *Fusarium* and *Aspergillus* ear rot) were prevalent in 2012. These diseases are favored by hot, dry conditions, and are more problematic when corn plants are stressed. Therefore, the environment was a primary factor in disease prevalence and impact on corn production in 2012.

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 reports 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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