

## Soybean Disease Loss Estimates from the United States and Ontario, Canada — 2017

Each year, soybean diseases reduce yield in the United States and Ontario, Canada. The importance of these diseases vary annually, and many factors influence which diseases significantly affect yield. These factors can include environment, production practices, and a variety's susceptibility to disease.

This publication provides the estimated annual soybean yield losses due to plant diseases and pathogens in 2017 for the major soybean-producing areas in the United States and Ontario, Canada. Extension, university, USDA plant pathologists and soybean specialists from each state and province provided the estimates used in this publication. These reports accounted for 99.9 percent of the total soybean production in the United States and Ontario in 2017. The estimated losses include those caused by foliar diseases, stem diseases, nematodes, seedling blights, and seed diseases.

Disease loss estimates are gathered through various means including disease surveys; interactions with extension, university, government, industry, and farmer representatives; and personal experience with diseases losses. Estimation methods vary by state or province.

For this publication, the authors determined disease loss values based on yield before estimated losses for each state or province:

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

The authors then formulated total bushels lost per disease (percent loss X yield before estimated losses) for each state and province.

### 2017 Conditions and Production

The United States produced more than 4.4 billion bushels of soybean in 2017, and many areas reported record production (exceeding records from 2016). Ontario, Canada, produced 139.5 million bushels.



**Figure 1.** Soybean cyst nematode continues to cause the most estimated yield loss of any soybean disease in the United States and Ontario.

### 2017 Disease Losses

In all, 9.1 percent of the total estimated soybean production (bushels) lost in 2017 were due to diseases in the top 29 soybean-producing states, and 8.8 percent of the total estimated soybean bushels were lost due to disease in Ontario, Canada. Table 1 provides yield loss estimates for the specific diseases included in the survey of plant pathologists throughout the soybean production system in the United States and Ontario, Canada.

**Table 1.** Estimated soybean yield losses from diseases in the top 29 soybean-producing states in the United States and Ontario, Canada, in 2017.

Disease/Pathogen	2017 Estimated Yield Losses for U.S. (thousands of bushels)	2017 Estimated Yield Losses for Ontario (thousands of bushels)
<b>Root Rots and Seedling Blights</b>		
Soybean cyst nematode	121,173	3,825
Seedling diseases due to <i>Fusarium</i> , <i>Pythium</i> , <i>Phomopsis</i> , and <i>Rhizoctonia</i>	50,525	1,989
Root-knot nematode	12,341	0
Reniform nematode	2,281	0
Other nematodes <sup>a</sup>	1,423	0
<b>Leaf and Aboveground Diseases</b>		
Frogeye leaf spot	18,288	8
Septoria brown spot	12,734	2
Cercospora leaf blight	12,529	2
Purple seed stain	2,987	76
Bacterial diseases	2,350	46
Virus diseases <sup>b</sup>	2,300	76
Rhizoctonia aerial blight	1,713	0
Downy mildew	677	2
Soybean rust	379	0
<b>Stem Diseases</b>		
Sclerotinia stem rot (White mold)	57,409	3,519
Sudden death syndrome	31,636	1,836
Charcoal rot	27,206	15
Phytophthora root and stem rot	23,369	1,836
Stem Canker	14,869	76
Brown stem rot	13,407	76
Pod and stem blight	12,219	15
Diaporthe/Phomopsis seed decay	6,841	15
Anthracnose	4,876	2
Fusarium wilt and root rot	2,974	76
Southern blight	429	0
<b>Other Diseases<sup>c</sup></b>	<b>3,728</b>	<b>0</b>

<sup>a</sup> Columbia lance, lesion, sting, and stubby root.

<sup>b</sup> Alfalfa mosaic, bean pod mottle, soybean mosaic, soybean vein necrosis, tobacco ringspot, and tobacco streak. Only soybean mosaic virus was reported in Ontario, Canada.

<sup>c</sup> Green stem, Phymatotrichopsis root rot, red crown rot, target spot, and top dieback

## Diseases in the Northern United States

The northern U.S. states accounted for 78.5 percent of the total estimated yield losses in 2017. Since more than three-quarters of U.S. production happens in the northern states, disease losses in these areas greatly affect the overall importance of different diseases across the country (see Table 2).

**Table 2.** Estimated soybean yield losses due to the six most significant diseases in the northernmost U.S. states<sup>a</sup> in 2017.

Rank		Disease/Pathogen	Estimated Yield Losses (thousands of bushels)
Northern Region	Nation		
1	1	Soybean cyst nematode	98,169
2	2	Sclerotinia stem rot (White mold)	57,089
3	3	Seedling diseases due to <i>Fusarium</i> , <i>Pythium</i> , <i>Phomopsis</i> and <i>Rhizoctonia</i>	43,614
4	4	Sudden death syndrome	27,036
5	5	Charcoal rot	23,383
6	6	Phytophthora root and stem rot	19,038

<sup>a</sup> Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, New York, North Dakota, Ohio, Pennsylvania, South Dakota, and Wisconsin.



**Figure 2.** Sclerotinia stem rot (white mold) reduced yield more than any other stem disease in the northern U.S. in 2017.

## Diseases in the Southern United States

Soybean cyst nematode, root-knot nematode, and frogeye leaf spot were the diseases of greatest importance in 2017 (see Table 3).

**Table 3.** Estimated soybean yield losses due to the six most significant diseases in the southernmost soybean states<sup>a</sup> in 2017.

Rank		Disease/Pathogen	Estimated Yield Losses (thousands of bushels)
Southern Region	Nation		
1	1	Soybean cyst nematode	23,004
2	12	Root-knot nematode	11,955
3	7	Frogeye leaf spot	9,426
4	11	Cercospora leaf blight	8,069
5	3	Seedling diseases due to <i>Fusarium</i> , <i>Pythium</i> , <i>Phomopsis</i> and <i>Rhizoctonia</i>	6,911
6	4	Sudden death syndrome	4,600

<sup>a</sup> Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

## Disclaimer

The yield losses estimated in this publication were provided by members of the North Central Research and Extension Activity (NCERA) 137 Soybean Disease Committee and the Southern Soybean Disease Workers. This information is only a guide. The values in this publication are estimates and are not intended to be used as exact measurements of soybean yield losses due to diseases. However, these data provide valuable insight into the significance of a given disease within a production region (north or south) as well as across the entire production system. The authors used the most appropriate means available to estimate disease losses and no liability resulting from the use of these estimates is assumed.

Reference to products in this publication is not intended to be an endorsement to the exclusion of others that may be similar. Individuals using such products assume responsibility for their use in accordance with current directions of the manufacturer.

## Find out More

This publication was developed by the Crop Protection Network (CPN), 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.

Find more crop disease resources at [CropProtectionNetwork.org](http://CropProtectionNetwork.org).

Dr. J. Allen Wrather (University of Missouri) and Dr. Stephen Koenning (North Carolina State University) began this project in 1996 with the support of the United Soybean Board. We here list several of their publications that focus on these estimates. In addition, we also list a recently published article that focuses on loss estimates from 2010 to 2014.

Allen, T. W., et al. 2017. Soybean yield loss estimates due to diseases in the United States and Ontario, Canada, from 2010 to 2014. *Plant Health Progress* 18:19-27.

Koenning, S. R. and Wrather, J. A. 2010. Suppression of soybean yield potential in the continental United States by plant diseases from 2006 to 2009. *Plant Health Progress* doi: 10.1094/PHP-2010-1122-01-RS.

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Wrather, J. A., Stienstra, W. C. and Koenning, S. R. 2001. Soybean disease loss estimates for the United States from 1996-1998. *Canadian Journal of Plant Pathology* 23:122-131.

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