



## Soybean Pod and Seed Rots in 2018

### Soybean Seed Quality Problems in 2018

- Extended periods of warm and wet conditions following maturity can negatively affect seed quality and yield in soybeans by causing pod shattering, seed sprouting in the pods, and growth of fungal diseases.
- Many soybean producing areas have experienced excessive rainfall this fall, which has delayed harvest and exposed mature soybeans to weathering and degradation in the field.
- Areas of the Eastern and Northeastern U.S. have been particularly affected due to a combination of record rainfall and above average temperatures that have provided an ideal environment for the proliferation of fungal diseases.
- Pioneer field teams have been working with soybean growers to determine the extent and severity of seed quality problems and identify any management factors that may have had an impact.



### Pod and Seed Diseases Observed in 2018

- Several common pathogens that can affect soybean pods and seed have been observed in 2018.
- None of these pathogens are known to produce mycotoxins, but some can reduce yield and seed quality.

#### Cercospora Leaf Blight and Purple Seed Stain

- Caused by the fungal pathogen *Cercospora kikuchii*, which attacks both the leaves and the seeds of soybeans.
- Seeds are infected through their attachment to the pod, the hilum. Infected seeds may show a pink to pale or dark purple discoloration, which varies in size from specks to blotches to the entire seed coat.
- *Cercospora* diminishes seed appearance and quality, but usually does not decrease yields significantly.



Cercospora purple seed stain.

#### Phomopsis Seed Decay

- Caused by the fungal pathogen *Phomopsis longicolla*, which forms a complex with *Diaporthe phaseolorum* var. *sojae* to infect soybeans.
- Seeds appear shriveled, cracked, elongated, and may be covered with a thin white layer of mold. Small black specks of pycnidia may occur on the seeds.
- Infection can cause reductions in soybean yield and grade.

#### Frogeye Leaf Spot

- Caused by *Cercospora sojina*, a fungus that infects leaves, stems, and pods of soybeans.
- Lesion development on pods begins as water-soaked spots that progress to dark reddish-brown lesions.
- The fungus can also grow through the pod wall to infect maturing seeds. These seeds may show cracking of the seed coat and discoloration ranging from small specks to large blotches.



Frogeye leaf spot lesions.

#### Anthracnose

- Anthracnose in soybean is primarily caused by the fungal species *Colletotrichum truncatum* in the Midwestern U.S.
- Anthracnose can infect stems, leaves, and pods of soybean.
- Infected pods may be completely filled with mycelium and can have no seeds or fewer/smaller seed form. Seed that does form may be discolored, shriveled, and moldy.

#### Opportunistic Fungi and Bacteria

- Opportunistic pathogens are those that are normally associated with degradation of crop residue.
- Once the plant tissue is dead, it can no longer defend itself against these pathogens and is susceptible to infection.
- Soybean plants that remain in the field for extended periods following maturity can be degraded by opportunistic pathogens when conditions are favorable for diseases.

## Weather is the Driving Factor

- Fungal pathogens that commonly infect soybean pods and seed overwinter in crop residue so are present in essentially all soybean fields at some level.
- The severity of infection that actually occurs is therefore largely determined by the favorability of weather conditions.
- Soybean seed quality problems in 2018 are the result of an unusual confluence of weather conditions that have both delayed harvest and provided a uniquely favorable environment for fungal diseases.
- Many soybean-producing areas of the U.S. experienced above average rainfall as soybeans were maturing (Figure 1).
- In the Northeastern U.S., above-average rainfall was accompanied by above-average temperatures (Figure 2), producing an environment highly favorable to fungal diseases.
- Rainfall during July, August, and September was double or triple the long-term average in some areas.

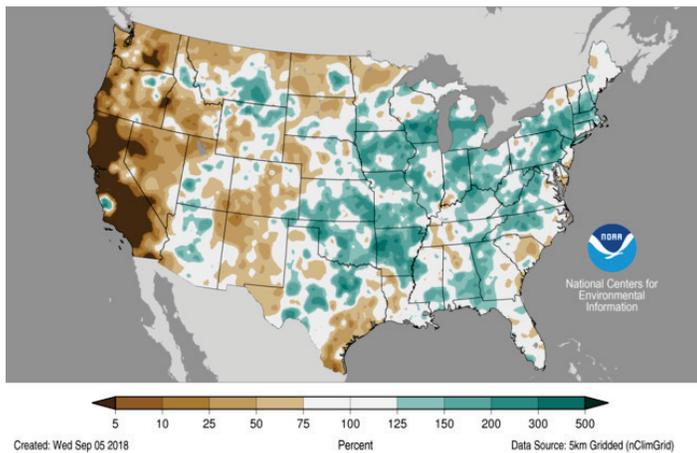


Figure 1. Precipitation (percent of long-term average) in August 2018.

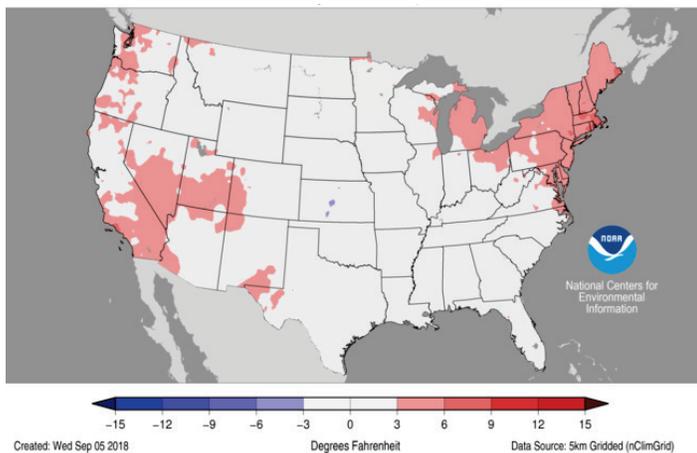


Figure 2. Mean temperature departures from average in August 2018.

## Observations

- In general, it appears that seed quality issues are more prevalent in earlier-planted soybeans.
- Problems do not appear to be associated with any particular soybean maturity groups or varieties.

- It is likely that the interaction between maturity timing and weather conditions was the primary determinant of seed quality problems in a given field.
  - Soybean plants that are mature and weathering in the field under conditions favorable for disease are highly prone to infection.
  - The longer the soybeans remain in the field before harvest, the more time diseases have to work.
  - Soybeans easily take up water, which can cause seed swelling and pod splitting and increase susceptibility to diseases.
  - Warmer temperatures drive faster fungal growth.
- Effects of foliar fungicide applications varied in terms of preventing yield loss from pod and seed diseases in 2018.
  - In many cases it appears there was no effect. An application made around the typical timing (R3 stage) would not have any activity left to control pathogens invading the mature plant late in the season.
  - In areas with heavy frogeye leaf spot pressure, more consistent yield benefits were observed, particularly on soybean varieties with lower genetic resistance.

## Harvest, Handling, and Storage

- Affected fields should be harvested as soon as feasible to prevent further loss of yield and quality.
- If soybean plants have retained green foliage due to wet conditions, a desiccant may be needed.
- Soybeans should be dried down to 11% moisture to inhibit fungal growth, aerated, and delivered as soon as possible.
- Soybeans should be dried at temperatures between 100 and 130 °F. Higher temperatures can cause damage to the seed.
- Damaged soybeans can be blended with good quality soybeans, if possible.
- Growers should open a claim with their crop insurance provider if there is a concern over soybean quality and yield.
- Livestock feeding should not be a problem – There are no mycotoxins associated with the soybean seed diseases being observed in 2018.

## Management Considerations for the Future

- Seed quality problems in 2018 are largely the product of a highly unusual set of weather conditions that have favored disease growth and delayed harvest, so there no simple management changes that could have prevented problems this year or that will prevent problems in the future.
- In general, anything growers can do to reduce the amount of time mature soybeans remain in the field before harvest will help reduce seed quality issues.
- Pioneer and university researchers will continue to evaluate results from 2018 to look for any genetic or management differences.
- Although 2018 was an unusual year, similar weather patterns are expected to appear more frequently in the future due to climate change.