

Assessing the Impact of Excess Moisture on Crops



How Does Excess Moisture Result in Crop Damage?

- Germinating seeds and plant roots require oxygen in the soil for respiration.
- Under flooded conditions the saturated soil becomes oxygen depleted, drastically reducing metabolism.
- Oxygen depletion occurs faster when temperatures are higher and there is a higher rate of biological activity in the soil.
- Saturated soils can reduce yield, and if oxygen is depleted for a long duration it could result in death to a portion or the entire plant.

Factors Influencing Extent of Crop Damage

Stage of Plant Growth

For crops that are just germinating or emerging, they are vulnerable to flooding damage as their level of metabolism is high. Saturated soils may slow or prevent germination, and the longer it takes for emergence after germination, the greater the chance of stand loss.

For emerged crops, young plants are more susceptible to damage for two reasons:

- 1) The growing point for many crops is at or below the soil surface and is directly subjected to the stress of oxygen depleted conditions.
- 2) Young plants are in the process of trying to establish a vigorous root system. Stunting or death of roots by oxygen-depletion can be a major stress for a young plant.

Duration of Saturated Soils

The longer the duration of flooding or water-logged conditions, the greater the risk of injury. Long durations under water result in more oxygen depletion and the buildup of harmful chemicals in the plant.

Under flooded conditions, 36 to 48 hours is often the tolerable limit for plants. Under water-logged conditions, crop tolerance is species dependent. Most annual crops can tolerate 3 to 7 days of water stress. Data from different sources suggests a ranking of most tolerant to most susceptible to waterlogging as follows: soybean, oats, wheat, corn, barley, canola, peas, and dry beans (Ransom 2021).

Confirming Plant Survival

To confirm plant survival of emerged plants, check the color of the growing point and look for new leaf growth 3-5 days after water drains from a field. Healthy growing points will be firm and yellowish-white.

Long Lasting Effects

Surviving plants after excess moisture may experience the following:

- Excess moisture during early crop growth can slow root development, which may make these crops more sensitive to dry soils and nutrient deficiencies later in the season.
- Lengthy periods of wet soil can also favor the development of disease and make the plants more susceptible to root rot.
- Excess water may result in nitrogen loss through leaching or denitrification. The amount of nitrogen lost depends on the length of time the soil is saturated and soil temperature.

References

Random, Joel. 2021. Impacts of flooding/waterlogging on crop development.

<https://www.ndsu.edu/agriculture/sites/default/files/2021-05/Impacts%20of%20waterlogging.pdf>

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