During rainy springs, fields may flood or even stay saturated for long periods of time. Flooded fields have two forms: saturated or waterlogged (where only the roots are flooded) or submerged (where the entire plant is under water). Saturated or waterlogged soils are more common than completely submerged plants, but they can both be damaging to yield.

**Seed Damage**

The primary damage to seeds from flooding or saturated soils is oxygen deprivation. Both corn and soybean seeds need oxygen to survive, germinate, and emerge. Oxygen supply can become depleted within 48 hours after submersion. The lack of oxygen will delay germination and emergence, and put the seeds at risk of rotting.

**Soybeans**

Flooding of soybean fields will slow growth, delay emergence, slow nodulation, and can cause seedling blights. Saturated soils can also slow the photosynthetic process, limit leaf area growth, and inhibit new root growth.

Even when the water subsides quickly, the field is at risk of soil crusting which can cause emergence delays. Soil crusting can become a concern if the soybeans have not emerged. Use a rotary hoe when the field is dry enough to drive on to assist emergence.

Soybeans can generally survive for 48 to 96 hours once completely underwater. The actual length of time depends on soil moisture before flooding, the air temperature, the amount of sunshine and cloud cover, the oxygen levels in the soil, and soil drainage. Higher air temperatures will reduce the number of days a soybean can survive underwater. Cloudy days will slow respiration, using less oxygen and energy, but sunny days will speed up respiration and oxygen use.

According to the University of Minnesota Extension, soybean fields that are flooded for two days or less do not see yield losses. If flooding lasts for four or more days, the crop will become stressed which will cause delays in plant growth and shorter plants with fewer nodes. Six days of flooding can cause significant yield loss while flooding for a week or more can result in loss of the entire stand.

Hold off on evaluating your soybean stands for four to seven days after the flooding to determine if there is any new growth or diseases. As the soybeans start to regrow, they will remain stunted and yellow until nodulation increases. Soybeans will also be more susceptible to seedling diseases such as Phytophthora in wet years.

*Left:* Water standing on soybean plants will reduce root growth, delay nodulation, and leave the plants vulnerable to seedling blights.
**Corn**

Cool air temperatures could increase a corn seed’s survival time to about 96 hours. When the seed starts to deteriorate, it loses the energy needed to germinate and grow the roots and mesocytol.

When corn is completely submerged underwater before it reaches the 6th leaf stage, it can survive for about four days if the air temperatures stay below 70°F. Cloudy weather will help with survival. If air temperatures are above the mid-70°F mark and there is a lot of sunshine, the plant’s survival could be less than 24 hours. The longer the plant is underwater, the higher the risk for seedling diseases and plant death. Even after the flooding subsides, the saturated soils can cause root death and disease.

Corn that is only partially submerged can continue to photosynthesize at a slower rate. This will allow the plant to survive longer in a flooded situation. Flooded corn has a better survival rate after V6, since the growing point is above ground. Extended periods of flooding and saturated soils will lead to nitrogen loss and may possibly require some supplemental nitrogen later in the season.

In a cornfield that has been underwater, wait four to five days before evaluating the growing point of the plant. Look for new green growth from the whorl, and be sure that the plant is solid and roots appear white and healthy. Corn and soybeans damaged by flooding and saturated soils will be more susceptible to stresses later in the season due to poor root growth and nutrient losses.

**Mud**

Mud that washes or splashes up onto the plant leaves will slow photosynthesis, causing stress. Another rainfall is often needed to wash off the leaves.

**Diseases**

Corn that is flooded after germination and before the corn is about 10 inches tall is at risk for Crazy Top. Crazy Top is a fungal infection that causes the tassels and ears of affected plants to produce numerous small leaves instead of reproductive tissue. Plants may be taller or shorter than healthy plants.

Plants that hold warm water in the whorl around V3-V9 may develop Physoderma infection. Physoderma results in a purple-to-black midrib, and can cause plants to snap off at a lower node due to infection.

**Fallow Syndrome**

If flooding prevents crops from growing in specific places in the field, be aware of fallow syndrome. Fallow syndrome occurs when the microbial community in the soil collapses due to a lack of plant life in the previous year. If there are low spots where your crop did not get established due to flooding, consider planting a cover crop to avoid seeing fallow syndrome in the next growing season.

**Additional Resources:**

https://extension.umn.edu/growing-soybean/flooded-soybean
https://extension.entm.purdue.edu/pestcrop/2013/issue11/index.html