AGRONOMIC ALERT

Technology Development & Agronomy by MONSANTO

Managing Flooded Soybean Fields

- Flooding delays emergence in soybeans, slows growth and results in stand loss.
- Saturated soils can inhibit root growth, leaf area expansion, and the photosynthetic process.
- It is important to scout fields entirely before making the decision to replant.

Saturated and Flooded Fields

Along with soil temperature, adequate soil moisture and high soil oxygen concentrations are favorable for seed germination and plant growth. Saturated soils, which may include flooded or ponded soils, can have a negative impact on emergence. The main side effects include plant growth restriction and decreased oxygen availability to the plant. Young plants may develop yellow leaves due to slowing of photosynthesis and plant growth. Lack of oxygen because of a prolonged period of saturated soil can reduce germination and emergence. In addition, portions of roots may die as a result of no oxygen. However, there is still a chance for survival unless the growing point is damaged.

The longer an area remains saturated, the higher the risk of plant death and higher air temperatures can shorten the number of days of survival.[1] According to University of Minnesota Extension, typically for soybean, yield losses are not noted in fields flooded for 2 days or less. Four days or more of flooding can stress the crop, delay plant growth, and cause shorter plants with fewer nodes. Six days can cause significant yield loss while flooding for a week or more can result in loss of the entire stand.[3]

Figure 1. Submerged soybean plants.

Soil Crusting

Soil crusting can occur when a crust layer forms on the soil surface as wet soils dry. The crust layer can delay or prevent seedling emergence. In addition, soybean hypocotyls can easily be broken when trying to push through the crust. Crusting may be more common in fields with fine textured soils, low organic matter, and little surface residue, especially where excessive tillage has taken place.[2] A rotary hoe can break up the crust and aid seedling emergence. Timing is essential and breaking the crust as soon as possible is most beneficial.

Scouting and Replanting Options

It is important to scout fields within 4 to 7 days after the water has receded. Soybean seedlings must have viable buds on the stem and should show signs of growth. Stand counts need to be taken to see if a desirable plant stand survived. Count intact plants with buds or expanded leaves. Research across the Midwest shows that yield decreases by 2 to 6% for every 10% reduction in stand counts below 150,000 per acre for stand reduction 2 to 4 weeks after planting. Soybean plants usually compensate well and fill in small gaps by branching out. If there are numerous gaps larger than 2 feet in diameter, consider replanting as the plant can't fill in these larger gaps.[4]

If replanting with soybeans, minimum or no tillage is recommended to maintain efficacy of any herbicides and/or soil insecticides already applied to the field. Plant soybeans 1 – 1.5 inches deep and not deeper than two inches. Planting too deep can burn the energy that could be used later by the plant. In addition, planting too deep can inhibit emergence in stressful situations, such as soil crusting and compaction.

Table 1. Percent Yield Potential at an established density of 4 and 8 plants per row foot

Stand Reduction (%)	Percent Yield Potential	
	4 plants per foot row	8 plants per foot row
0	95	100
10	93	98
20	91	96
30	88	93
40	83	89
50	78	84
60	73	78

Source: Soybean Replant Decisions, IOWA State University Extension, 2000.

Sources:

[1] Pedersen, P. 2007. Planting and replanting scenarios. Iowa State University Extension, Integrated Crop Management, IC-498.

[2] Al-Kaisi, M. and Pedersen, P. 2007. Wet conditions: challenges and opportunities. Iowa State University Extension, Integrated Crop Management, IC-498.

[3] Seth, N. 2004. Flooded fields and soybean survival. Uniersity of Minnesota Extension, http://www.soybeans.umn.edu/resources/news/news_6-3-04.htm, (verified 5.30.13).

[4] Abendroth, L. and Elmore, R. 2005. Soybean replanting guidelines. UNL cropwatch, http://cropwatch.unl.edu/web/cropwatch/archive?articleId=1031386. (verified 5.30.13).

Bohner, H. 2003. Do soil temperatures at planting effect soybean yield. Ministry of Agriculture Food and Rural Affairs. Ontario, Canada, Crop Talk.