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Plan for 2009 Crop Year by Managing Flooded Soils

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Abstract

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Plan for 2009 Crop Year by Managing Flooded Soils

By Mahdi Al-Kaisi, and Stephen Barnhart, Department of Agronomy

Approximately 1.2 million acres of Iowa farm land affected by flooding early this year have not been planted to any crop. There are potential economic and soil environmental consequences of leaving these soils unattended. The long-term damage to soil and water quality in areas of significant flooding need to be considered when planning for next season's crop.

Several changes that take place when soil is under saturated conditions for an extended period of time can be carried into the next season. One of these potential changes is the change in biological health of the soil, with the greatest concern coming when soil is left unplanted. The existence of growing plants in such areas will help build up the microbial community in the root zone, which is essential to nutrient cycling.

The flooded soil may experience "post flood syndrome," similar to the "fallow syndrome", where the land is left unplanted to any crop for the entire season. Flooded soils will encounter problems caused by the reduction of soil vesicular-arbuscular mycorrhizae (VAM) fungi colonization rates next growing season.

The VAM fungi are colonized around the root systems of crops in a mutually beneficial (symbiotic) relationship. The fungi benefits from the host plant roots, the crop benefits from the increased nutrient uptake zone developed by the fungal hyphae (threads that make up the mycelium of fungi). Unplanted flooded areas in the state can potentially be affected next season due to the absence of a root system that is essential to maintaining this microbial community that contributes to nutrient cycling.

In addition to potential biological changes that will be caused by flooding and the absence of active root system, there are some other chemical and physical changes that occur when soil is flooded and left without any growing crop. Most of the chemical changes will be induced by temporary changes in oxidation and reduction conditions. However, physical-chemical-biological changes in soil such as aggregate stability, soil structure, pH, etc., can be significant, especially if there is no growing crop.

Cover crops are management tool for June flooded fields.

Cover crop can be very beneficial in improving soil quality through soil structure, water infiltration and biological community, and to remediating the potential damage caused by the flood. Cover crops will also serve to retain some of the existing soil fertilizer nutrients and reduce their loss through leaching and surface runoff.

It is highly recommended that fields affected by flooding be managed carefully for the remainder of this growing season. Planting a short-term cover crop will provide a host source to grow the fungi. The most likely cover crop choices are a 'spring cereal' crop such as oats, or a 'winter cereal' such as grain rye, winter wheat or winter triticale. The 'winter cereals' will grow longer into the autumn and can be expected to re-grow next spring. They might be a

useful forage alternative, but will be an additional management consideration in row-crop settings.

Perennial or annual ryegrass would serve well as a temporary cover crop, but would be more costly than a cereal grain. Forage legumes such as red clover, alfalfa, or sweetclover would also serve as a suitable cover crop, but due to the late season planting would not be expected to 'fix' very much legume nitrogen.

Producers frequently ask, "Would allowing a weed population to grow on these flooded sites work just as well to prevent fallow syndrome?" This is not a highly researched option, but biologically, yes. Weeds would likely serve as a suitable 'cover crop', but at the risk of increased weed seed dispersal this season and a greater weed management problem in future years. The presence of a planted cover crop, or weeds, will improve the wildlife habitat value of these flooded sites, compared with leaving them bare.

Use flood experience to plan long-term.

Farmers need to consider the long-term impact on flooded areas and carefully evaluate the nutrient status during next season. Taking soil samples from the flooded areas is a way to assess the major nutrients content, in particular the P level, and have information to use in correcting potential nutrient deficiencies. Producers also need to avoid any extensive tillage in areas affected by flooding so problems aren't compounded by soil compaction, which in turn reduces water penetration and increases potential soil erosion.

Lessons can be learned from flooding and wet conditions. Producers can evaluate the field conditions and assess the need for implementing longer-term management practices that will minimize future impact. This is a good time to evaluate the need for installing tile drains or grass water ways that help remove excess water from fields.

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