AGRONOMIC Spotlight

Technology Development by MONSANTO

Fallow Syndrome in Corn

Questions regarding fallow syndrome in corn often arise following a spring when several acres did not get planted due to flooding and wet conditions. Fallow syndrome in corn, also known as Post-Flooded Corn Syndrome, is common when corn is planted in ground that was fallow and/or flooded the previous year. Symptoms include phosphorus (P) and Zinc (Zn) deficiency. It is a result of low vesicular arbuscular mycorrhizal (VAM) populations due to a lack of a host. Management options to help reduce the effects of fallow syndrome may include planting a cover crop, banding starter fertilizer in the spring, or planting a crop more tolerant to low VAM populations.

Fallow Syndrome: Symptoms and Causes

P or Zn deficiency, and reduced early growth, are common symptoms of corn suffering from fallow syndrome. The deficiencies are often not related to the amount of available P and Zn in the soil, but rather a decrease in VAM populations. VAM is a beneficial fungus found in the soil. It has a symbiotic relationship with corn. VAM prospers by capturing much of the energy it needs from corn roots. Corn benefits because VAM acts as an extension of corn roots, helping them to absorb more nutrients (especially P and Zn) and moisture for corn growth.

VAM populations decrease significantly when there is no host present. Most agricultural plants, even most weeds, can be hosts for VAM. Brassica species (e.g. canola, cabbage, broccoli, etc.) and sugar beets are the exception and are not good hosts for VAM. Therefore, fallow syndrome is most common when corn is grown in a year following fallow and/or flooded conditions, or a non-host crop.

VAM populations increase upon growth of corn or another host crop. The time it takes for VAM populations to rebound is relative to the extent of the previous decline in population. However, the effects of fallow syndrome are generally not evident two years following the occurrence that caused the decline in the VAM populations.

Effect of Fallow Syndrome on Yield Potential

There is limited information available that explains the potential yield loss from fallow syndrome. In a trial conducted in Iowa and Missouri in 1994, corn planted into fields that were fallow due to floods the prior year and received only 25 pounds P/acre in starter fertilizer, showed P deficiency symptoms and yielded 32 bu/acre less than the non-flooded field. When 60 to 80 pounds P/acre were applied as a starter fertilizer, the yield penalty from low VAM populations ranged from 7 to 16 bu/acre and plants did not exhibit any P deficiency symptoms.

Management Options

Plant a Cover Crop. Planting a cover crop provides a host for VAM to reproduce. Healthier cover crops generally result in a greater increase in VAM populations. Therefore, planting a cover crop as early as feasible is preferred. However, if it is not possible to plant a cover crop in mid-summer, one planted in late summer or early fall can still help increase VAM populations. Brassica crops, which are an extremely poor host for VAM, should not be used as a cover crop if the intention is to raise VAM populations.

Figure 1. Stunted, purple corn due to the plant being deficient in phosphorus is a common symptom of corn with fallow syndrome.

Band P with Starter Fertilizer. P is a relatively immobile nutrient in the soil. Broadcasting P has little value to help minimize the effects of fallow syndrome. Applying 60 to 80 pounds P/acre as a starter fertilizer can help overcome the effects of fallow syndrome. That rate is equivalent to approximately 16 to 21 gallons of 10-34-0 fertilizer. When applying these high rates, the starter should be applied using a 2x2 placement (2 inches below and 2 inches to the side of the seed row), not in furrow.

Inoculants. VAM fungal inoculants are generally not feasible based on availability and cost.

Planting a Different Crop. While most crops are hosts to VAM, some crops are more tolerant to low VAM populations. Soybean and sorghum show less of a negative response to low VAM populations and may be a viable option.

Sources: Gelderman, R. and A. Bly. April 2010. Crop Nutrient Considerations for Wet or Flooded Fields. South Dakota State University Extension. ExEx8166. http://sdces.sdstate.edu/(verified 8/31/2010).

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Too Much of One Good Thing Brings too Little of Another. July 14, 1998. Ag Answers. Ohio State and Purdue Extension.