Fallow Syndrome in Corn

**What is Fallow Syndrome?**

Fallow Syndrome, also known as Post Flooded Corn Syndrome, can be observed in corn that is planted into ground that was flooded or fallow the previous season. It is primarily characterized by the symptoms of phosphorus deficiency and slow early growth. The deficiency is not necessarily due to soil deficient in phosphorus, but the plant’s inability to take in the nutrient. In a normal, healthy field, there are beneficial fungi called vesicular-arbuscular mycorrhizae (VAM) that form a symbiotic relationship with corn plants assisting them in the absorption of water and nutrients. The hyphae, or external branching structures, of the VAM can be up to 100 times longer than roots and extend the nutrient absorption zone of the roots.¹ When ground has been empty or underwater with no host plants for these VAM to live with, their populations decrease significantly. When corn is planted into this ground, the absence of VAM makes it hard for plants to take up all the nutrients necessary for optimal growth.

Most agricultural plants and weeds can be hosts for VAM, with the exception of brassica species (e.g. canola, cabbage, broccoli, etc.) and sugar beets. Therefore, symptoms of fallow syndrome can also occur when corn is grown following a non-host crop like sugar beets. When corn or any other host crop is planted, VAM populations increase; however, the amount of time it takes for VAM populations to rebound is relative to the extent of decline in population. Generally, the effects of fallow syndrome are no longer evident two years following the occurrence that caused the decline in the VAM populations.

**Symptoms**

The primary symptoms of fallow syndrome are a corn crop deficient in phosphorus (P) or zinc (Zn) accompanied by slow, uneven early growth. The leaves of young phosphorus-deficient plants are bluish-green and slightly narrowed, turning reddish-purple starting at the tips and along the edges. Leaf tips may die. Zn deficiency symptoms are rare beyond the seedling stage. Yellow to white bleached bands appear on the lower part of leaves while the midvein, margins, and tip remain green.

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Effects of Fallow Syndrome on Yield

There is limited research available regarding the potential effects of fallow syndrome on corn yield. A 1994 study conducted in Iowa and Missouri compared corn planted into ground that was flooded the previous year with adjacent non-flooded ground.\(^1\) Corn planted in previously flooded ground that received only 25 lbs of P/acre in starter fertilizer showed P deficiency symptoms and yielded 32 bu/acre less than the non-flooded ground. When 60 to 80 lbs of P/acre were applied as a starter fertilizer, the yield penalty from previously flooded ground ranged from 7 to 16 bu/acre and plants did not exhibit any P deficiency symptoms.

Management Options

**Band P with Starter Fertilizer.** P is a relatively immobile nutrient in the soil. Broadcasting P provides little value in minimizing the effects of fallow syndrome. Applying 60 to 80 lbs of P/acre as a starter fertilizer can help overcome the effects of fallow syndrome.\(^1\) That rate is equivalent to approximately 16 to 21 gallons of 10-34-0 fertilizer.\(^2\) 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.\(^3\)

**Planting a Cover Crop.** An alternative to P fertilization when soil levels are sufficient, is to plant a cover crop. Cover crops provide a host for the VAM to reproduce and rebuild their populations. The more time a cover crop has to grow, the greater resulting increase in VAM populations; therefore, planting is best done early. If it is not feasible to plant mid-summer, late-summer or fall planting can still provide beneficial VAM populations. One of the least expensive plans is to plant a low rate of oats (about 1 bu/ acre) on ground that was flooded or left unplanted.\(^4\) When choosing a cover crop, remember that brassicas, which are extremely poor hosts for VAM, should not be used if the intention is to increase VAM populations.

**Inoculants.** Attempting to rebuild populations by adding VAM fungi to the soil is not feasible based on availability and cost of VAM inoculum.

**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 than corn and may be alternative options.

Sources:


Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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