

## **In-season foliar applications of nutrients with limited soil mobility can improve yields**

Summary: Immobile soil nutrients such as phosphorus may be adjusted in-season to improve crop yields.

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To: News-dailies, News-weeklies, AgMedia, News-local, News-tv, News-radio, MSU-All-News, News-internal, NatResourcesNonmedia, Producers, Web. From Sara Adlington, (406) 994-4602  
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BOZEMAN – Several soil nutrients in addition to nitrogen and sulfur can be applied in-season to help improve crop yields. Early to mid-season application of nutrients such as phosphorus, potassium, or metal micronutrients such as iron can benefit yields when crops are stressed by cold, dry or very wet conditions.

The best bet for ensuring optimal yields is balanced soil fertility going into the growing season. However, cold, dry or flooded conditions may limit plant root growth, as well as nutrient mobility and availability in soil.

"If soil nutrients are marginal, and root growth is slow due to cold or very wet conditions, then roots might not come into contact with a sufficient amount of nutrients," said Clain Jones, Extension soil fertility specialist in the Department of Land Resources and Environmental Sciences at Montana State University.

Foliar application, especially of micronutrients and immobile macronutrients such as phosphorus, is most beneficial if applied when there is enough leaf area to catch the liquid fertilizer. If immobile nutrients land on the soil surface, they will likely not be readily available to the roots.

Phosphorus is relatively immobile in soil and cold- or moisture-stressed crops' roots may not access sufficient phosphorus. If plants appear dark green and stunted and the older leaves become somewhat purple, then foliar phosphorus may be warranted. Jones noted that foliar phosphorus can be a good route to get phosphorus into stressed crops. Up to 16 pounds of foliar P2O5 per acre applied to wheat between early stem elongation and near-heading may increase yields if plants are deficient.

"Applying foliar phosphorus later, near flowering, may increase yields due to delayed leaf senescence. However, this only works if there is minimal moisture stress, that is, in high yielding conditions," said Jones.

Water-logged soils may actually have increased phosphorus availability. Therefore, if soil phosphorus levels were adequate for average yields, additional phosphorus may not be needed for higher yield potentials in regions of Montana that received heavy rains this spring.

Cool or dry weather is known to limit potassium availability. Potassium is important for nitrogen uptake, minimizing drought stress and speeding crop maturity. Potassium-deficient plants appear stunted with 'burned' leaf edges, and potassium-deficient small grains may produce excessive tillers.

"If small grains appear potassium-deficient, then foliar potassium chloride application may be beneficial as late as the flag leaf stage," said Jones.

Most micronutrients, like copper, zinc, and iron are only needed at very low rates (for example, less than two pounds copper per acre). Therefore, seed row fertilizer applications will result in one to two foot gaps between granules or liquid drops along the row. If roots are stressed by cold, dry, or water-logged conditions, they may not reach sparsely distributed fertilizer early enough in the growing season to meet the crop need. Jones has seen quite a few iron deficient plants this year, recognized by "interveinal chlorosis," likely due to waterlogged soils that limit root growth and iron uptake.

Foliar application of micronutrients may be beneficial, but only on the recommendation of a crop or soil professional.

Plant deficiency symptoms are illustrated in "Nutrient Management Module No. 9", and timing of foliar applications are in a recent presentation by Jones. Rescue treatments for nitrogen, sulfur and chloride are given in a recent press release. All of these are available on Jones' website <http://landresources.montana.edu/soilfertility>. Contact your Extension agent or crop adviser for help in determining fertilizer rates.