

MSU Grain Crops Update
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Emergency Corn Nitrogen Topdress

Rainfall and/or other limitations compounded by wet weather during this spring, have delayed nitrogen fertilizer application for some corn growers, making side-dressing no longer possible, because the crop is now too tall to permit ground equipment passage. Thus, these growers must generally apply their remaining nitrogen by airplane or high clearance applicator.

Proper timing for emergency nitrogen applications depend primarily upon crop health and growth stage. If the crop is lime green or lower leaves are turning yellow and firing up (nitrogen deficient), then nitrogen fertilizer application should proceed as quickly as possible. We do not suggest applying nitrogen fertilizer when soils are completely saturated, flooded or ponded, because anaerobic conditions stunt crop growth/response and promote nitrogen loss. However, **you do not have to wait for the soil surface to completely dry or crust before application, if the crop is nitrogen deficient**, particularly if there is a high likelihood of subsequent rainfall (to incorporate the nitrogen) and the soil is well-drained. Prolonged nitrogen deficiency during rapid vegetative stages, which is when nitrogen demand is highest, is going to reduce corn grain yield potential considerably. If the crop is dark green, then you have slightly more latitude to wait for “ideal” application conditions. Fertilizer application should generally commence well before tassel stage, so rainfall can incorporate the nitrogen into the soil and plants can use it and improve their health, before kernel development begins.

Figure 1. Wet weather and other complications will force some growers to apply nitrogen by airplane, rather than ground equipment, to their corn crop.



The primary limitation with applying granular nitrogen fertilizer during mid-season is leaf burn resulting from fertilizer granules falling into leaf whorls. Thus, **broadcast application should be limited to 100 to 150 pounds of granular nitrogen fertilizer material per acre on corn more than 3 feet tall.** Avoid fertilizer application when leaves are wet with dew or rain, because moisture encourages fertilizer granules to stick to leaves and promote burn. Many will likely need to make two applications to attain the nitrogen needed for the crop, rather than applying one large application (200 to 300+ pounds of fertilizer material/a. – or about 70 to 150 lbs./a. of N). Delaying the second application a week or more will spread a reasonable amount of burn on different leaves, rather than causing severe burn on concentrated leaves.

Figure 2. Leaf burn caused by broadcast application of granular nitrogen fertilizer initially appears bad, but the relatively small loss of leaf area is far less troublesome than mid-season nitrogen deficiency to a corn crop.



When topdressing nitrogen later than normal, you should be able to use more conservative fertilizer rates than normal (about 1 pound or less of actual N per bushel of corn grain yield goal). Plants should use the nitrogen very efficiently, since they are already rapidly using nitrogen during late vegetative stages. Furthermore, if the crop has been deficient for long, normal yields are no longer likely, so full rates are not necessary.

Two sources of granular nitrogen fertilizer are generally most feasible for mid-season topdress application on corn – ammonium nitrate and urea. Ammonium nitrate is generally the preferred nitrogen source because it is not subject to volatilize, compared to urea. When urea is broadcast on the soil, it reacts with the enzyme urease converting it to ammonia. If this process occurs on the soil surface, particularly if crop residue is present, ammonia is lost in the air as a gas in the air (volatilization). Rainfall or tillage is needed to incorporate urea into the soil where ammonia becomes ammonium and binds to the soil. Volatility can be a more important problem during the early summer, compared to early spring applications on wheat, because warm temperatures and rapid evaporation encourage nitrogen loss. You can reduce volatility by adding urease inhibitors, such as Agrotain, to granular urea. Urease inhibitors temporarily slow the activity of the urease enzyme. But you'll still need timely rainfall or overhead irrigation to get urea-based N into the soil so the plants can use it.

Foliar nitrogen fertilizers and lower analysis nitrogen sources are not feasible for these situations because they cannot economically supply sufficient nitrogen to meet crop demand.

Figure 3. Typical leaf burn caused by broadcast application of granular nitrogen fertilizer after the crop becomes too tall to sidedress.



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