

► Practical Strategies For Increasing Nitrogen Use Efficiency

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Granular urea is a widely used source of nitrogen for Mid-South rice producers, but is not the predominant nitrogen source for corn producers in that same geographic region. Urea has a greater nitrogen content (46% N) than other nitrogen sources such as liquid urea-ammonium nitrate (UAN), and can be applied with a rapidly-moving fertilizer spreader that will apply it in swaths up to 80 feet wide,

making it more efficient than slower-moving UAN applicators that may only apply in swaths up to 40 feet. As farms continue to consolidate, producers are searching for options that allow them to apply inputs more quickly and efficiently. A major concern to corn producers considering switching to surface-broadcast urea is the potential loss of nitrogen due to volatilization – the result of urea hydrolysis converting the nitrogen to ammonia gas.

One practical option to protect against nitrogen loss available to growers in irrigated corn production is to water in the surface-broadcast urea within two days after the fertilizer application. Research from a University trial (Holcomb et al., 2011) suggests a minimum of one half inch of rain or irrigation is necessary to water in the urea deep enough to protect against volatilization. A similar study conducted in Louisiana revealed that surface broadcast urea that is not irrigated or incorporated volatilized more than fifteen percent of the nitrogen applied by two weeks after application (Harrell, 2013), highlighting the loss potential of unprotected urea.

AGROTAIN® nitrogen stabilizer is a urease inhibitor marketed by Koch Agronomic Services, LLC that affects urea hydrolysis, reducing the potential for nitrogen loss through volatilization. The active ingredient in AGROTAIN® nitrogen stabilizer is n-(n-butyl) thiophosphoric triamide, or NBPT, and has been thoroughly tested by researchers (Rawluk et al., 2001;). The mechanism by which it affects urea hydrolysis is well understood, and its efficacy in Mid-South rice production has been demonstrated through several research studies (Dillon et al., 2011; Norman et al., 2009). Mid-South corn producers are requesting similar research results in corn production, so that they can better evaluate the potential value of the technology in this crop. Field studies are currently underway in several Southern Universities that will help corn growers characterize the value of surface broadcast urea that has been protected with AGROTAIN® nitrogen stabilizer.

Several University research trials have already been conducted in corn production. A three-year trial conducted by the University of Kentucky (Schwab and Murdock, 2010) examined corn yields based on applications of urea 2 weeks after planting applied at a low and high rate, compared to an application of AGROTAIN® stabilizer-protected urea at a low application rate. Urea was surface broadcast in a Randomized Complete Block arrangement at 75 and 100 pounds of nitrogen per acre, while AGROTAIN® stabilizer-treated urea was surface broadcast at 75 pounds of nitrogen per acre. Overall yields for the three years were 140 bushels per acre for urea applied at 75 pounds of nitrogen per acre, 155 bushels per acre for urea applied at 100 pounds of nitrogen per acre, and 160 bushels per acre for AGROTAIN® stabilizer-treated urea applied at 75 pounds of nitrogen per acre. In all three years, yields for the stabilizer-treated urea was significantly greater ($P=0.05$) than urea applied at the same nitrogen rate, and numerically greater than yields from urea applied at the higher nitrogen rate. In a five-year study conducted in Illinois on non-irrigated silt loam soil (Ebelhar, 2009), yields increased by three bushels per acre for AGROTAIN® stabilizer-treated urea over untreated urea, and by five bushels per acre for urea infused with both a urease inhibitor and a nitrification inhibitor, over untreated urea. All treatments were surface broadcast at planting, and the average yield for the entire study (all treatments, N rates and years) was 158 bushels per acre.

References

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