

Nitrogen Fertilizer

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Rice needs supplemental nitrogen fertilizer additions to achieve maximum yields. In the standard dry seeded, delayed flood rice production system, the bulk of the nitrogen is supplied as urea. Then a permanent flood is immediately established. However, in real farm situations the establishment of the permanent flood can be delayed for several days. During the time period between fertilizer application and flood establishment the applied urea is subject to losses by several pathways. These include volatilization of urea and conversion of urea to nitrate followed by subsequent leaching and denitrification. Several products are commercially available to control these losses. This field day stop will compare several products in their ability to achieve rice yields in a dry seeded, delayed flood production system.

In the process of urea volatilization, urea is attacked by a common soil chemical, urease enzyme, which splits the urea molecule resulting in free ammonia. This ammonia is then lost from the soil system into the air. These losses can be up to 30% of the applied nitrogen. In some cases you may be able to smell the ammonia as it is lost from the field. This process only occurs at the soil surface. To minimize volatilization urea can be incorporated by tillage or moved into the

soil by rainfall or irrigation. There are also products available which deactivate the urease enzyme, protecting the urea. Surface applied urea to wet and warm soils generally have the greatest potential for losses.

Urea itself is not subject to the process of denitrification. For denitrification to occur the urea must first be converted to ammonium and the ammonium subsequently converted to nitrate. In the ammonium form nitrogen is very stable and the potential for loss small. In the soil system the conversion from urea to nitrate takes 5 to 10 days and generally does not occur in flooded soils. Denitrification only occurs in water logged or flooded soils. In this process soil bacteria remove an oxygen atom from the nitrate molecule for use in their own respiration. This leaves the nitrogen in the form of a gas and it is free to leave the soil for the air. Products which block the conversion of urea to nitrate can prevent losses due to denitrification.

Products that prevent delay or block volatilization or denitrification will only have benefit when conditions favoring these processes are present. This field day stop will review the conditions and situations where these products will show benefit. Also presented are the results from side by side comparisons for products designed to control nitrogen losses in rice production. Δ

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