



Nitrogen Requirements GENERAL

The optimal fertilization program depends on water management. With continuous flooding, N is generally applied pre-plant. Consider using a split application when fields are drained early in the season for prolonged periods.

Application Rates

Split applications, with part of the N applied pre-flooding and the rest topdress, generally do not result in increased yields compared to a single pre-flood application.

Preplant N applications in rice, typically applied as aqua ammonia, do not increase the risk of nitrate leaching, if the field is flooded soon after the N application. In fact, high N use efficiencies can be achieved.

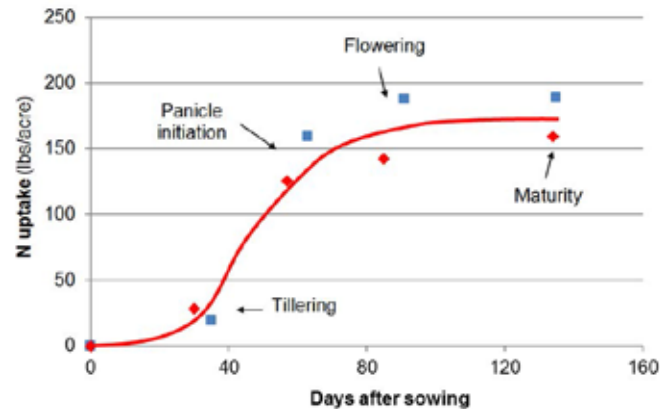
However, high pre-plant application rates can result in high ammonium concentrations that increase the risk of lodging, disease and weed pressure.

Early in the season (first 35 days), short drain periods of less than 3 to 4 days do not result in significant N losses, as the soil remains mostly saturated during these periods. However, if the soil is allowed to dry longer, there is potential for N loss due to denitrification when the field is reflooded.



Rice Nitrogen Uptake and Partitioning

Seasonal N Uptake



More information on rice fertility management, including placement, fertilizer source, phosphorus and potassium are available at:

www.cdffa.ca.gov/go/FREPguide



SELECTED REFERENCES

Williams, J.F., 2010. Rice nutrient management in California. University of California, Agricultural and Natural Resources, publication 3516.

Mikkelsen, D.S., 1976. Diagnostic plant analysis for rice. In: Reisenauer, H.M. (Ed.) Soil and Plant-Tissue Testing in California. University of California Cooperative Extension Bulletin 1879. pp. 30-31.

Mutters, C., 2010. Midseason nitrogen fertilizer. University of California Cooperative Extension. Butte County Rice Leaf, June 2010, 2-3.

Linquist, B.A., Hill, J.E., Mutters, R.G., Greer, C.A., Hartley, C., Ruark, M.D., van Kessel, C., 2009. Assessing the necessity of surface-applied preplant nitrogen fertilizer in rice systems. *Agronomy Journal* 101, 906-915.



Water Seeded RICE NITROGEN Fertilization Guidelines

Online nutrient guidelines for rice and other crops, as well as relevant references, are available at:

cdffa.ca.gov/go/FREPguide

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Nitrogen Fertilization PREPLANT

Application Rate

A total N application rate of 150 lbs/ac is considered average. Due to site-specific factors, such as N mineralization potential of the soil, and yield expectations, the required fertilizer N may vary by location and variety. Also, N fertilizer recommendations may be reduced by 10-20 lbs/acre when straw incorporation and winter flooding are consistently practiced after harvest.

Mode of Application

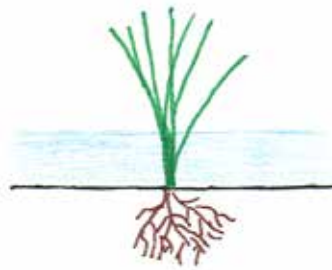
The preplant N is a combination of Aqua-ammonia and a starter fertilizer blend. Aqua-ammonia is chiseled to a depth of 3-4 inches, to prevent ammonia volatilization and denitrification losses when the field is flooded.

The starter blend (usually containing N, P, and K) is applied as a granular or liquid formulation. The blend should be lightly incorporated into the soil before flooding. This helps reduce N losses and algae problems early in the season.

The starter blend can also be applied anytime in the first 30 days after planting.

Soil Analysis

In contrast to many row crops and vegetables, the pre-plant soil nitrate test is of little use in rice, because when the field is flooded, residual soil nitrate is mostly denitrified and lost to the atmosphere.



Nitrogen Fertilization during SEASON

Leaf Sampling

The decision to topdress can be made based on leaf sampling or using a leaf color chart or SPAD meter to estimate leaf N concentration.

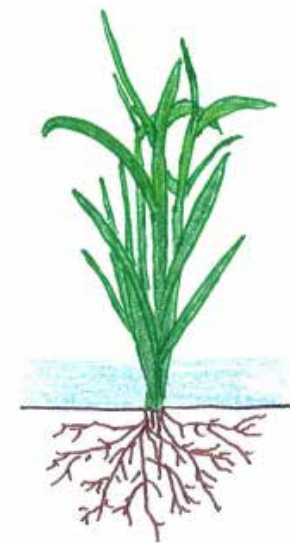
Use the newest fully expanded leaf for tissue analysis. This leaf is often referred to as a Y-leaf, because it forms the letter “Y” together with the stem and the youngest, still rolled leaf. Sample 50 leaves from about 30 locations within the field at the early stages of plant development and 30-60 leaves at the later stages.

Leaf Nitrogen Content

Leaf N concentration declines from mid-tillering to when the flag leaf appears, so it is important to know the growth stage at which the leaf is being evaluated.

The chart below contains critical and adequate N concentration numbers for the Y leaf at each relevant stage of growth.

Plant growth stage	Total N (%)	
	Critical	Adequate
Mid-tillering	3.8-4.0	4.0-4.8
Maximum tillering	3.4-3.6	3.6-4.2
Panicle initiation	3.0-3.2	3.2-3.6
Flag leaf	2.6-2.8	2.8-3.2



Nitrogen Fertilization TOP DRESS

A mid-season topdress N application is usually not recommended. Unless, the field was drained for a prolonged period during the early season (see general) or when a midseason leaf analysis indicates insufficient N supply.

Application Rate and Time

Ideally, no more than 30 lbs/acre should be applied midseason. Application rates exceeding 60 lbs/acre can greatly reduce the efficiency of N fertilizer. Midseason N applications should be made before the panicle initiation stage, roughly 50-55 days after sowing.

Mode of Application

Since fields are usually flooded during the application period, fertilizer is most commonly applied by aircraft. When fields are drained, N fertilizer is best applied just before flooding the field to prevent nitrification.

The optimal fertilization program depends on water management. With continuous flooding, N is generally applied pre-plant. Consider using a split application when fields are drained early in the season for prolonged periods.

For more information and references about N management in rice, access the California Fertilization Guidelines at:

cdfa.ca.gov/go/FREPGuide