PLANT ANALYSIS

Leaf Color

The N status of corn plants is often reflected in leaf color, with a dark green color indicating N-sufficient plants. Leaf greenness can be determined with a hand-held device, such as the SPAD Chlorophyll Meter, or a canopy reflectance meter.

Leaf Concentrations

To interpret leaf sampling results correctly, care must be taken to sample specific plant parts for each growth stage. For early season growth, whole plants should be sampled, and at midgrowth, the first fully developed or third leaf from the top should be selected. The sufficiency range is 3.5-5.0% for early season and 3.5-4.0% for midgrowth.

For tasseling and silking stages, the leaf opposite and below the primary ear should be sampled. The sufficiency range for these two stages is 2.8-3.8% and 2.0-3.0% respectively.

Corn Stalk Concentrations

To review and evaluate the N fertilization program and to adjust for the following years, a stalk nitrate test at corn maturity can be performed.

Optimal stalk nitrate-N concentrations range from 700-2000 ppm. Optimal values in fields where manure was applied in the fall are higher, possibly because a large portion of the manure N becomes available later in the season.

SELECTED REFERENCES


Nitrogen Fertilization

PREPLANT and STARTER

Preplant
Preplant nitrogen (N) should be applied close to planting. A longer time between application and crop uptake increases the risk of N losses.
N fertilization rates may be adjusted by referring to residual soil nitrate-N levels, which are determined through soil sampling in early spring.

Starter
A fertility program where starter N is combined with sidedress N gives growers more flexibility to adjust N rates to growth conditions, whereas a single preplant application may lead to N losses.

Starter fertilizer is traditionally banded at 2 inches to the side and 2 inches below the seed. Corn fertilization guidelines in several states recommend applying between 10 and 60 lbs N/acre with the starter. For direct seed placement, the N fertilization rate should not exceed 10-15 lbs/ac in medium and fine textured soils. Direct placement is not recommended for sandy or dry soils.

Nitrogen Fertilization

SIDEDRESS

Application Timing
Sidedress N should be applied between the 3-leaf stage and tasseling. The optimal timing of the first sidedress application depends on available soil N and starter fertilizer application rate.

Application Rates
When losses are minimized, corn needs about 1-1.25 lbs N/bushel of grain, which corresponds to approximately 6-7.2 lbs N/ton of silage corn. Therefore, for a grain yield of 180 bu/ac (5 tons/ac) or a silage corn yield of 30 tons/acre, the plants require a total of 180-216 lbs N/ac.

Cooperative Extension guidelines in several states recommend reducing fertilizer N rate when pre-sidedress nitrate tests show values higher than 10ppm.

For a table of recommended application rates based on variable nitrate test results and expected yields, please visit the full guidelines at: www.cdfa.ca.gov/go/FREPguide.

Application Mode
Banding is generally the most efficient method of applying sidedress N due to root placement.
Subsurface bands should be placed 8 to 15 inches away from plants to reduce the amount of root pruning and plant injury from ammonia.
Broadcast applications of UAN and ammonium nitrate fertilizers can result in leaf injury and yield reduction. Broadcasted urea-based fertilizers should be incorporated into the soil to prevent ammonia loss through volatilization.

In furrow irrigation systems, N should only be applied with the irrigation water when a tailwater recovery and reuse system is in place.

Foliar Applications
The amount of N that can be absorbed through the leaves is small, and studies generally did not find a yield effect due to foliar N applications.

For more information and references about N management in corn, access the crop fertilization guidelines at: www.cdfa.ca.gov/go/FREPguide