Field Corn

The level of nitrogen fertility has more influence on the growth and yield of field corn than any other single plant nutrient because it is the nutrient most often deficient in Arizona soils. The amount of fertilizer N required will vary depending on the yield potential of the crop and the amount of residual N in the soil prior to planting. Preplant soil analysis and plant tissue analysis during the season can be very useful in monitoring the nitrogen needs of the crop.

Fertilizer recommendations in this guide apply to all field corn varieties grown in Arizona and are based on a plant population of 30,000 plants per acre and yield potentials of 8500 to 11,000 lbs. (150 to 200 bushels) of grain per acre or 20 to 30 tons of silage per acre. Rates may need to be adjusted for significantly different yield goals.

- **Estimating crop N requirement**

Prior to planting a composite soil sample should be analyzed for NO_3-N content. Estimate the total amount of N fertilizer that is required from Table 35. Adjust this N rate as needed depending on crop appearance, mid-season plant tissue test results and previous experience.

Table 35.
Estimated seasonal nitrogen fertilizer rates for field corn based on preplant soil nitrate-nitrogen levels. These guidelines have not been verified for field corn grown in Arizona.

Soil Test NO_3-N	Approximate N Fertilizer Rate*
ppm	lbs./acre
0 - 10	200 - 300
10 - 20	120 - 200
20 - 50	50 - 120
above 50	0 - 50

**decrease this N rate by 60 lbs./acre if corn follows alfalfa.*

- **Early season nitrogen**

Up to 60 lbs. N per acre should be applied before or at planting particularly if the NO_3-N soil test value is below 20 ppm. Nitrogen can be broadcast on the soil surface and incorporated or placed in a band two inches below and to the side of the seed. Band applications of N above 60 lbs. per acre increase the risk of salt damage to young seedlings, especially on sandy textured soils.

- **Mid-season nitrogen**

All remaining nitrogen should be sidedressed or applied in the irrigation water between the 3- to 4-leaf stage and tasseling. Applications of N at the silking stage and beyond should only be made if N deficiency has been identified by plant tissue analysis or visual symptoms.

Periodic sampling of plant tissue during the growing season can be very useful in monitoring the nitrogen status of the crop (Table 36).

About 10 to 25 plants or plant parts should be sampled from each area being tested. The number of samples tested from each field depends on the uniformity of the field. Samples should be collected from randomly selected plants in uniform areas representing portions of a field that can be fertilized separately. Samples should be placed in a paper bag and dried at about 150°F (65°C) or refrigerated as soon as possible and submitted to a laboratory for total N or NO_3-N analysis as needed.

If a nitrogen deficiency is detected at any time up through the silking stage, then application of a nitrate or urea source is recommended. These forms of N move readily in soil solution and are immediately available to the plant roots with the first irrigation after the fertilizer has been applied. This decreases the time necessary for recovery from the nitrogen deficiency. Otherwise, the nitrogen source is of less importance because nitrification of ammonium (NH_4) sources can take place rapidly enough to permit the resulting NO_3 to be moved into the root zone to supply the needs of the crop. Caution should be used when applying ammonium sources of nitrogen such as anhydrous or aqua ammonia in order to avoid plant injury from ammonia toxicity, especially on very sandy soils.

- **Nutrient removal**

A grain yield of 11,200 lbs. per acre will contain about 150 lbs. of N. The entire crop of grain plus stover will contain about 270 lbs. N per acre.

- **Nitrogen uptake patterns**

The uptake of nitrogen by field corn consists of three distinct phases. The first is characterized by a

Table 36.
Interpretation of nitrogen levels in different plant parts of field corn throughout the growing season.

Plant Part*	N Test, Units	Growth Stage				
		3-4 Leaf	8 Leaf	12 Leaf	Tassel	Silk
		Adequate nitrogen level in plant tissue				
Whole plant	Total N%	4.0	3.5			
Youngest mature leaf	Total N%	4.0	3.5	3.2	3.2	
Ear leaf	Total N%	—	—			2.9
Basal stalk	NO_3-N ppm	12,000	14,000	12,000	10,000	8,000

**The "ear leaf" is the leaf immediately below and opposite the primary ear. Stalk samples consist of the four inches of main stalk tissue immediately above the ground level. These guidelines have not been verified for field corn grown in Arizona.*

low but increasing N flux between the seedling through the 8-leaf stage. Nitrogen flux rises dramatically to a maximum, approaching 10 lbs. N per acre per day at the 12-leaf stage, followed by an equally rapid decline until silking. Nitrogen flux during the grain filling period which follows is moderately low, generally averaging 1 to 2 lbs. N per acre per day.

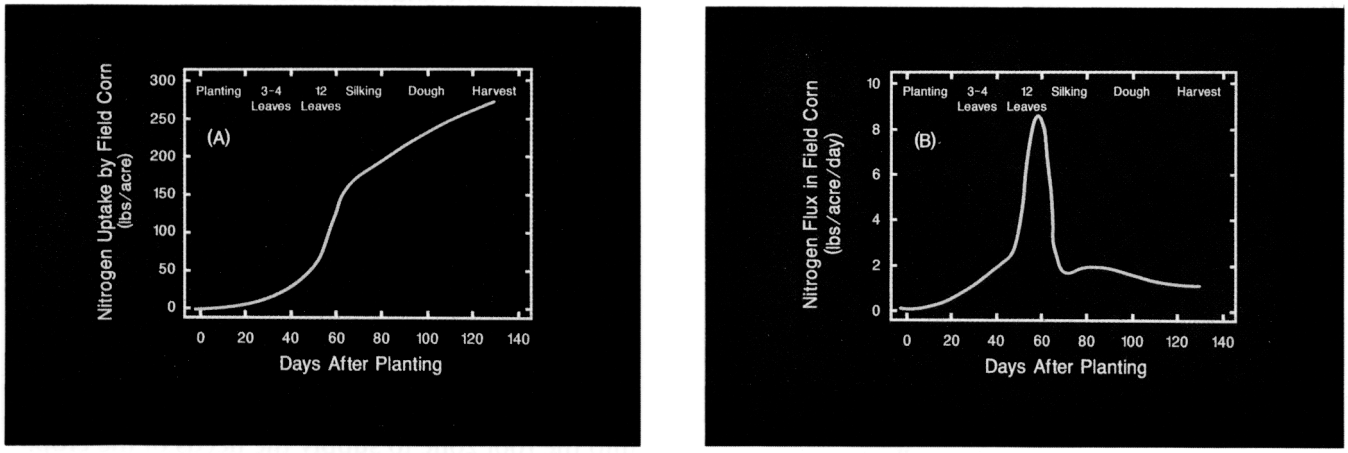

Figure 38.
Cumulative seasonal nitrogen uptake (A) and daily nitrogen flux (B) patterns for field corn at a yield level of 11,200 lbs. grain per acre (after Ritchie et al. 1986. How a Corn Plant Develops. Special Report No. 48. Iowa State University).