Grain Sorghum

The level of nitrogen fertility has more influence on the growth and yield of grain sorghum 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 can be very useful in estimating the nitrogen needs of the crop.

Fertilizer recommendations in this guide apply to all grain sorghum varieties grown in Arizona and are based on a yield potential of 6,000 to 7,000 lbs. (107 to 125 bushels) of grain 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 49. Adjust this N rate as needed depending on crop appearance, mid-season plant tissue test results and previous experience.

Table 49.
Estimated seasonal nitrogen fertilizer rates for grain sorghum based on preplant soil nitrate-nitrogen levels. These guidelines have not been verified for grain sorghum grown in Arizona.

Soil Test NO_3-N	Approximate N Fertilizer Rate*
ppm	lbs./acre
0 - 10	150 - 200
10 - 20	100 - 150
20 - 50	30 - 100
above 50	0 - 30

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

- **Early season nitrogen**

Up to 60 lbs. N per acre can 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. Placement of urea (46-0-0) or diammonium phosphate (18-46-0) with or near the seed is not recommended due to the risk of seedling injury from ammonia toxicity.

- **Mid-season nitrogen**

All remaining nitrogen should be sidedressed or applied in the irrigation water between the 3- to 4-leaf stage and flowering. Applications of N after the flowering stage should only be made if a N deficiency has been positively identified.

If a nitrogen deficiency is detected at any time through the flowering 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 such as anhydrous or aqua ammonia in order to avoid plant injury from ammonia toxicity, especially on very sandy soils.

- **Nutrient removal**

A harvest of 7560 lbs. of sorghum grain per acre will contain about 125 lbs. N. The entire crop will contain about 185 lbs. N per acre.

- **Nitrogen uptake patterns**

The seasonal uptake of nitrogen by grain sorghum consists of three distinct phases. The first is characterized by a low but increasing N flux between the seedling and 3- to 4-leaf stage. Nitrogen flux rises rapidly to a maximum, exceeding 4 lbs. N per acre per day at the 10- to 12-leaf stage, followed by an equally rapid decline until half-bloom. Nitrogen flux during the grain filling period which follows is moderately low, generally averaging 1 to 2 lbs. N per acre per day.

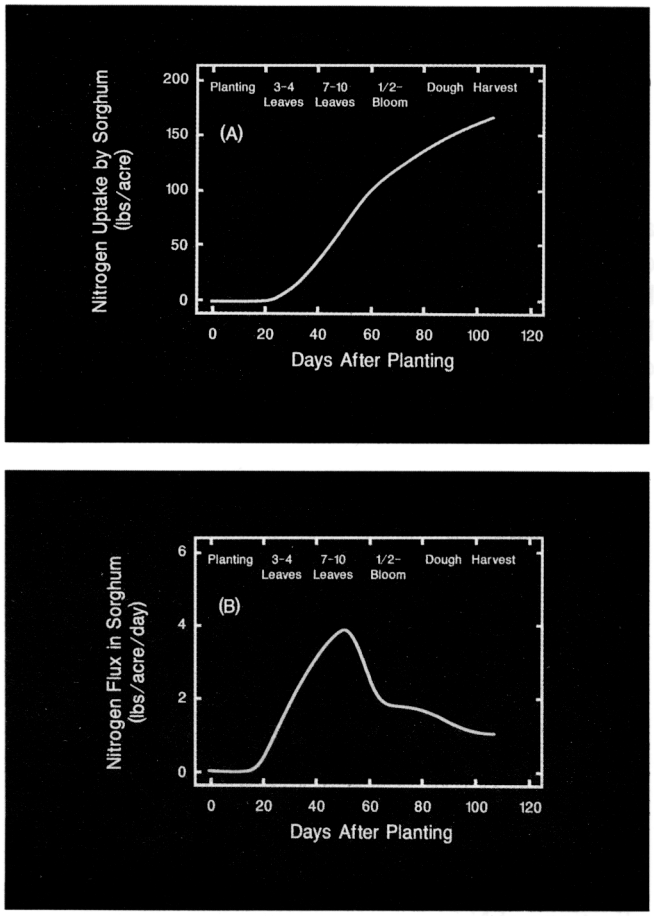

Figure 54.
Cumulative seasonal nitrogen uptake (A) and daily nitrogen flux (B) patterns for grain sorghum at a yield level of 7560 lbs. per acre (after Vanderlip. 1979. How a Sorghum Plant Develops. Publication No. 1203. Kansas State University).