## Cauliflower

The level of nitrogen fertility has more influence on the growth and yield of cauliflower than any other single plant nutrient because it is the nutrient most often deficient in Arizona soils. With good management, a total of about 200 to 250 lbs. N per acre is usually needed for optimum production. Preplant soil analysis and leaf midrib analysis during the season can be very useful in monitoring the nitrogen status of the crop. Deficiencies of nitrogen at any time in the season are to be avoided, as yields will usually be reduced. Deficiencies after the initiation of curd formation, called "buttoning," are especially serious, as nitrogen applications after this stage may not completely correct the problem.

Fertilizer recommendations in this guide apply to all cauliflower varieties grown in Arizona and are based on a plant population of 25,000 plants per acre and a yield potential of 10 to 15 tons per acre. Rates may need to be adjusted for significantly different plant populations or yield goals.

- **Early season nitrogen**

Preplant application of 40 to 60 lbs. N per acre on fine-textured soils (clay loams and silty clay loams) and 0 to 40 lbs. N per acre on coarse-textured soils (sands and sandy loams) are generally required. Preplant applications of nitrogen on very sandy soils are usually inefficient because nitrogen is easily leached below the root zone of young plants. Use the lower rates if there is a high residual nitrogen level in the plow layer of soil (i.e. above 15 ppm $NO_3$-N). About one-half of the total nitrogen applied to the crop should be applied during the first five to seven weeks after stand establishment.

- **Mid-season nitrogen**

At the four- to six-leaf stage of growth (45 to 50 days after seeding), collection of leaf midrib samples for nitrate ($NO_3$-N) analysis should begin. The thickened midribs from the center of the youngest full-sized leaves should be separated from the leaf blades. Be sure to include the stem connecting the leaf blade to the main stalk with the midrib sample (Figure 34). Do not sample midribs from diseased, damaged, or unrepresentative leaves. On older plants, sample midribs from the youngest full-sized leaves. These are typically the "easiest" leaves

Figure 34.
**Begin sampling cauliflower midribs at the 4- to 6-leaf stage. Collect the midribs from the youngest full-sized leaves as shown above.**

to sample. About 25 to 50 midribs per sample are adequate for analysis, depending upon the size of the leaves at the time of collection. The number of samples tested from each field depends on the uniformity of the field. Samples should be collected from uniform areas representing portions of a field that can be fertilized separately. Samples should be taken at one- to two-week intervals throughout the season. 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 $NO_3$-N analysis.

- **Interpretation of midrib nitrate levels**

The midrib nitrogen level is normally high (with adequate soil fertility) early in the season during vegetative growth and declines as the season progresses. Desirable levels of nitrate-nitrogen are shown in Table 32 and Figure 35.

A timely application of nitrogen fertilizer can prevent or slow the decline of midrib nitrate. If the nitrate-N level is below 5,000 ppm $NO_3$-N prior to the "buttoning" 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 a nitrogen deficiency. At higher levels of midrib N, the nitrogen source is of less importance because nitrification of ammonium ($NH_4$) sources can take

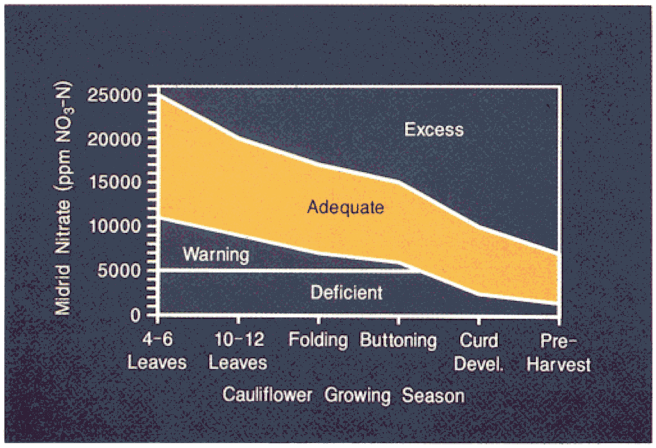


**Figure 35.**
**Interpretation of nitrate-nitrogen in cauliflower midribs at different stages of growth.**

place rapidly enough to permit the resulting $NO_3$ to be moved into the root zone to supply the needs of the plants. 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.

**Table 32.**
**Desirable levels of nitrate-nitrogen in cauliflower midribs at various stages of growth.**

| Stage of Cauliflower Growth | Approximate Days After Planting | Desirable Levels of Midrib $NO_3$-N |
|---|---|---|
| | | ppm |
| 4 to 6 Leaves | 45 - 50 | 11,000 |
| 10 to 12 Leaves | 60 - 65 | 9,000 |
| Folding | 75 - 80 | 7,000 |
| Buttoning | 85 - 90 | 6,000 |
| Curd Development | 100 - 105 | 2,500 |
| Pre-harvest | 115 - 120 | 1,500 |

- **Nutrient removal**

A harvest of 10 tons of cauliflower curds per acre contains about 125 lbs. N. The entire crop will contain about 250 lbs. N/acre.

- **Nitrogen uptake patterns**

Nitrogen uptake by cauliflower is very low prior to the 4- to 6-leaf stage. By the buttoning stage, N flux has increased to about 6 to 8 lbs. per acre per day. Nitrogen uptake temporarily slows as the curd begins to form and then increases again. Then, because cauliflower is harvested prior to entering reproductive growth, nitrogen uptake remains high until harvest.

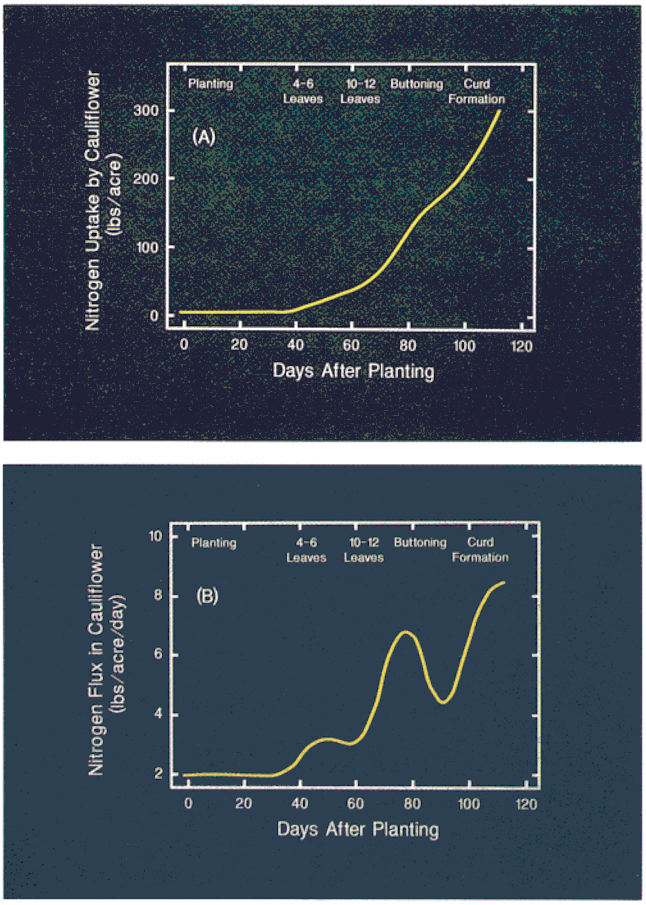


**Figure 36.**
**Cumulative seasonal nitrogen uptake (A) and daily nitrogen flux (B) patterns for Snowball-123 cauliflower at a yield level of 11.7 tons per acre.**