Watermelon

The level of nitrogen fertility has more influence on the growth and yield of watermelon than any other single plant nutrient because it is the nutrient most often deficient in Arizona soils. With good management a total of about 125 to 175 lbs. N per acre is usually needed for optimum production.

Preplant soil analysis and leaf petiole analysis during the season can be useful in monitoring the nitrogen status of the crop. Deficiencies of nitrogen at any time of the season are to be avoided, as marketable yield and general plant vigor and appearance will usually suffer. Deficiencies after fruits are 4 to 6 inches in diameter are especially serious, as nitrogen applications after this stage may not completely correct the problem.

Fertilizer recommendations in this guide apply to all watermelon varieties grown in Arizona and are based on a population of 5000 to 7000 plants per acre and a yield potential of 30 to 40 tons per acre. Rates may need to be adjusted for significantly different plant populations or yield goals.

- **Early season nitrogen**

Preplant applications of nitrogen are not often required since early season uptake of N prior to the early runner stage is very low. If the soil test value for NO_3-N taken before planting is below 10 ppm then apply 50 lbs. N per acre. Nitrogen should be broadcast on the soil surface just prior to listing and shaping of the melon beds.

- **Mid-season nitrogen**

At the 3- to 4-leaf stage of growth, collection of leaf petioles for nitrate (NO_3-N) analysis should begin. The petiole (leaf stem) from the youngest full-sized leaves should be sampled. This is normally the fourth or fifth leaf from the end of a vine (Figure 55). Do not sample petioles from diseased, damaged or unrepresentative leaves. About 25 to 50 petioles per sample are adequate for analysis. The number of samples tested from each field depends on the uniformity of the field. Samples should be collected from randomly selected plants within 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 NO_3-N analysis.

Figure 55.
Begin collecting watermelon petioles at the 3- to 4-leaf stage, sampling the youngest full-sized leaf. Once runners begin to form, this is usually the fourth or fifth leaf from the end of the vine as shown above.

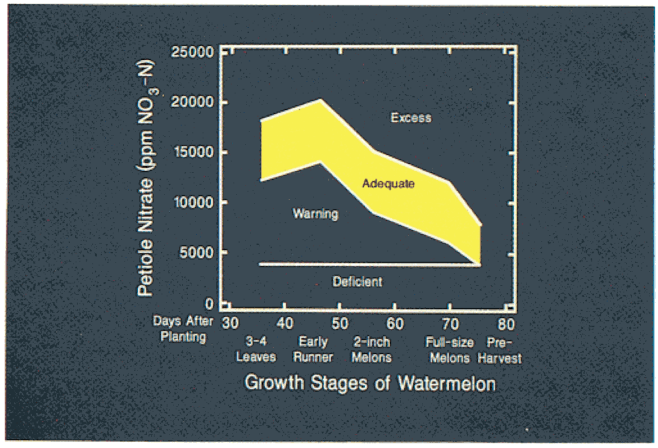

Figure 56.
Interpretation of nitrate-nitrogen in watermelon petioles at different stages of growth.

Petioles should be collected at the 3- to 4-leaf, early runner, 2-inch melon and full-size melon stages.

- **Interpretation of petiole nitrate levels**

The petiole nitrate level is normally high (with adequate soil fertility) early in the season during vegetative growth and declines as the season progresses. The interpretation of petiole nitrate values and corresponding midseason fertilizer application are shown in Table 51 and Figure 56.

Petiole nitrate concentrations should be maintained above 4000 ppm NO_3-N throughout the season. Visual symptoms of N deficiency such as

Table 51.
Interpretation of NO_3-N levels in watermelon petioles and corresponding nitrogen fertilizer recommendations at various growth stages.

Stage of Growth	Petiole NO_3-N Ranges	Apply this Amount of N Fertilizer
	ppm	lbs./acre
3- to 4-leaves	>12,000	none
	4,000 to 12,000	25 to 50
	<4,000	50 to 75
Early runner	>14,000	none
	4,000 to 14,000	50 to 75
	<4,000	75 to 100
2-inch melons	>9,000	none
	4,000 to 9,000	0 to 40
	<4,000	40 to 60
Full-size melons	>6,000	none
	4,000 to 6,000	0 to 20
	<4,000	20 to 30

pale green foliage or reduced vine growth appear when the petiole nitrates drop below about 2000 ppm NO_3-N. This should be avoided as some reduction in yield will probably occur even if the deficiency is corrected. No losses of yield or quality have been observed when high rates of N fertilization have resulted in excessive levels of petiole NO_3-N.

Applications of N after melons have reached full size but before harvest will be of little or no help in correcting late season nitrogen deficiency. This is because N uptake decreases very rapidly once melons have reached their full size. In addition, ammonium forms of N applied at this time may not have sufficient time to convert to NO_3 and thus will remain positionally unavailable to plant roots.

If the nitrate-N level is below 4,000 ppm NO_3-N prior to the full-size melon 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 petiole N, 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 plants. 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.

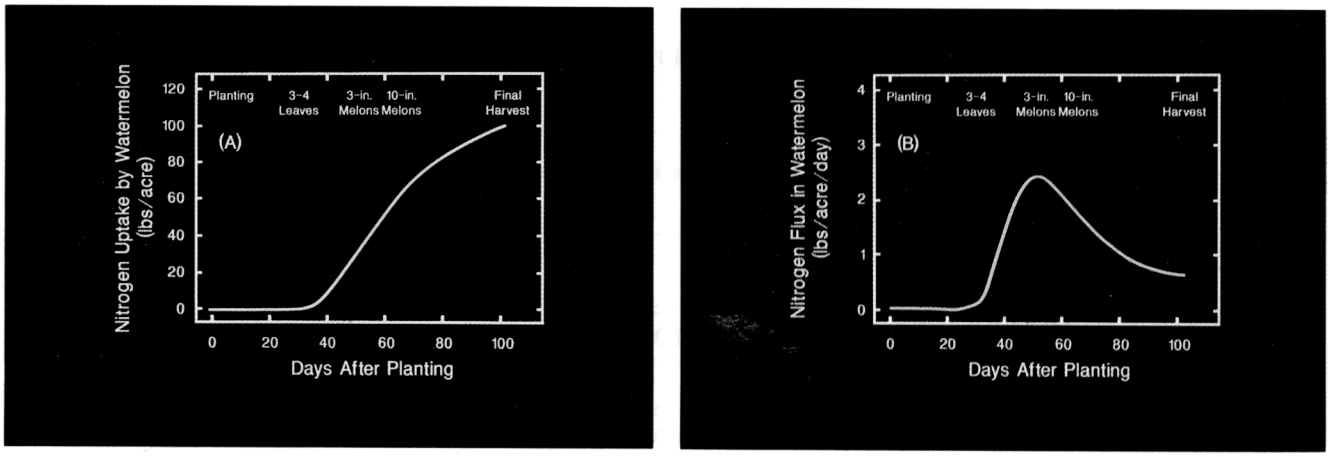

Figure 57.
Cumulative seasonal nitrogen uptake (A) and daily nitrogen flux (B) patterns for Mirage watermelon at a yield level of 40 tons per acre.

- **Nutrient removal**

A harvest of 40 tons of marketable watermelons per acre will contain about 70 lbs. N. The entire crop will contain about 100 lbs. N per acre.

- **Nitrogen uptake patterns**

Nitrogen uptake by watermelon is very slow prior to the early runner stage. Nitrogen flux increases slightly as melons begin to form and reaches a maximum of 2.6 lbs. N per acre per day as fruits grow in size. Little N is taken up after melons approach full size.