

## Asparagus

### *Management Highlights*

- Target pH: 6.8
- Apply N at first cultivation for most efficient N use by the crop.
- Use a B soil test or apply B every 3 years at recommended rates to prevent crop deficiency.

### Yield Goals

Yield of asparagus is influenced by many factors beyond soil test results and fertilizer application. Cultivar selection, planting date, weather conditions, soil type and water-holding capacity, weed, insect and disease pressure and crop management practices are just a few. *For that reason, the University of Delaware does not use yield goals in determining nutrient recommendations for vegetable crops at the present time. Instead, recommended rates are designed to produce maximum economic yields of high market quality in a good to average year.*

Growers should use these nutrient recommendations along with field history data, their knowledge of specific crop requirements, their management plans, and conditions from the current growing season to develop an appropriate fertilizer program for the crop.

### Soil pH and Liming

The target pH for asparagus on most Delaware soils is 6.8. Soils that are higher in organic matter ("black" soils) have a lower target pH (5.6) because organic matter moderates some of the effects of excessive soil acidity (e.g., aluminum toxicity). The lime recommendation for a specific field is calculated from the soil pH and buffer pH measurements using the steps outlined in *Calculating the Lime Requirement -- Chapter 3, Section 3.4*. Avoid overliming in order to prevent deficiency of micronutrients such as manganese.

In most cases, the lime requirement can be met by either calcitic or dolomitic limestone. When soil test Mg is less than 38 FIVs, use dolomitic limestone to prevent Mg deficiency and increase soil Mg concentrations.

### Nitrogen Management

The University of Delaware recommends a total nitrogen (N) application of 50-100 lbs N/ac per growing season for asparagus. The specific rate to be used is dependent upon crop status (e.g., new plantings versus cutting bed) as summarized in Table 1.

When planting new beds into legume cover crops or fields where manure has been applied, fertilizer N rates should be reduced. To calculate the adjustment necessary, see *Nitrogen Rate Adjustments -- Chapter 3, Section 3.5.1.2*.

**Table 1. Nitrogen recommendations for asparagus.**

<u>Crop Growth Stage</u> <u>Application Method and Timing</u>	<u>N Rate</u> <u>(lbs N /ac)</u>
<b><u>Growing crowns</u></b>	
Broadcast and disk in	50
<b><u>New plantings (Crowns and transplants)</u></b>	
Broadcast and plow down	50
Sidedress 4-6 weeks after planting	25 - 50
<b><u>Cutting beds</u></b>	
Broadcast before cutting season	75

### Phosphorus Management

Yield-limiting phosphorus (P) deficiency is rarely a concern on Delaware soils. Long-term applications of fertilizers and manures have resulted in P accumulations on many soils that are capable of supplying crop needs for several years with no further additions.

To determine whether P fertilization is necessary for a specific field, conduct a routine soil test. University of Delaware P recommendations for asparagus are

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dependent upon the soil test P value and the P needs of the crop. As with many other perennial crops, P requirement varies with crop status (e.g., new versus cutting beds). A summary of those P recommendations is given in Table 2 below. For new plantings and growing crowns, P should be broadcast and incorporated by plowing or disking prior to planting. For cutting beds, broadcast P across the field prior to the cutting season.

**Table 2. Phosphorus recommendations for asparagus.**

Crop Status	P Index Value			
	0-25	26-50	51-100	101 +
	----- lbs P <sub>2</sub> O <sub>5</sub> / ac -----			
Growing Crowns	200	100	50	0
New Plantings (Crowns & transplants)	200	100	50	0
Cutting Beds	200	150	100	0

### Potassium Management

The need for potassium (K) fertilization of asparagus is best determined by the use of a routine soil test. Potassium recommendations are based on the soil test K value and the K needs of the crop. As with P, the K requirement of asparagus also varies with crop status. A summary of University of Delaware K rates for asparagus is given in Table 3.

When establishing new beds, K should be broadcast and incorporated prior to planting. On cutting beds, K should be topdressed prior to the cutting season.

**Table 3. Potassium recommendations for asparagus.**

Crop Status	K Index Value			
	0-25	26-50	51-100	101 +
	----- lbs K <sub>2</sub> O / ac -----			
Growing Crowns	200	100	50	0
New Plantings (Crowns & transplants)	200	100	50	0
Cutting Beds	200	150	100	0

### Calcium and Magnesium Management

Calcium (Ca) and magnesium (Mg) needs of asparagus are usually met through routine liming. If the soil test Mg value is low (e.g., less than 38 FIVs) and liming is indicated, use dolomitic limestone to raise soil pH and increase soil Mg. If, however, liming is not necessary but Mg fertilization is still indicated, apply soluble Mg as Mg sulfate or Mg chloride to increase soil Mg. Appropriate application rates are given below in Table 4.

**Table 4. Application rates for soluble Mg as a function of Mg fertility index value.**

Mg Index Value									
0	5	10	15	20	25	30	35	40	
----- lbs soluble Mg / ac -----									
80	70	60	50	40	30	20	10	0	

### Boron Management

Boron (B) deficiency may occur in asparagus grown on Delaware soils. The best way to determine the need for B fertilization is with a soil test. Interpretation of and application rates based on the B soil test are summarized in Table 5. In the absence of a soil test, **apply 1 - 2 lbs/ac of actual B every three years** in a blended, broadcast fertilizer or as a soil or foliar spray. *Avoid over-application of B to prevent plant injury from B toxicity.*

**Table 5. Interpretation of the B soil test for asparagus.**

Soil Test Rating	Soil Concentration	Recommended Application
	--- lbs B/ac ---	--- lbs B/ac ---
Low	0.00 - 0.70	2.0
Medium	0.71 - 1.40	1.0
Optimum	> 1.40	0

### Manganese Management

Manganese (Mn) deficiency may occur in asparagus grown on Delaware soils, most often as a result of overliming soils that are naturally low in Mn. The

University of Delaware Soil Testing Program uses an availability index based on the soil test Mn value and soil pH to predict the likelihood of Mn deficiency. That availability index is calculated using the equation:

$$MnAI = 101.7 - (15.2 \times pH) + (2.11 \times ST-Mn)$$

where:

- MnAI = Mn availability index
- pH = water pH of the soil
- ST-Mn = Mehlich 3 soil test Mn in lbs/ac.

Table 3-14 in *Chapter 3, Section 3.5.5.2 (Manganese Management)* gives a summary of MnAI values for various soil pH-soil test Mn combinations. Interpretations of the Mn availability index for asparagus are given below in Table 6.

**Table 6. Interpretation of the Mn availability index for asparagus.**

MnAI Value	Interpretation
Less than 12	Mn deficiency is likely at this soil pH and Mn concentration.
12 or greater	Mn deficiency is unlikely.

Suspected Mn deficiency can be confirmed by tissue analysis. Confirmed deficiency situations can be corrected in season by foliar applications of Mn of 1 to 2 lbs/ac of actual Mn as Mn sulfate, Mn oxide or Mn chelate. If deficiency is predicted by the availability index or was observed during the previous growing season, it can be prevented by an application of 8-10 lbs/ac of actual Mn in the fertilizer band. Band applications of acid-forming fertilizer, which lower the pH in the area of plant roots, may correct Mn deficiency without the addition of Mn fertilizer.

**Other Nutrients**

No other nutrients are known to be limiting to asparagus production in Delaware.

**Additional Information**

See Soil Test Notes 1, 4, 5 and 7 (Appendix 7) and **Extension Bulletin 137: *Commercial Vegetable Production Recommendations - Delaware 2003*** (Kee et al., 2003) for additional information concerning fertilization of asparagus.