

## Peas - Lima Beans, Double-cropped

### Management Highlights

- Target pH: 6.5
- Broadcast N prior to planting to promote good growth of the crop prior to bloom. Larger plants are desirable because they provide greater potential for blossoms, and subsequently, yield.

### Yield Goals

Yield of lima beans is influenced by many factors beyond soil test results and fertilizer application. Cultivar selection, planting date, early vegetative growth, 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 recommendation along with field history data, their knowledge of specific crop requirements, appropriate management practices, and conditions from the current growing season to develop an appropriate fertilizer program for the crop.

### Soil pH and Liming

The target pH for lima beans on most Delaware soils is 6.5. 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 micro-nutrients 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 nitrogen (N) be applied to each crop in the peas-lima beans double-crop rotation. Table 1, below, gives a summary of the nitrogen rates to be used. Nitrogen should be broadcast prior to planting each crop and incorporated for most efficient crop use and to promote strong vegetative growth prior to bloom. Good plant growth early in the season is necessary to obtain good yields because larger plants are capable of producing more blossoms and, subsequently, have a greater yield potential.

**Table 1. Recommended N rates for the peas-lima bean double-crop rotation.**

Crop	N Rate
	----- lbs N / ac -----
Peas	40 - 80
Lima Beans	20

The higher N rates should be used on sandier soils, which are more prone to leaching losses, or for fields with a higher yield potential.

### 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.

## Commercial Vegetable Crops

To determine whether P fertilization is necessary for a specific field, conduct a routine soil test. University of Delaware P recommendations for peas and lima beans in double-crop rotation are dependent upon the soil test P value and the P requirement of the crops. A summary of those P recommendations is given in Table 2 below.

**Table 2. Phosphorus recommendations for double-cropped peas and lima beans.**

Application Method and Timing	P Index Value			
	0-25	26-50	51-100	101 +
	----- lbs P <sub>2</sub> O <sub>5</sub> / ac -----			
Broadcast and disk in at or prior to planting	120	80	40	0

### Potassium Management

The need for potassium (K) fertilization of double-cropped peas and lima beans is best determined by a routine soil test. Potassium recommendations are based on the soil test K value and the K requirement of the crops. A summary of University of Delaware K rates for the rotation is given in Table 3.

**Table 3. Potassium recommendations for double-cropped peas and lima beans.**

Application Method and Timing	K Index Value			
	0-25	26-50	51-100	101 +
	----- lbs K <sub>2</sub> O / ac -----			
Broadcast and disk in at or prior to planting	120	80	40	0

### Calcium and Magnesium Management

Calcium (Ca) and magnesium (Mg) needs of double-cropped peas and lima beans 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

### Manganese Management

Manganese (Mn) deficiency may occur in lima beans 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 double-cropped peas and lima beans are given below in Table 5.

**Table 5. Interpretation of the Mn availability index for double-cropped peas and lima beans.**

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 1-2 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 double-cropped pea and lima bean 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*** (et al., 2003) for additional information concerning nutrient management of double-cropped peas and lima beans.