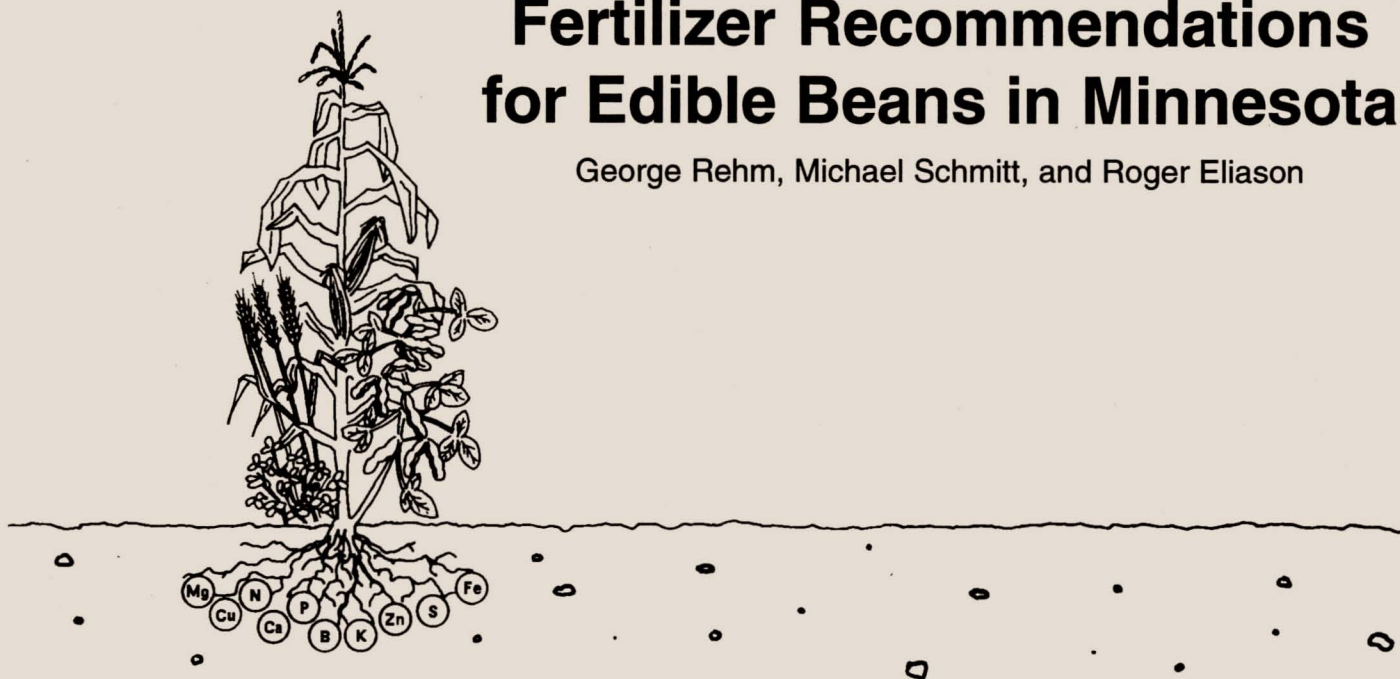


Fertilizer Recommendations for Edible Beans in Minnesota

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Edible bean production contributes substantially to farming enterprises in Minnesota. The term “edible bean” describes a variety of beans that are grown for human consumption. The recommendations and suggestions in this publication are intended to be used for the production of all edible beans. At this time, there are no data suggesting that one type of edible bean should be fertilized differently than another.

Nitrogen:

Nitrogen (N) fertilizer recommendations can be based either on the results of the soil nitrate test or the consideration of yield goal, previous crop, and soil organic matter content. The soil nitrate test is appropriate for the fine-textured soils of western and northwestern Minnesota. It should not be used for soils that have a sand, loamy sand, or sandy loam texture. When the soil nitrate test is used, the fertilizer N recommendations are calculated using Equation 1.

$$\text{Equation 1: } N_{\text{Rec}} = (.05) (\text{YG}) - N_{\text{ST}} - N_{\text{PC}}$$

Where:

YG = yield goal, lb./acre

N_{ST} = nitrate-N ($\text{NO}_3\text{-N}$) measured at a depth of 0-24 inches, lb./acre

N_{PC} = N credits for a previous crop, lb./acre.

These are listed in **Table 1**.

Table 1. Nitrogen credits for legume crops for the first year of edible beans following a legume. Use these values in equation 1.

Legume Crop	1st Year Nitrogen Credit -- lb./acre --
soybeans	40
edible beans, field peas, harvested sweet clover	20
harvested alfalfa or nonharvested sweet clover:	
4 or more plants/ft ²	150
2 - 3 plants/ft ²	100
1 or less plants/ft ²	40
red clover	70

The nitrogen recommendations for the situations where the soil nitrate test is not used are listed in **Table 2**.

Nitrogen management practices should be adjusted according to soil texture. Split applications are sug-

gested for sandy soils (sands, loamy sands, sandy loams). Approximately one-half of the suggested nitrogen should be applied approximately two weeks after planting. The remainder of the amount needed can be applied two weeks later.

Split applications are not needed if soils are not sandy. The nitrogen needed for these fields can be applied in the fall, before planting, or as a sidedress treatment. Considering the late date of planting common with edible bean production, a spring preplant application followed by incorporation would be preferred. Do not apply any N in contact with the seed at planting.

Table 2. Nitrogen recommendations for edible beans for situations where the soil nitrate test is not used.

Crop Grown Last year	Organic Matter Level	Yield Goal (lb./acre)				
		1400 or less	1401-1900	1901-2400	2401-2900	2900+
----- N to apply (lb./acre) -----						
alfalfa (4+ plants/ft ²) nonharvested sweet clover	low	0	0	0	0	0
	medium and high	0	0	0	0	0
soybeans	low	0	20	40	60	80
	medium and high	0	0	0	30	50
edible beans, field peas, harvested sweet clover	low	80	40	60	80	100
	medium and high	0	0	30	50	70
group 1 crops	low	0	0	0	25	45
	medium and high	0	0	0	0	25
group 2 crops	low	40	60	80	100	120
	medium and high	10	30	50	70	90

* Low = less than 3.0%; medium and high = 3.0% or more.

CROPS IN GROUP 1

alfalfa (2-3 plants/ft ²)	grass/legume hay
alsike clover	grass/legume pasture
birdsfoot trefoil	fallow
	red clover

CROPS IN GROUP 2

alfalfa (0-1 plants/ft ²)	grass hay	sorghum sudan
barley	grass pasture	sugarbeets
buckwheat	millet	sunflowers
canola	mustard	sweet corn
corn	oats	vegetables
flax	potatoes	wheat
	rye	

There is no evidence to suggest that there is a superior source of nitrogen for edible bean production. If applied so as to prevent loss, all nitrogen fertilizers should have an equal effect on yield.

Phosphate and Potash

Current phosphate recommendations are summarized in **Table 3**. The recommendations for potash use are in **Table 4**. The recommendations listed in these tables are suggested for either banded or broadcast applications. Do not apply any fertilizer in contact with the seed.

Table 3. Phosphate recommendations for edible bean production.

Yield Goal	Phosphorus (P) Soil Test (ppm)*				
	Bray: 0-5 Olsen: 0-3	6-10 4-7	11-15 8-11	16-20 12-15	21+ 16+
lb./acre	----- P_2O_5 to apply (lb./acre) -----				
1400 or less	30	20	15	0	0
1401-1900	35	25	15	0	0
1901-2400	45	30	20	10	0
2401-2900	55	40	25	10	0
2901+	60	45	25	10	0

* Use one of the following equations if a P_2O_5 recommendation for a specific soil test value and a specific yield goal is desired.

$$P_{2O_5 Rec} = [.0231 - .0011 (\text{Bray } P, \text{ ppm})] (\text{Yield Goal})$$

$$P_{2O_5 Rec} = [.0231 - .0014 (\text{Olsen } P, \text{ ppm})] (\text{Yield Goal})$$

Table 4. Potash recommendations for edible bean production.

Yield Goal	Potassium (K) Soil Test (ppm)*		
	0-40	41-80	81+
lb./acre	----- K_2O to apply (lb./acre) -----		
1400 or less	35	15	0
1401-1900	45	15	0
1901-2400	55	20	0
2401-2900	65	25	0
2901+	75	30	0

* Use the following equation if a K_2O recommendation for a specific soil test value and a specific yield goal is desired.

$$K_{2O Rec} = [.0346 - .00042 (K \text{ Soil Test, ppm})] (\text{Yield Goal})$$

Micronutrients:

Past research with edible beans has indicated that zinc is the only micronutrient that may be needed in a fertilizer program. Zinc suggestions for both starter and broadcast applications are listed in **Table 5**.

There is no research suggesting that other nutrients are needed in a fertilizer program for edible bean production. **CAUTION! Do not** apply any fertilizer in contact with the seed at planting.

Table 5. Zinc recommendations for edible bean production.

Zinc Soil Test*	Zinc to Apply	
	Starter	or Broadcast
- ppm -	----- lb./acre -----	
0.00 - 0.25	2	10
0.26 - 0.50	2	10
0.51 - 0.75	1	5
0.76 - 1.00	0	0
1.10 +	0	0

* Zinc extracted by the DTPA procedure.

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