

FERTILIZER PLACEMENT, BANDING AND FOLIARS IN BEANS

Terry W. Helms

INTRODUCTION

The past few years have posed interesting challenges to bean growers. Unlike the previous hot, dry years, the 1993 season brought cooler and wetter weather promoting slow growth and several root diseases. I would like to discuss how to identify and correct some of these problems through plant nutrition.

SOIL TESTING

Soil testing is an excellent way to determine supplemental nutritional requirements of a crop and to identify particular problems that might arise during crop growth. A complete analysis includes salts, sodium, pH, excess lime, and C.E.C, all of which affect plant growth and development.

Soil pH by itself is not critically important, but those factors that contribute to high pH are critical. These factors include soluble salts, sodium, and excess lime. All of these contribute to nutrient availability, toxicity, and water permeability. Bean plants are affected by salts greater than 1.5 mmhos/cm and water penetration problems are imminent if excess sodium is not removed from the root zone. At least a 10% yield loss may result from excess sodium. Watering-up beans may be necessary to leach salts from the root zone. In a dry year, this may mean 24 hr. sets with furrow irrigation, or 8 - 12 hr. sets on sprinkler irrigated fields.

FERTILIZER APPLICATION AND PLACEMENT

Consider the following example:

Crop:	Commercial Beans
Yield Goal:	30 cwt.
Previous Crop:	Grain with 2 tons residue
pH:	8.0
CaCO ₃ :	7.0%
Salts:	0.8 mmhos/cm
Sodium:	0.3 meq/100g
Nitrates:	10 ppm
Phosphorus:	18 ppm
Potassium:	350 ppm
Zinc:	2.4 ppm
Iron:	3.6 ppm
Manganese:	2.5 ppm
Copper:	1.2 ppm
Boron:	0.85 ppm

Nitrogen is required to decompose straw from a previous grain crop at 15 pounds nitrogen per ton of residue. The CaCO_3 level is high and affects the availability of phosphorus and micronutrients. There are indications of heavy zinc applications in the past. In fact, 10 pounds of zinc have been applied every year that beans were raised. Yet, beans only need 0.25 pounds of zinc per acre. The high zinc level may induce deficiencies of manganese and iron which are already low.

On this basis Stukenholtz Laboratory would recommend a broadcast application of the following nutrients :

Nitrogen:	70 lb/acre
Phosphorus:	100 lb/acre
Manganese:	5 lb/acre

Since CaCO_3 levels are high, using acid forming fertilizers is the most economical way to improve iron availability. Acid forming fertilizers might include 21-0-0, 11-52-0, 18-46-0, 16-20-0, Iron-Sul, disintegrating sulfur, phosphoric acid, and sulfuric acid. Ideally, a broadcast application would include 40 - 60 pounds of nitrogen the previous fall for stubble decomposition, with the balance of the nitrogen, phosphorus, and manganese applied in the spring. It is necessary to work the nutrients in deeply to minimize the salts in the seed bed.

BANDING

Banding and the use of foliar sprays give better fertilizer use, healthier plants, and less disease by placing the fertilizer where the plants can use it efficiently. Banding is a flexible program and, when combined with foliar sprays, can provide the most efficient use of plant nutrients.

There are some things to consider when banding fertilizers. The recommendations on a soil test are for broadcast recommendations. For banding, it is necessary to translate the recommendations. First, reduce the phosphorus recommendation by approximately one-third for banded fertilizer. For foliar spraying, one pound of foliar applied phosphorus equates to 10 pounds of soil applied phosphorus. Next, do not exceed 15 - 20 pounds of nitrogen with the seed. Also, if using dry fertilizer use 11-52-0 for the phosphorus source. Do not use 18-46-0 in a band near the seed. The micronutrient ratio is one pound of banded product for 5 pounds of broadcast applied product. This can be adjusted up or down slightly depending on whether foliar nutrient spraying is practiced. The ideal placement of banded nutrients is 2 - 3 inches directly below the seed.

Based on the above example. Stukenholtz Laboratory would recommend banded applications of the following nutrients:

Nitrogen:	15 lb/acre (assuming 55 lb N fall application)
Phosphorus:	65 lb/acre
Manganese:	2 Qt. manganese chelate/acre
Iron:	1 Pt. iron chelate/acre (optional)
Humic Acid:	2 - 4 Qt./acre

TISSUE TESTING

Tissue testing compliments soil testing by showing the utilization of available nutrients. In addition, tissue testing helps to identify hidden hunger. It helps decrease disease through proper nutrition, increases yield and quality. In addition, it can help identify and confirm deficiency problems. The ideal timing to pull a tissue test is about 7-10 days prior to first bloom.

Foliar feeding is a method for fine tuning any fertilizer program by applying nutrients as needed during the growing season. Many growers have applied foliars without tissue testing and have had little success. As such, general foliar recommendations are seldom correct. Without tissue testing, the applied nutrients may have created nutrient imbalances, and possibly induced deficiencies with other nutrients. Tissue testing is therefore necessary to avoid needless applications, as well as provide a method of monitoring nutrient levels.

EDTA chelates are not recommended, because they will usually burn the crop. Inorganic products and ligno-sulfonate base products work better. Beware of "complete" products containing high levels of nitrogen, phosphorus, and potassium with tiny amounts of micronutrients. Be certain that all applications recommended are in the proper amount. Add micronutrients to the level that is recommended.

The best time to apply foliar nutrients is prior to first bloom. A second application can be made 10 - 14 days later.

There are a few things that can be done to insure success in foliar nutrient application. Use a banded application. This includes mounting a spray rig on the cultivator, or using a bander such as those used to band on sugarbeet herbicides and foliars on sugarbeets. Use lots of water to get full coverage and also to aid in mixing products (8-10 gallons of water per acre by air and 15-20 gallons of water per acre by ground rig on a broadcast basis). Foliar sprays must be applied during the cool part of the day; either early mornings or late evenings. Applying foliars during the heat of the day may cause leaf burn, resulting in yield decrease.

CONCLUSION

Soil testing helps identify which nutrients are deficient and whether or not a salt problem needs to be solved. Banding fertilizers provides an economical solution to fertilizer use efficiency with less root disease, healthier plants, and higher profits for the grower. Tissue testing and foliar feeding compliment each other by fine tuning the soil applied fertilizer program. The use of banding and foliar sprays is a flexible program that can fit different grower needs and cultural practices.