

## Crop Information

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### Corn High Yield Management

A range of elements other than selection of hybrid influences corn yields. Soil condition, weather, fertility, weeds, and insects can also play a major role in yield potential.

Management of the crops you grow is a year round process. This begins with fall application of fertilizer and plowing, to summer soil testing and monitoring the rip for fertilizer deficiencies and pest problems.

Researchers believe that our hybrids will respond to top management practices and give you maximum returns.

Firstly, in order to get top yields, we must select the best ground to produce this crop. Ideally, a field that has been in crop rotation and has had a good fertility program in place will yield the best.

Secondly, seed placement and timing is critical. Too deep a planting could place seed into cold soil or even into poorly balanced subsoil conditions in areas of limited topsoil.

Early planting is also important. As most corn growers are aware, the earlier the corn is in, the better the yield potential (in most cases...).

Thirdly, we must be aware of the weed pressures that may exist on our farm and choose the proper herbicide program to control them. Making notes, when walking fields in summer, will keep track of weed problems when planning next year's crop at a later date. Another item to be aware of, when walking these fields in the summer, is insect populations, both root worm and corm borer. Both these insects may not look to be creating a problem but they do feed on roots and stems cutting off the plant's nutrient uptake system. If the plant is unable to take up nutrients and water, yields suffer and disease takes over (stalk rot, smut, etc.).

Last but not least, "Soil Fertility" is a major component in maximum yield corn production. Fertility management begins with a soil test and monitoring system. In order to maintain high yields in all crops, we must establish a good fertility base and use a program to build on it.

Remember that fertility programs are a long process and dramatic results may not be appreciated the first year. The fertilizer that we apply feeds the soil not the plant and we must build nutrient levels to optimum ranges in order for the soil to supply nutrients adequately throughout the season.

#### Nitrogen Recommendation Formula

$1.45\% \times \text{YIELD GOAL} - (10 \times \text{Organic Matter Content}) + \text{or} - \text{"N" Previous Crop}$

Example

CORN AFTER BEANS

YIELD GOAL 120 BU/AC

ORGANIC MATTER 3.5% (not to exceed 50 lbs. N)

$1.45 \times 120 = 174$

$10 \times 3.5 = -35$

Previous Crop = -10

Total "N" Requirement = 129 lb./ac Nitrogen

#### Previous Crop Nitrogen Adjustment

Corn +20

Beans -10

Winter Wheat / Grain +20

Clover -40

High yields also require a population that is high enough to take advantage of these fertilizer levels. "A rule of thumb" is 140 plants/ac/bu yield goal.

These recommendations do not include micronutrients and are a balanced economic program to be used to grow high yields in fields that these yield goals are feasible. In order to make this program work, you must be aware of your yield limitations and fertilize accordingly.

### **Explanation**

If you have achieved 120 bu/ac yields in the past, it is reasonable to assume that, that field could go 140-150 bu/ac under to management.

Application of P& K is best applied in the fall and ploughed down. Nutrients applied in the spring should only be a limited amount through the planter and your Nitrogen needs broadcast or sidedressed.

### **Example Planter Mix**

Formula for Determining Nitrogen Holding Capacity  
Organic matter factor x CEC = Nitrogen holding capacity

Example:

CEC = 8, OM = 1.5

$8 \times 9 = 72$  pounds of nitrogen in one application

### **PHOSPHORUS**

Phosphorus recommendations must be at levels in the good to high range from the Croptech optimum level chart in order for the best emergence. Refer to chart 2. Too much Phosphorus in the planter will only reduce yields by competing with other nutrients that are required in early stages of growth such as Zn and Mn.

However in fields that are low in P higher levels of P in the planter will give you a better response but yield levels expected are much lower.

### **POTASSIUM**

Potassium levels must also be limited in the planter as they will cause Mg deficiencies plus can burn off young roots that are required to uptake nutrients. See chart 2 for optimum levels of K in soil types as a guide to K needs. After making this recommendation from the charts adjust the K recommendations based on the optimum levels of % K. Remember that K is required in the plant for uptake and long distant translocation of N to be used in the leaf therefore K should be in a 1:1 balance with N.

### **MAGNESIUM**

Good levels of Mg must be maintained in order to uptake P therefore we will shoot for about 14% saturation of Mg in the soil for optimum Mg. In some soils, this may not be possible because of the high Ca therefore; we will add additional Mg in the planter mix.

### **CALCIUM**

In most cases for corn production, it is most profitable to add additional Ca to the mix and if needed it usually comes from low pH and we will supply this from lime.

### **SULFUR**

Requirements for this nutrient are dependent on S levels in soils plus Ca levels. If S is less than 25ppm add about 10 - 15 pounds per acre for S nutrition. In some cases even where S levels are high we do get a yield response from additional S. If Ca % saturation is greater than 80% I would suggest 10 pounds of elemental S in the row to aid in the uptake of K, Mg and P. This application also works well in soils with high CEC such as soils with CEC greater than 25 or soils with greater than 20 and low organic matter. This form of S however only works as elemental S and does not seem to work with S coming from Sulfate of a Potash Magnesia sources as it would if we just needed S as a nutrient.

"NEVER" apply large amounts of N P K through the planter at planting time. This could cause seed and root burn and extreme fertility imbalances close to the seedling.

A proper agronomic fertilizer program should be taken from an up to date soil test that includes organic matter and a micronutrient test, such as Zn for a corn program.

Keep in mind that fertilizer programs and high fertility will not respond unless all other management elements are in check. Most important is that pH balance must be corrected before fertilizer will pay. Optimum pH for corn production is 6.2 - 7.0.

In addition to the above information when recommending Nitrogen it should also be kept in mind the placement is as important or more important than the amount of Nitrogen used. A corn plant uses most of its Nitrogen after the corn is in the reproductive stage. Only about 25% of its total needs are required in the first 30 days after emergence. Therefore application of Nitrogen too early that is in the Nitrate form or that will be converted quickly is not efficient use of the Nitrogen. Refer to the A&L Nitrogen Management in Agricultural Soils handbook for further information on Nitrogen use by plants.

Another concern that we must have when applying Nitrogen is how much certain soil types can hold and how much should we split apply. Research has proven that a split of Nitrogen 60% preplant or premerge and 40% sidedressed works well. Sidedress application when the corn is in the 5 leaf stage is the most efficient placement of Nitrogen, however it is sometimes difficult to get into a crop at this time and we want to make sure that there is enough Nitrogen to get the crop this far. Leaving all the Nitrogen application or more than 75% to be applied at this time could short the plant of Nitrogen especially in years when rainfall makes it impossible to get into the crop at this time.

Another measurement that we have for determining Nitrogen placement is soil type and the soil's capacity to hold Nitrogen. A soil type that has a CEC of 8 and organic matter of 1.5 can only hold 72 pounds of Nitrogen in any form on the exchange complex therefore if your crop requires more N than this you will have to split it to get the most efficiency out to the Nitrogen.

### **Common Factors Used in Calculating Nitrogen Holding Capacity**

Organic Matter - Factor Used

0.00- 1.00 7

1.00 - 1.49 8

1.5 - 2.0 9

2.0+ 10

### **BORON**

Boron is leached readily from soils and the more course the soil (lower CEC) the faster the Boron will leach from the soils. Boron's function in the plant is primarily that of a catalyst for most other nutrients. In other words it completes a chain of chemical reactions in the life cycle of a plant. Three major nutrients that Boron influences in the uptake are P, K, and Ca.

Boron however is very toxic if over used therefore application is sometimes difficult. To blend 1 lb. /ac in most mixes it is difficult to get a uniform distribution. To avoid this problem I recommend a soil application of Boron at 1 lb./ac as Sol U Bor (5 pounds of material) preplant incorporated or pre emerge (can be applied with most herbicides).

In cases of severe Boron deficiencies follow up with foliar Boron 2 - 3 times depending on tissue levels. In order for Boron foliar to be effective, a soil application must also be in place.

### **ZINC**

Zinc is required in the plant to ensure early emergence and good leaf area. When applying Zinc to a corn crop it is more important in the early planting and in cold soils even when Zinc levels are good. If applying Zinc to soils where Zinc is medium to low make sure that Zinc is applied at 1 pound for every 10 pounds of P that is put in the planter to make sure adequate Zinc will be available in these cold soils. If Zinc levels are good to high apply Zinc at 1 pound for every 20 pounds of P applied in the planter. Zinc should always be applied in the planter and always as a Zinc sulfate source.

### **MANGANESE**

Corn is only a medium response crop to Mn and should be applied to the planter mix at levels recommended by the soil test. Mn however will convert from the available form in the soil and become unavailable to the plant therefore in some soils deficient in Mn it may be necessary to follow up with a foliar spray.

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