



## Most Asked Agronomic Questions

### Bulletin 760

## Chapter 6

### Fertilizer Application

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**1. Some companies say a pound of nutrient is a pound of nutrient; others say method of application and product choice are important. Which is correct?**

As established by law, fertilizer is sold on an index of relative availability; this index is found on the label of each fertilizer product sold. As a result, if products which have the same quoted amount of nutrients are compared, one will find that the fertilizer products are agronomically equivalent in terms of crop response.

Changing the method of application can improve the efficiency of a fertilizer. For example, banding a fertilizer close to the seed row has been shown to improve the uptake of nutrients contained in that fertilizer; however, the same improved efficiency can be gained through the banding of any of various fertilizer products.

**2. Competition constantly interchanges availability and solubility. Please define these terms, and compare liquids to dry in both definitions.**

"Plant availability" is an indication of what quantity of nutrients in an applied fertilizer is able to be taken up by a crop under field conditions.

"Water solubility" is the percent of nutrients that are dissolved by water. In a true liquid, 100 percent of the nutrients are dissolved.

Fertilizers are sold on the basis of an index of relative availability. Based on this index, liquid and dry fertilizers supply equal quantities of nutrients for uptake.

**3. Can you fertilize only for the crop planted or do you have to take "tie up of nutrients" into consideration?**

In general, crop removal alone is not a good index of fertilizer needs. Annual fertilizer recommendations are based on crop response data (the fertilizer needed to produce a particular crop under the specific

conditions where the correlation research is conducted). Normally, if the fertilizer recommendation as based on crop response data is lower than that calculated from crop removal, we make a recommendation equal to crop removal so that the fertility level of the soil will not be depleted.

#### **4. Should I apply most of my fertilizer broadcast or in the row for corn? Is there any difference in yield when fertilizing broadcast versus in-row?**

When selecting a fertility program, one should consider soil test levels. If the soil test levels of P and K are medium to low, a row application is usually more effective than a broadcast application. If soil fertility is high, then either method of application (row or broadcast) should be of equal value.

#### **5. Even on high test soils we recommend some row fertilizer. Would this be used early or late in the season by corn plants?**

The nutrients from a row fertilizer are used relatively early in the season. Usually, roots are actively feeding in this fertilizer zone approximately 2-4 weeks after emergence.

#### **6. How beneficial is banding (not row applied) versus broadcast applications?**

Research has shown that on low fertility soils there is a slight advantage to banding of immobile elements like phosphorus and potassium.

Based on soil test results, less than 10 percent of Ohio soils would be expected to show a benefit from banding of P and K fertilizers as compared to broadcast applications.

#### **7. How can I cut my fertilizer costs? When can I cut back on P and K?**

To determine the most efficient fertilizer program for agronomic crops, the user must consider both the amount of nutrients that his soil will supply and the overall yield potential of his soil. Soil tests and plant analyses are good indicators of the nutrient supplying power of a soil. Based on these indexes and the expected yield, a farmer should be able to make an intelligent, well informed decision about fertilizer inputs. Refer to Extension Bulletin E-2567, *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, for further information on developing efficient fertility programs for agronomic crops.

Under typical Midwest farming conditions, no further yield response to added P is expected for corn or soybeans whenever the Bray P<sub>1</sub> level exceeds 40-60 pounds P per acre. Similarly, when the level of exchangeable K exceeds 300 pounds K per acre on silt loam soils or 350 pounds K per acre on clay loam soils, no further response to fertilizer K is normally seen.

#### **8. How best to fertilize economically in a crop rotation?**

In developing a fertility program for a crop rotation, one should determine the dominant fertilizer need for each crop of the rotation and then each year concentrate most heavily on that particular plant nutrient, being careful, however, not to neglect other nutrient requirements. For example, in the year that corn is grown, one must be sure there is adequate nitrogen present but at the same time not ignore P and K needs. With wheat, phosphorus needs should be satisfied first.

#### **9. Is feeding corn a good fertility program economical by following soybeans with no fertility?**

When soils tests (P and K) are high at the start of a corn/soybean rotation, it should make little difference in yield whether the applied fertilizer is added to the corn crop or to the soybean crop. Nevertheless, in such a high fertility situation, there may be some merit to adding all the fertilizer to corn as you will need

to apply N to this crop anyway.

In contrast, under low fertility conditions, there seems to be a slight advantage to adding most of the P to corn and most of the K to the soybeans.

**10. With medium soil test levels, can I fertilize every other year? All Of P<sub>2</sub>O<sub>5</sub> on corn this year and all of K<sub>2</sub>O on beans next year?**

If a soil test is medium to low, we recommend an annual application of both P and K to obtain maximum return on your fertilizer dollar. If, however, a soil test is medium to high, adding all of the P to corn and all of the K to beans can be an effective program to optimize returns in a corn/soybean rotation.

**11. What considerations should be addressed in deciding the merit of P and K application in soybean production?**

When considering the merit of any fertilizer application, one must assess its effect both on crop yield and crop quality. Soybean plants are good feeders of P. Normally, they can produce good quality beans at optimum yields even when the soil test level of Bray P<sub>1</sub> is relatively low (approximately 30 lbs. P/A). In contrast, on soils having low levels of exchangeable K, addition of K fertilizer has been shown to improve soybean yields. Likewise, K applications are known to improve soybean quality. In Ohio the desired soil test potassium level for soybeans is 280 + (5 X CEC). This recommendation is 60 pounds per acre higher than for most other crops.

**12. Will I see a yield response by applying fertilizer on soybeans when the field already tested high in P and K?**

No. If a soil tests high in both P and K, a yield response from a fertilizer application (P and K) should not be expected for any crop.

**13. Is it better to apply fertilizer at the time of planting wheat or put it all on in early winter?**

P and K fertilizers should be applied at the time of seeding wheat. If these immobile nutrients are applied after planting, uptake can be hindered. The reason for this is that P and K will tend to remain above the rooting zone and thus will not be available for uptake.

**14. What is the highest rate of nitrogen to apply to corn and get maximum return? phosphorus? potash?**

Research conducted in Ohio has shown that an application of 200-250 pounds N per acre can give maximum returns on the dollar invested, provided good cultural practices are employed. Refer to Table 9, page 9 of *Tri State Fertilizer Recommendations*, Ext. Bull E-2567, for examples of N recommendations for corn.

For P and K, the highest rate to use for maximum returns depends on relative soil availability, which is determined by soil testing. Refer to Table 11 on page 13 and Table 18 on page 14 of Ext. Bull. E-2567, *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, for examples of P and K recommendations for corn at various soil test values and yield goals. These recommendations are based on correlation data obtained from research conducted in Ohio.

**15. Do blend fertilizers separate when spread with a 'spinner' type spreader?**

With a "spinner" type spreader, the spread pattern that results depends on the size and the density of the materials that are being applied. Traditionally, there has tended to be a slight separation of blended fertilizers, with lighter materials not being spread in as wide a pattern as the heavier ones. In recent years, the fertilizer industry has tried to counteract this problem by changing the size of fertilizer particles so that all would be spread with approximately equal patterns. As a result, there is now little separation of blend fertilizers when spinner type spreaders are employed.

**16. Are liquid fertilizers equal to or better than dry fertilizers? Are liquid fertilizers more available than granular fertilizers?**

Based on equivalent rates of applied nutrients, research has shown that liquid and dry fertilizers are of equal value to most agronomic crops. There is no difference in availability between liquid and dry fertilizers.

Reference: "Mineral Nutrient Sources" in *Compendium of Research Reports on Use of Nontraditional Materials for Crop-Production*, NCR # 103 Committee.

**17. When suspension grade fertilizers are used, the entire fertilizer needs (NPK) of the crop can be applied in one trip across the field, along with herbicides. Economically, this is equal to or better than dry. Are we seeing a growth in the use of suspension grade fertilizers? Agronomically, is it a sound practice?**

Based on statistics of recent fertilizer sales in the Midwest, there appears to be relatively little change in the amount of fluid fertilizer that is being sold as compared to the total amount of fertilizer marketed. The percentage of the fluid fertilizer sales that are suspension grade fertilizers (as opposed to true liquids) is increasing only slightly in the Midwest. The growth of suspension grade fertilizers will probably continue to be slow in the Midwest as they are relatively unstable in cool climates. (These products must be used soon after purchase; if they are not, they tend to coagulate.) The short storage time of suspension grade fertilizers makes them unattractive to many farmers.

As long as fertilizer nutrients are applied in an appropriate manner, there is no difference in crop response whether the product which is used is dry, liquid, or a suspension. These three forms of fertilizer are of equal value to a crop.

Reference: Hargett and Berry. *1986 Fertilizer Summary Data*. TVA Publication ISSN:01461850.

**19. Does foliar application of liquid fertilizer do me any good?**

Foliar application of liquid fertilizer has been found to be an effective method of correcting nutrient deficiencies in perennial crops like fruit trees (apples, peaches, etc.). For annual crops, however, there is little evidence that foliar application of liquid fertilizer is preferable to soil applied. An exception to this is that for soybeans and alfalfa foliar applied Mn tends to be more effective than soil application.

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