



# Selecting the Right Fertilizer for Tobacco Transplant Production in Float Systems

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Although many specialty fertilizers are available from farm suppliers and public retail outlets, not all are suitable for use in tobacco float systems. Some of the commonly available home and garden fertilizers do not contain all the required nutrients, and others have the wrong form of certain nutrients. Some fertilizers that have been marketed specifically for the float system have also produced unsatisfactory results, due to having the wrong form of nitrogen (N). This has resulted in entire beds of pale, sickly seedlings which had to be dumped (Figure 1).



**Figure 1.** Plants grown on high nitrate 20-10-20 (right) are much more vigorous and healthy than plants grown on urea based 20-10-20.

## Read the Fertilizer Label

Information needed to determine if a fertilizer is suitable for use in float beds is contained on the fertilizer label. The Kentucky Fertilizer Law requires that any product offered for sale, for which nutrient value is claimed must be labeled to show guarantees for the nutrient(s) claimed. The label must guarantee the nutrient content on a percent by weight basis. It also requires that if the chemical form of nitrogen (N) is claimed, the form shall be guaranteed and that the percentages of the individual forms claimed shall add up to the total N content guaranteed on the label. This information is necessary to determine the suitability of a fertilizer for use in tobacco float beds.

When evaluating a fertilizer for use in the float system, look first at the grade. The grade indicates the guaranteed percentages of total N, available phosphate (expressed as %

P<sub>2</sub>O<sub>5</sub>) and soluble potash (expressed as % K<sub>2</sub>O) on a weight basis. The grade is always shown as a series of three numbers, in the order N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O. The amounts of N and K<sub>2</sub>O should be nearly the same (a 1:1 ratio), while the P<sub>2</sub>O<sub>5</sub> percentage (middle number) should be ½ to ¼ of the percentage of total N and soluble potash (eg. 20-10-20, 15-5-15, 20-5-20). Research has indicated that 1:1 ratios of total N and soluble potash will give balanced root and top growth. These ratios insure that there will be adequate phosphate for growth, yet will prevent lush growth and may reduce the frequency of clipping.

## Read the Entire Label

To determine if a fertilizer is suitable for use in float beds, you need to know the forms of N present. If forms of N are claimed they will be shown on the label in the fine print below the total N guarantee. If the

form of N is not shown, do not use the product for float beds. To be suitable for float beds, a fertilizer should have at least 60% of the total N in the nitrate-N (NO<sub>3</sub>-N) form. Fertilizers containing high amounts of urea-N have caused a lot of problems in the float system. The urea is thought to be converted in the soilless medium, to other forms of N which are toxic to tobacco seedlings. High urea-N fertilizers stunt plant growth, and in severe cases will kill young seedlings. Ammoniacal-N (NH<sub>4</sub>-N) apparently does not cause a toxic effect

on seedlings, but it appears to be only slowly taken up by the plants. Plants grown on high NH<sub>4</sub>-N fertilizers grow more slowly. Nitrate-N, on the other hand, is in a form that is readily absorbed by plants.

Fertilizer labels may provide other useful information as well. Many fertilizers have acid components that will reduce problems with water alkalinity. This information may be printed on the label, but it is not required by law. Also inspect the label for any cautions, or specific directions for the use of the product.

## Test Your Water Source

Water quality can have a large influence on the effect of some fertilizers in float beds. Problems with urea based fertilizers have been worse in the presence of alkaline water. If you are unsure of the quality of your water, you should contact your county agricultural extension agent to have your water tested. Do not use fertiliz-

ers with high proportions of  $\text{NH}_4\text{-N}$  or urea-N unless recommended, based on water analysis. The water analysis report should contain specific instructions for the correction of problems.

## Use Secondary and Micronutrient Fertilizers Carefully

Do not mix different kinds of fertilizers unless specifically recommended by the manufacturer. Some materials are incompatible and will salt out when mixed. If salting out occurs, the availability of nutrients will be reduced, and nutrient deficiencies may result. Do not add gypsum or epsom salts to your float water unless a water analysis suggests the need for supplemental calcium (Ca) or Magnesium (Mg).

While micronutrients are needed only in very small amounts, they are required. Fertilizers suitable for use in float beds should contain micronutrients, and if their content is claimed by the manufacturer, the specific kind and amount will be shown and guaranteed on the fertilizer label. A

suitable fertilizer should at least contain boron (B), copper (Cu), iron (Fe), manganese (Mn), molybdenum, (Mo), and zinc (Zn). When using a fertilizer containing these, do not add supplemental micronutrient preparations as this can lead to toxicity to the plants or salting out of the nutrients.

### Example Labels

**Figure 2** is an example of a fertilizer label which has the proper ratio of  $\text{N-P}_2\text{O}_5\text{-K}_2\text{O}$ . However, it does not give the breakdown of the forms of N. If the forms of N are not listed, do not use the material for float beds. Also, no micronutrients are claimed or guaranteed on this label.

**Figure 3** is an example of a fertilizer that would be only marginally suitable for use in the float system. As shown on the label, the ratio of  $\text{N-P}_2\text{O}_5\text{-K}_2\text{O}$  is 1:1:1. While not the preferred ratio, this in itself would not likely cause problems. Of greater importance is the content of forms of N. One-half of the total N from this product is in the urea-N form, which

is known to cause problems in the float system. Only 30% ( $6.05/20 = 0.30$ ) of the total N is in the readily available  $\text{NO}_3\text{-N}$  form, when it should be at least 60% for use in float beds.

Many producers have used materials similar to this with mixed results, depending on other factors such as water quality. Some have had reasonably good success with fertilizers such as the one in this example, while others have observed stunted growth. Note, too, that this fertilizer contains micronutrients.

**Figure 4** is an example of a label for a fertilizer which would be considered suitable for tobacco float systems. It has  $\text{N-P}_2\text{O}_5\text{-K}_2\text{O}$  in the preferred ratio, and a favorable ratio of forms of N. Note that over 60% ( $12.25/20 = 0.61$ ) of the total N is in the readily available  $\text{NO}_3\text{-N}$  form. This is a fertilizer which contains the needed micronutrients. The concentrations of micronutrients will vary from one brand of fertilizer to the next, but should always be much less than 0.1%.

**Figure 2.** An example of a fertilizer not suitable for tobacco float systems.

<b>BRAND X FERTILIZER</b>	
20-10-20	
GUARANTEED ANALYSIS	
Total Nitrogen (N) .....	20.00%
Available Phosphate ( $\text{P}_2\text{O}_5$ ) .....	10.00%
Soluble Potash ( $\text{K}_2\text{O}$ ) .....	20.00%

**Figure 3.** Example of a fertilizer that is marginally suitable for tobacco float systems.

<b>BRAND Y FERTILIZER</b>	
20-20-20	
GUARANTEED ANALYSIS	
Total Nitrogen (N) .....	20%
3.95% Ammoniacal N	
6.05% Nitrate N	
10.0% Urea N	
Available Phosphate ( $\text{P}_2\text{O}_5$ ) .....	20%
Soluble Potash ( $\text{K}_2\text{O}$ ) .....	20%
Magnesium (Mg), Total .....	0.05%
0.05% Water Soluble Mg	
Boron (B) .....	0.007%
Copper (Cu) .....	0.004%
0.0036% Chelated Copper	
Iron (Fe) .....	0.05%
0.05% Chelated Iron	
Manganese (Mn), Total .....	0.025%
0.025% Chelated Manganese	
Molybdenum (Mo) .....	0.0009%
Zinc (Zn) .....	0.0025%
0.0025% Chelated Zinc	
<b>Derived from:</b> Ammonium Phosphate, Potassium Nitrate, Urea, Magnesium Sulfate, Boric Acid, Copper EDTA, Iron EDTA, Manganese EDTA, Sodium Molybdate, Zinc EDTA	

**Figure 4.** Example of a fertilizer that is suitable for tobacco float system.

<b>BRAND Z FERTILIZER</b>	
20-10-20	
GUARANTEED ANALYSIS	
Total Nitrogen (N) .....	20%
7.75% Ammoniacal N	
12.25% Nitrate N	
Available Phosphate .....	10%
Soluble Potash ( $\text{K}_2\text{O}$ ) .....	20%
Magnesium (Mg), Total .....	0.05%
0.05% Water Soluble Mg	
Boron (B) .....	0.007%
Copper (Cu) .....	0.004%
0.0036% Chelated Copper	
Iron (Fe) .....	0.05%
0.05% Chelated Iron	
Manganese (Mn), Total .....	0.025%
0.025% Chelated Manganese	
Molybdenum (Mo) .....	0.0009%
Zinc (Zn) .....	0.0025%
0.0025% Chelated Zinc	
<b>Derived from:</b> Ammonium Nitrate, Potassium Phosphate, Potassium Nitrate, Magnesium Sulfate, Boric Acid, Copper EDTA, Iron EDTA, Manganese EDTA, Sodium Molybdate, Zinc EDTA	