

FERTILIZING TOBACCO FLOAT BEDS

Research shows that burley and dark-fired plants need a nitrogen level of 75-125 ppm. This is a lower level than what was recommended during the early years of float beds. The lower nitrogen rate will still produce an excellent plant, and on the same time schedule. The top growth will be somewhat less, and therefore fewer clippings may be necessary. Try to maintain nitrogen levels above 50 ppm; at this level plants begin to yellow and show stunted growth. In Tennessee the recommendation calls for a 20-10-20 fertilizer, and several companies offer this particular analysis. The fertilizer should contain at least 50% NITRATE-NITROGEN. Avoid fertilizers that contain AMMONIUM-NITROGEN AND UREA. These fertilizers can cause too rapid top growth and possible soluble salt problems. Use the chart show below for determining how much 20-10-20 fertilizer to add to float beds.

Adding a rate of 6-8 oz /100 gallons or 4-5 lbs. / 1000 gallons of 20-10-20 fertilizer to fresh, clean water will put the float bed in the Aideal range@ of 75-125 ppm.

<u>NITROGEN LEVEL</u>	<u>OZ./100 GALLONS</u>	<u>LBS. /1000 GALLONS</u>
25 PPM	1.65 OZ	1.05 LBS.
50 PPM	3.30 OZ	2.1 LBS.
75 PPM	5.00 OZ	3.2 LBS.
100 PPM	6.70 OZ	4.2 LBS.
125 PPM	8.40 OZ	5.2 LBS.

The water soluble fertilizer should be dissolved and mixed in a bucket of water, and then poured into the beds. The fertilizer will be easier to dissolve if the grower will use hot water. It may be inconvenient to get hot water to your greenhouse, but if possible it will work better.

CHOOSING THE RIGHT FERTILIZER FOR FLOAT BEDS

There are literally hundreds of specialty fertilizers available from farm suppliers, garden centers, and discount stores. Just because a product grows good flowers does not mean that it is the best for tobacco float systems. The amounts of nitrogen and potash should be the same (1:1 ratio), but the phosphate percentage (middle number) should be one-half to one-fourth of the percentage of nitrogen and soluble potash (e.g., 20-10-20, 15-5-15, 20-5-20). For tobacco float systems, avoid fertilizers with high levels of urea-N, since these have caused problems in float bed systems. Simply check the label to see if the nitrogen form is guaranteed. If the manufacturer does not guarantee the form on nitrogen on the label, then do not use the material on float beds. Do not mix different fertilizers together unless specifically recommended by the manufacturer. Some materials are not compatible. Remember it pays to take time to read the product label, and choose a fertilizer designed specifically for tobacco float bed systems. A few minutes in the store could save you from having big headaches in the greenhouse or float bed.

DETERMINING THE GALLONS OF WATER IN THE BEDS

There are several ways that one can accurately determine the gallons of water in the float beds. You might have a flow meter or use a tank of known size to fill the beds. If you are like most folks, we don't have a clue how much water is in the beds. Either formula that is shown below will work for any size beds, you just need to take a few measurements.

A. $(\text{Number of trays in bed}) \times (\text{depth water inches}) \times (1.4) = \text{gallons of water}$

B. $\text{GALLONS} = \text{LENGTH (ft)} \times \text{WIDTH (ft)} \times \text{DEPTH (ft)} \times 7.48 \text{ cu.ft./gal.}$
EXAMPLE BED SIZE: 66 FEET LONG x 10 FEET WIDE x 5 INCHES DEEP

STEP 1. TO CONVERT INCHES TO FEET, DIVIDE 5 INCHES BY 12 INCHES PER FOOT ($5/12 = 0.42 \text{ FT}$)
STEP 2. MULTIPLY $66' \times 10' \times 0.42' \times 7.48 = 2,074 \text{ GALLONS}$

MEASUREMENT EQUIVALENTS

Many of the treatments for float beds call for extremely small amounts. The following conversion chart may be helpful to make sure that the proper amount is applied.

LIQUID MEASUREMENT

1 Teaspoon = 5 cc
 1 Tablespoon = 3 Teaspoons = 2 Fluid Ounce = 15 cc
 1 Fluid Ounce = 2 Tablespoons = 1/8 Cup = 30 cc
 1 Cup = 16 Tablespoons = 8 Fluid Ounces = 2 Pint = 240 cc
 1 Ounce = 30 cc
 2 Ounce = 15 cc
 3 Ounce = 8 cc

DRY MEASUREMENT

1 Ounce = 28 Grams
 1/4 Pound = 4 Ounces = 113 Grams
 2 Pound = 8 Ounces = 227 Grams
 1 Pound = 16 Ounces = 454 Grams
 2 Pounds = 32 Ounces = 908 Grams
 3 Pounds = 48 Ounces = 1,362 Grams
 5 Pounds = 80 Ounces = 2,270 Grams

NOTE: Many growers will find it easy to convert the small liquid measurements into cc's. Most farms have a syringe around, and these small amounts of liquids can easily be measured using a medical syringe.

DISEASE CONTROL

Tobacco plant diseases can be very serious when found in the greenhouse float beds and outdoor float bed systems. BLUE MOLD, PYTHIUM, DAMPING-OFF, STEM ROT, TARGET SPOT, and SCLEROTINIA are the ones that have caused the largest problems over the past several years. Damping Off and Target Spot are caused by the same fungus (Rhizoctonia). The Damping Off affects the plant stems and the Target Spot affects the foliage. All of these diseases are caused by fungi. Rainy, cool and cloudy weather is ideal for rapid fungi growth. These diseases will continue to spread without treatment, even after going to the field. Mancozeb products (**Manzate Prostick or Penncozeb**) will give growers the best control of Damping Off and Target Spot. Begin sprays when the plants are in the four-leaf stage (about "dime" size) and continue treatments weekly until they are transplanted. Treat with the spray combination shown below every 5-7 days, spray to the point of runoff; repeat sooner if it is washed off by rain.

3 gallons of spray mixture should cover about 1000 square feet when plants are about "dime" size.
 6-12 gallons of spray mixture should cover about 1000 sq. ft when plants are from "dime" size to setting size.

Growers should build or buy a good spray system for the greenhouse. Many growers have built a spray system that mounts on the rolling cutter bar. A 15-20 gallon tank, with a 12-volt diaphragm pump, and a set of hollow cone nozzles attached to the bottom of the cutter bar boom. Most growers do not get good spray coverage or adequate spray volume when using a 2-3 gallon pressure sprayer. Even the best chemicals do not work properly if the coverage or volume is incorrect.

Fungicides, Bactericides & Insecticides for Tobacco Float Plants

Quadris - "Target Spot"	.14 fl.oz. (4 ml)/1000 sq.ft.	Only one application prior to transplanting
	<u>PER GALLON</u>	<u>PER 100 GALLONS</u>
Manzate Prostick Or Penncozeb 75DF	1 · teaspoon	0.5 pound (8oz)
ORTHENE (97% acephate)	1 teaspoon	0.75 pound (12 oz)
Streptomycin (for bacterial rot, blackleg)	1 teaspoon (prevention)	0.5 pounds (8 oz)
Streptomycin	2 teaspoons (if disease present)	1.0 pound (16 oz)

Terramaster – 1.0 fl.oz./100 gal float bed water for pythium control, apply directly into float bed water; delay application 3 weeks after seeding. If pythium is present use 1.4 oz./100 gal. Refer to label for directions.

Tobacco Disease Control

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Disease Control Products for Plant Beds (Greenhouse and Outdoor)

Disease	Product	Rate	Remarks*
Angular leaf spot, wildfire, blue mold (suppression)	streptomycin sulfate (Agri-Mycin, Firewall)	8-16 oz/100 gals. spray (100-200 ppm)	Begin applications when plants are dime-sized or larger and repeat at 5-7 day intervals until disease is under control. Also aids in control of black leg and bacterial soft rot if applied in sufficient spray volume to run down stem.
Target spot	Quadris	0.14 fl. oz. (4 ml)/1,000 sq. ft.	Only one application prior to transplanting. Use only if target spot begins to build.
Blue mold	Aliette WDG	0.5 lb./50 gals. spray	Apply 3-12 gals./1000 sq. ft. May cause leaf burn if washed into the root zone or float water when other products such as Admire or other Group 4A insecticides are used. Do not exceed 0.6 lb. product/1000 sq. ft./application or 1.2 lb. product/1000 sq. ft./season.
Mosaic (tobacco mosaic virus)	whole or skim milk	Hand dip: 1 pt. in 1 gal. dip water	Dip hands every 20 minutes while handling plants.
		Plant spray: 5 gals./100 gals. spray	Spray plants with milk solution 24 hrs. before handling.
Pythium root rot	Terramaster 4EC	Preventive: 1.0 fl. oz./100 gals. float water. Curative: 1.0-1.4 fl. oz./100 gals. float water.	Apply no sooner than 2 wks. (preventive rate) or 3 wks. (curative rate) after seeding. Additional applications can be made at 3-wk. intervals, up to 5 days before transplanting. No more than 3.8 fl. oz./100 gals. float water may be applied per crop. Even distribution in floatbed water is essential. Mix with water in a bucket to form a dilute emulsion, and distribute emulsion evenly into floatbed water.

*Refer to product label for details on methods of application and restrictions.

If you need a color marker to easily tell where you have sprayed, add one to two drops of food color to the spray mixture.

AMOUNT OF SPRAY TO USE:

1. Three (3) gallons of spray mixture should cover about 1000 square feet when plants are about "dime" size. NOTE: THAT 1,000 SQUARE FEET IS ABOUT 400 TRAYS
2. 6-10 Gallons of spray mixture should cover about 1000 sq. ft when plants are from "dime" size to setting size .

DIRECTIONS FOR USING THE DIST 4 METER

Resolution/Range = 0.01mS/cm /199.99mS/cm

Distributed by Holders Transplants, Co-op, and Others

1. Determine the DIST 4 reading for the water source without fertilizer (R1). The reading for utility water is usually 0.20, well or spring water can test 0.30-0.60.
2. Determine the DIST 4 reading for the nutrient solution in the float beds (R2). If you are in the correct range the meter reading should be about 0.80-1.20.
3. Conductivity Reading (Rc) =reading of fertilized water (R2) minus the reading for the water source (R1)

Rc= R2-R1 The reading that is targeted for most situations is between 0.40-0.80

4. Fertilizers vary greatly according to analysis and the electrical conductivity (EC) of a particular fertilizer. Once the EC of a fertilizer is known, then the DIST 4 reading can be used to determine the parts per million(ppm) nitrogen. Refer to table shown below to find the fertilizer that you are using or refer to fertilizer label on bag.

If you have an older (purchased before 1998) DIST 4 meter that reads differently.

OLDER DIST 4 METER

Resolution/Range – 100uS/cm / 19900uS/cm.

1. Process for determining Rc is the same for old or new meter. Old meter will read in whole numbers.
2. Utility water will usually test 2. Well or spring Water can test 3 – 6.
3. Rc reading in most situations should be between 4 – 8

Electrical conductivity information for selected water soluble fertilizers.

FERTILIZER	50 ppm N			100 ppm N			150 ppm N		
	EC ¹	DiST 4 ² (mmhos/cm)	Oz./100 gal	EC ¹	DiST 4 ² (mmhos/cm)	Oz./100 gal	EC ¹	DiST 4 ² (mmhos/cm)	Oz./100 gal
Peters Peat-Lite 20-10-20	0.33	0.33	3.3	0.66	0.66	6.7	1.00	1.00	10.0
Carolina Choice 20-10-20	0.33	0.33	3.3	0.57	0.57	6.7	0.84	0.84	10.0
Speedling 20-10-20	0.33	0.33	3.3	0.65	0.65	6.7	0.98	0.84	10.0
Miller 20-10-20	0.30	0.30	3.3	0.57	0.57	6.7	0.84	0.84	10.0
JCC 20-10-20	0.33	0.33	3.3	0.66	0.66	6.7	1.00	1.00	10.0
Champion Bulldog 20-10-20	0.31	0.31	3.3	0.63	0.63	6.7	0.93	0.93	10.0
Prosol 20-10-20	0.33	0.33	3.3	0.65	0.65	6.7	0.98	0.98	10.0
Peters Agrosol 20-9-20	0.33	0.33	3.3	0.66	0.66	6.7	1.00	1.00	10.0
Peters Agrosol 15-4-15	0.39	0.39	4.5	0.78	0.78	9.0	1.17	1.17	13.5
Miller Supreme 16-4-16	0.43	0.43	4.2	0.84	0.84	8.3	1.23	1.23	12.5
Peters 20-20-20	0.20	0.20	3.3	0.40	0.40	6.7	0.60	0.60	10.0
Prosol 20-20-20	0.20	0.20	3.3	0.40	0.40	6.7	0.60	0.60	10.0
Miller 20-20-20	0.26	0.26	3.3	0.51	0.51	6.7	0.74	0.74	10.0
Champion Bulldog 20-20-20	0.19	0.19	3.3	0.39	0.39	6.7	0.62	0.62	10.0

¹ EC (Electrical Conductivity) is expressed as millmhos/cm

² Difference in meter reading of fertilized water minus unfertilized water. Note: most conductivity meters read in mmhos/cm, including new DiST 4 and the Milwaukee Instruments Sharp EC meter. However, the Aolde DiST 4 meters read in a different unit (100ΦS/cm). The numbers listed in this table under the DiST 4 column are for the new DiST 4 meter and must be multiplied by 10 (decimal moved one place to the right) if using the old DiST 4 meter.