

# Use Soil & Tissue Sampling as a Hedge Against Fertilizer Cutbacks

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Like most people, I started to watch all kinds of prices more closely over this year. The cost of 18-46-0 and other phosphorus fertilizers, in particular, seemed to spin out of control. In midwinter, the numbers changed almost as fast as the gauge on the diesel pump when I filled up at the gas station. The inflation of fertilizer prices has risen higher than any other product that I know of.

Even last year, I heard growers talk about cutting back on their fertilizer applications to save money. This year, different growers reported cutting rates across their fields, treating only a portion of their fields, or even cutting out fertilization altogether. Whether these growers don't have the money to buy fertilizer or refuse to pay exorbitant prices from a sense of outrage, the result is likely to be the same.

I already see hunger signs in tree fields where growers have cut back on fertilizer. Frasers in some fields are exhibiting poor color, stunted growth, short needles, and/or poor budset. Typically in drought conditions, tissue will come in low, but soil levels will be relatively normal. Normal soil reflects recent fertilizer applications that were not taken up into the tissue due to drought stress. Now, when county agents and I take diagnostic samples, both soil and tissue levels are frequently coming back low. This pattern can point to a lack of nutrient management. More reports than usual are deficient in the basics – phosphorus and potassium. Unless growers provide trees the nutrients they need, symptoms will get worse.



**Table 1:**  
**Optimum Nutrient Levels**  
**for Fraser fir**

<b>Nutrient</b>	<b>Soil</b>	<b>Tissue</b>
Nitrogen	100-120#	1.5-2.0%
Phosphorus	75 + index	0.2-0.6%
Potassium	75 index	0.6-0.8%
Calcium		
@ CEC=8	50-55%	0.6-0.8%
@ CEC=12+	40-45%	0.6-0.8%
Magnesium	10-15%	0.1-0.15%
Sulfur	25 index	.08-0.10%
Iron	-	40-300 ppm
Manganese	25 index	30-300 ppm
Zinc	25 index	20-75 ppm
Copper	25 index	5-10 ppm
Boron	-	18-30 ppm

The irony of this situation is that growers are letting trees go hungry for a false assumption -- that they are saving money by waiting to fertilize. Today's outrageous fertilizer prices may look good in comparison to future costs. Already, last year's high prices look cheap by comparison. Delaying fertilization to next season may not only have a detrimental effect on tree quality but carry an even heavier financial burden!

Where growers have cut back their fertilizer applications without the benefit of current soil and tissue reports, they are truly working blind. By taking samples, growers could use the results to set priorities and address the most pressing nutrient issues. Optimum nutrient levels using the NCDA&CS soil and tissue labs are shown in Table 1.

When material costs rise almost 100% in the space of a year, the natural response is to conserve where possible or substitute a less expensive alternative. Several growers have substituted organic products such as poultry litter compost or free municipal stabilized sludge for their regular fertilizer applications. Others have substituted Dutch white clover ground cover for their annual nitrogen requirement on a portion of their fields.



Many growers made these decisions carefully based on nutrient levels documented in current soil and tissue analysis reports. The decision to cut back or substitute was determined by field-specific data. This alteration was made only if nutrient levels were adequate or would be met by the alternative. These growers were able to prioritize their fertilizer investments for the greatest return. This careful decision-making represents the highest standard of fertility management. The steps to taking good soil and tissue samples are listed in Table 2.


Armed with site-specific knowledge, alternative fertilizer practices can save money without putting tree quality at risk. Growers can assess the nutrient contribution of a practice or material. Tissue sampling can track the nitrogen provided from clover and show whether or not the trees are getting the nitrogen that they need. Based upon the percent nutrient content of organic materials, you can calculate per acre or per tree rates just like conventional fertilizers. Each field can get what it needs.

While established clover groundcovers can potentially supply all the nitrogen needs for a young Fraser fir, it will never supply all nitrogen needs for mature trees. Think about it – as tree demand for nitrogen progresses with the amount of foliage on the tree, the area of the ground covered with clover decreases. Mature Frasers need to be fertilized for optimum growth.

Further, clover will not correct either phosphorus or potassium deficiencies. All nutrients besides nitrogen need to be maintained at optimum levels for clover to be used successfully. With this limitation, clover is more useful on established fields that already have other nutrients built up.

Composts and other organic materials can substitute for conventional materials if the ratio of nutrients meets the needs of the soil report. Organic materials break down and provide nutrients over time which may be advantageous. The amount of organic material needed can be intimidating for those used to applying a few ounces of concentrated granular fertilizer.

If you are one of those growers that couldn't afford fertilizer this spring, don't push all thoughts of nutrient management off until next year. Fall applications of nitrogen can enrich the color of your trees prior to harvest. Fall phosphorus fertilization will support increased root growth, more robust foliage, and larger buds for next year's growth. Use soil and tissue sampling to make informed decisions about what your trees need.

Frankly, if a Christmas tree farmer doesn't feed his soil, he might as well get out of the business. To borrow from Aesop's fables, you might as well kill the goose that lays the golden egg. It is no easy task to sell good trees in a tight market. It is next to impossible to sell culls. 

**Table 2:**

### **Taking a Soil Sample**

- Use a soil probe (tube) for a more consistent sample
- Use a plastic bucket, not metal
- 5 -10 average trees randomly selected across the field
- 4 cores of soil per tree, in a "cross" pattern: 2 at the dripline of the tree, 1 between trees, 1 between rows
- Randomly shift position of cores around a tree as you move through the field to avoid hitting or missing past fertilizer patterns.
- Standard sample is 0 to 4 inches
- Take 2 depth samples for more information (0 – 4' and 4 – 8').
- Mix soil thoroughly.
- Only fill NCDA soil boxes 2/3 to line on the side of the box.

### **Taking a Tissue Sample**

- Sample the same trees from which you collect soil.
- Collect a minimum of 40 inches of foliage – typically one or two current shoots from each tree.
- Collect more shoots from trees with stunted growth.
- Sample the top third of the tree.
- Sample vigorous shoots such as terminal branches.
- Sample horns or crossover branches that should be pruned anyway.
- Sample in the dormant season unless sampling problem areas.
- Sample good and bad areas for problem sampling.



## **PLAN TO ATTEND:**

**Summer Meeting / Trade Show / Farm Tour**  
**Sparta, Alleghany Co.**  
**September 12-13, 2008**