FOR 102

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IFAS Extension

How Much Wood Is In Your Woods? A quick and simple method for pine timber volume estimation[1]

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Introduction

Are you considering a thinning or timber sale? Do you need to make a quick estimate of the merchantable cord wood volume in a pine stand? The method described here uses advanced forestry technology to simplify the task. The technique and calculations are straightforward, enough so that some people use no equipment——not even pencil and paper.

Foresters often use a blend of technology, mathematics and statistics for forest measurements. One such method makes use of an unequal probability sampling technique called “point sampling” to simplify the estimation of wood volume on a forest site. The theory is complex. But, you need not understand all the theory to use it.

While this sampling method is quick and simple, it does require that you identify merchantable trees. If you are not sure which pines are merchantable then you will find guidance in Extension Circular 662: Identifying and Measuring Forest Products.

Section Heading

How It Works

Point sampling provides a method for selecting sample trees around a point in the forest. The sum of the heights of these sample crop trees can then be converted directly to an estimate of cord volume per acre.

Normally, measurements of both tree diameter and height are required to estimate tree volume. Point sampling short cuts this process and eliminates the necessity of measuring tree diameters to estimate tree volume.

Step 1: Select a Sample Location

You should first select a random spot in the forest for your sample point. Decide on a direction and a number of footsteps to take before you enter the woods. This will help to avoid bias in locating your first sample location.

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Step 2: Select Sample Trees

At the sample location, you will stand in one spot and rotate in a complete circle while using an instrument called an “angle gauge.” Merchantable trees that appear bigger than the gauge are selected as sample trees.

Foresters use a variety of precision devices for this step. However, the coins in your pocket can serve as a reasonable substitute for an angle gauge. If you have a long reach, a nickel held 27 inches from your eye will work. For those with a shorter reach, a penny can be used at 24 inches or a dime at 23 inches. Use a yardstick and experiment to see which coin works best for your reach.

Table 1. Selection of a coin angle gauge.

Arm Reach (Inches)	**Coin** Gauge
23	Dime
24	Penny
27	Nickel

Now, hold the coin at the bottom and, with one eye closed, sight over the widest part of the coin to look for trees that appear larger than the coin is wide. You should look at the trees at about chest high (4.5 feet above the ground). Remember that only trees of merchantable size and quality that also look wider than the coin will be included in your volume estimate.

Be sure not to miss trees that are “hiding” behind other trees. And, do not be alarmed if some trees appear exactly the same size as your angle gauge. Simply continue on, counting one such borderline tree and ignoring the next.

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Step 3: Estimating Sample Tree Heights

For each sample tree that you have identified with your coin angle gauge, you will need an estimate of total tree height to provide the basis for volume estimation. A trick that may help you with height estimation is to imagine how many of something of a known height (perhaps a friend standing next to a tree) would be needed to equal the tree height.

Figure 1. A penny serves as the correct angle gauge for her arm length.

As you turn around and identify sample trees, you can mentally total up the sample tree heights. If your memory and mental math need a helping hand, simply jotting down the estimated heights of all counted trees will be helpful. The process is easier still if you estimate each tree height to the nearest 10 feet.

Step 4: Calculate the Volume

The cord volume per acre estimate at the sample point is simply 5% of the total of the sample tree heights. The answer can be calculated easily in your head. First divide the total of the heights by 10, and then halve the result.

An Example

Let's imagine that we want to take a sample point in a stand of planted pines. Many trees are visible around us. But, only 10 trees appear thicker than our coin gauge as we rotate to collect the point sample. We are interested in estimating the cords in small sawlog trees. To qualify as small sawlogs, our local market requires that trees be at least 8 inches in diameter at 4.5 feet above the ground. Only 4 of our 10 sample trees are large enough to meet the specification.

We estimate the total heights of the 4 trees to be 80, 70, 75, and 65 feet. The sawlog tree volume estimate is 80 + 70 + 75 + 65 = 290, divided by 10 is 29, and halved gives a result of 14.5 cords per acre.

Figure 2. This tree will be included in the volume estimate. Note that the tree appears wider than the nickel angle gauge.

How Good Is This Estimate?

Do not discount this procedure just because it is simple. If your height estimates are reasonably accurate and you have properly selected the sample trees, then this method can give very good results. But, it is only a single estimate. A professional forester would take many carefully placed sample points in a timber stand. And, foresters use instruments to aid in precise tree selection and measurement. Your volume estimate can likewise be improved by collecting data carefully from several randomly located spots and averaging the results.

How many point samples are required to get a good volume estimate? The answer depends on the variation in the stand and your definition of a "good" estimate. For example, averaging as few as 5 sample points may be adequate to estimate volume within 20 percent in a uniform, planted pine stand. In a natural stand with varying tree heights and stocking, you may need to sample 25 points to have the same confidence in the estimate. If a volume estimate within 10 percent is desired, multiply the number of recommended sample points above by four. Finally, remember that these are only guidelines. About one in twenty sample surveys will simply miss the target.

It is always good to have an approximate estimate of your timber volume. However, a sample survey conducted by a forester can be a good investment, particularly when timber is being sold. The knowledge of local markets and contractors that a local forester can provide is critically important in getting the best dollar returns from your timber.

Interested in More Details?

If you want to improve your sampling technique, you can practice with a target that is exactly 8.5" wide (a standard sheet of paper). Measure 23 feet, 4.5 inches from the target and stand with your eye over this spot. If your technique is good, the target should appear precisely the width of your angle gauge.

A more complete technical name for this procedure is "10 factor point sampling." Since this technique became popular just as computers were being widely adopted, a misconception developed that point sampling required complex calculations. In fact, one of the primary reasons for the introduction of point sampling was to reduce the need for difficult calculations.

If cord volume can be estimated directly with point sampling, then you may be wondering if this method has other uses. In addition to estimating various units of stand volume and weight, point sampling is frequently used to estimate a stocking measure called basal area. So, whether you are considering harvesting or thinning a stand, or just checking on stand health and growth, point sampling can help you estimate "how much wood is in your woods."

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