

How to Measure a Champion Tree

Basic Guidelines for Nominations to the N.C. Champion Tree Program

Nominations to the N.C. Champion Tree Program require three measurements: circumference of the trunk in inches, height in feet, and average crown spread in feet. Point value is determined by adding the circumference, height and $\frac{1}{4}$ average crown spread, with no conversion of units.

Example: A tree 144 inches in circumference, 100 feet tall, with an average crown spread of 80 feet:

$$144 + 100 + (80/4) = 264 \text{ points}$$

The measurement techniques outlined in this document are the basic methods for obtaining circumference, height and crown spread, which non-professionals can easily employ. For more complex situations, contact your County Ranger for measurement assistance, or refer to the [American Forests Measuring Guidelines Handbook](#).

CIRCUMFERENCE:

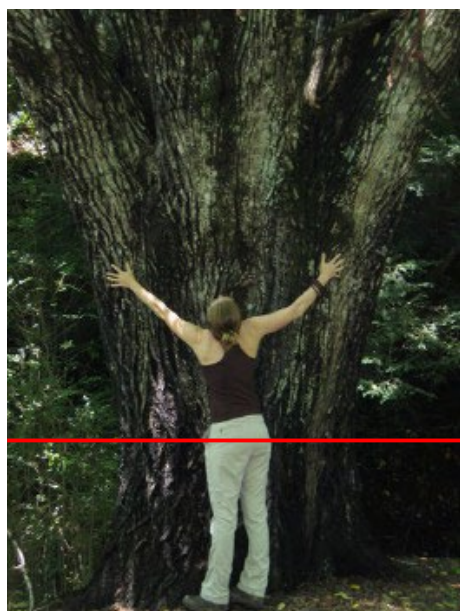
The circumference of a tree is measured in inches at 4.5' (breast height, or BH) above the center of the base of the tree [Figure 1].

LEGEND:

— Point of Measurement



Figure 1 *Chamaecyparis lawsoniana*, Buncombe County



However, if irregularities occur that cause this measurement to be under or overestimated, circumference should be measured as outlined in Avery and Burkhardt's Forest Measurements (1994). For example, if a tree forks immediately above BH causing significant swell just below the fork, circumference is measured at the narrowest portion of the stem below the swell [Figure 2]. If a tree forks below BH, the larger stem is measured at BH [Figure 3].

Figure 2 *Juglans cinerea*, Cherokee County



Figure 3 *Cladrastis kentukea*, Graham County



Figure 4 *Taxodium ascendens*, Hyde County



Figure 5 *Betula alleghaniensis*, Graham County

For buttressed trees such as cypress or tupelo where swell may extend for several feet off the ground, circumference is measured at 1.5 feet above the pronounced swell [Figure 4].

If a tree occurs on sloping ground, circumference is measured at BH from the uphill side of the tree [Figure 5]. If a tree has appreciable lean, circumference is measured not at 4.5 feet above the ground, but 4.5 feet along the stem [Figure 6].

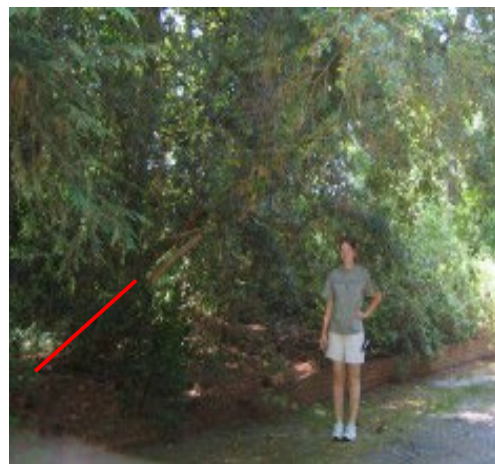


Figure 6 *Osmanthus americanus*, Wilson County

HEIGHT:



Total height to the nearest foot is measured with a clinometer [Figure 7].

Figure 7 Measuring height

For leaning or crooked trees, height measurements are taken at right angles to the direction of lean [Figure 8]. Furthermore, one end of the measuring tape (used to measure the distance for the clinometer reading) is held directly under the tallest point of the tree.



Figure 8 *Prunus munsonniana*, Buncombe County

AVERAGE CROWN SPREAD:

Average crown spread is measured to the nearest foot with a tape measure. Two measurements are taken in perpendicular directions (accounting for the widest and narrowest diameter of the crown) and averaged [Figure 9]. A clinometer with a degree scale can be used in order to ensure measurements are taken directly under the outer perimeter of the crown.

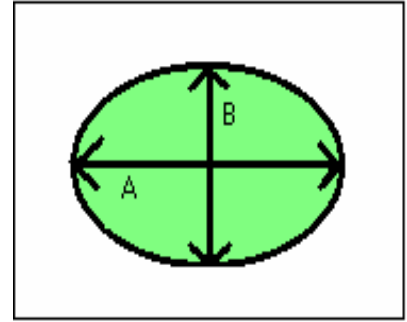


Figure 9 View from Above Average Crown Spread = $(A + B) / 2$

OTHER CONSIDERATIONS:

For deliquescent (multi-stemmed) specimens such as *Cercis canadensis*, *Styrax grandifolius*, and *Lagerstroemia indica*, circumference is measured on the largest stem at BH. Height is measured on the tallest stem, and average crown spread is determined for the entire specimen. However for root sprouts, only the largest sprout is measured for circumference, height, and average crown spread. Bottlebrush buckeye [*Aesculus parviflora*, Figure 8 a. and b.] is the most representative example for the latter case.



a



b

Figure 8 a *Aesculus parviflora* Champion Sprout; **b** Vegetative clump of *Aesculus parviflora*