

The Variation Of Stand Basal Area Calculation Using Three Different Methods For Dry Zone Teak Plantations In Sri Lanka

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ABSTRACT: Stand Basal Area (G) is simply the cross-sectional area of all the trees at breast height per hectare of a forest or a plantation (m^2/ha). G can be used to estimate stand volume and is a useful measure of the degree of competition in the stand. The present study was conducted for a 44 years old homogeneous Teak (*Tectonagrandis* L.f) plantation in the dry zone located in Anuradhapure Range, Mihintale Beat of Sri Lanka. Initially, a $100m \times 100m$ square plot was demarcated and then it was divided into $100; 10m \times 10m$ subplots to be compatible with the research design. Then at the breast height point, eight readings were taken using tree caliper and, a single reading was taken using the diameter tape. Using different basal area factors of three instruments such as angle gauge, Spiegel relascope and wedge prism, stand basal area readings for five locations within 1 ha plot were also taken. The G calculated by using the tape reading and eight diameter readings of caliper in the sample plot and wedge prism, Spiegel relascope and angle gauge were tested by one way analysis of variance test together with Turkey's pair wise comparison to recognize the differences among instruments used. According to the results, there is no significant difference among the tape, number of caliper readings and spiegel relascope. But the results showed significant differences for angle gauge and wedge prism with the absolute basal area value. Also there was no significant difference among the number of diameter readings were taken by caliper. In order to identify the minimum plot size that has to be used to collect data for G calculations using sample plot method, one sample t- test was used for selected plot sizes. The test mean used for this method was absolute basal area value calculated using cut and weight method. According to the test, it showed that the minimum plot size was $400m^2$ for the accurate basal area in the sample plot method. Also the results showed that the absolute error difference decreasing with the increasing of plot size. The three instruments used to calculate relative basal area values were compared statistically by one sample t-test to identify the best instrument for relative basal area calculation. In this method absolute basal area value was used as the test mean and test results showed that Spiegel relascope predicts relative basal area accurately and other both wedge prism and angle gauge do not predict relative basal area accurately. Finally, it is concluded that use of sample plot is the best method for total basal area calculations with a minimum plot size of $400m^2$. The diameter tape was recommended to use in the field when taking diameter measurements for basal area calculation. When calculate the relative basal area, Speigal relascope is recommended. The error generated due to use of angle gauge and Wedge prism is very high and it is not recommended these instruments to take basal area measurements in the dry zone teak plantations.

Keywords: absolute basal area, diameter at breast height (dbh), relative basal area, stand basal area, sample plot method

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