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# VARIATION OF BASAL AREA CALCULATION USING THREE DIFFERENT METHODS IN PLANTATION FORESTS

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## Abstract

Total basal area is a very important factor in plantation forestry and it gives an indication of growth conditions of plantations as well as the density of the trees. There are confusions among the different methods used for basal area calculations and it is very important to clarify the correct method for basal area estimation in plantation forestry.

Present study was conducted in the 26 year old *Pinus caribaea* plantation in Yagirala Forest Reserve situated in the low country wet zone of Sri Lanka. One hectare of the plantation was selected for the study. Selected one hectare area was further divided into 100 sub plots. Each tree in each sub plot was measured for diameter at breast height (dbh) using diameter tape and tree caliper. Four perpendicular measurements were taken for each tree using the tree caliper while one reading was taken by wrapping the tape around the tree. Using different basal area factors of the angle gauge and spiegel relascope five stand basal area readings were also taken in side the sample plot.

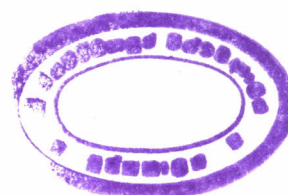
Using the four readings of the tree caliper tree cross section area was traced on to a graph paper and weight of all cross section areas was measured. Then the weight was converted in to area. Dbh readings observed using diameter tape and tree caliper were converted in to tree basal area values using the equation  $basal\ area = \pi d^2 / 40000$ . Two methods were used to calculate the basal area using caliper readings i.e. basal area calculation using one reading and two readings of the tree caliper. Using the five readings for the angle gauge and spiegel relascope relative basal area was calculated for each basal area factor.

One way analysis of variance test together with Tukey's pairwise comparison was used to identify the difference between diameter tape and tree caliper. According to the test it showed that there is no significant difference between these two instruments and there was also not a significant difference between basal area calculations using one caliper reading or two caliper readings.

In order to identify the minimum plot size that have to use to collect data for stand basal area calculations using sample plot method one sample t - test was used. Test mean used for this method was the absolute basal area value calculated using cut and weight method. According to the test it showed that the minimum plot size was  $2500m^2$  for the accurate basal area calculation in sample plot method. Therefore, absolute error was calculated for each basal area calculation method used the sample plots. According to the results it showed that the absolute error difference is decreasing with the increasing the plot size.

Relative basal area values calculated for different basal area factors for two instruments were statistically compared to identify the best instrument for relative basal area calculations. One sample t - test was used for this purpose. Absolute basal area value was used as the test mean. According to the test it was revealed that both Spiegel relascope and angel gauge do not predict relative basal area accurately.

According to the results of the study it was concluded that use of sample plots is the best method for the total basal area calculations with a minimum plot size of  $2500m^2$ . It is recommended to use the diameter tape for taking the measurement for basal area calculations due to its ease of use in the field. The error occurred due to the use of angle gauge and Spiegel relascope is very high and it is not recommended use both instrument to take basal area measurements in forest plantations even though it is very easy to use them in the field.





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