Measurement of Height-Diameter Ratio by Plot-less Sampling

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Aging man-made forest could be found due to the low price of logs in Japan. Such forests should be managed not only for their perceived benefits but also for their ability to contribute to environmental stability. The height-diameter ratio is one of the indicators of strength against wind and snow disaster. Usually accurate forest evaluation can be done by stands survey. However limited man-power and time are constraints due to wide area, inaccessible land, diversity of trees, etc. Fast survey can be done by plot-less sampling which is considered to effect forest evaluation.

The formula of stand height-diameter ratio comprises of two types, point sampling (Sato et al. 2008), and line sampling (Sato et al. 2009). Those sampling have vertical counting such as measure of average diameter at breast height (or total basal area), and horizontal counting such as measure of average height. The main survey was done in December 2008 at Oneyama memorial forest of the Japan Forestry Association at Annaka City, Gunma prefecture. The forest was 50 years old sugi (\textit{Cryptomeria japonica}) plantation, average diameter at breast height 31.5 cm and height 23.2 m. Measurements of height-diameter ratio by students were examined in terms of speed and accuracy.

Results shows that; 1) vertical survey was faster than horizontal survey, 2) point survey was faster than line sampling, 3) vertical survey was more accurate than horizontal survey, and 4) point survey was accurate than line sampling. However, line sampling was easy to calculate height-diameter ratio in the forest due to simple formula.

The accuracy of the survey might depend on the physical characteristics of forest such as slope of land, and kinds of forest age, number of trees etc. Especially, horizontal surveys found that difficult to identify the counting tree due to multi-layered canopy. So different types of the forest should be examined for future study. Also application of the height-diameter ratio to forest management should be considered.