



Form Factor for Amazonian Forest Trees

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Mini-Review

Volume 5 Issue 2

Received Date: September 08, 2020

Published Date: September 21, 2020

DOI: 10.23880/oajar-16000248

Abstract

The Amazon rainforest has a great diversity of species that provide a high variation of wood stock due to the characteristics of the trees. Among this, the taper of the shaft is essential to determine the form factor for the forest, which can be applied in previous estimates during the forest inventory. Thus, this mini-review aimed to show the variation of the form factor for different forest areas in the Brazilian Amazon. The form factor ranged from 0.874 to 0.4488 for several vegetations, if the average form factor (0.7) were applied in these sites it would have caused both over and underestimations. This demonstrates the high variation in taper that can be determinant in the estimation of forest stock. For this reason, a specific assessment of the form factor is essential for each forest to be managed, as it demonstrates the variation along the log and assists in forest planning.

Keywords: Influence; Heterogeneity; Inventory

Introduction

Tropical forests with high heterogeneity can have different form factors for the tree stems. Each area has characteristics that influence the shape, the diameter with bark measured at 1.30 meters in height on the tree (DBH) and commercial height (Hc) of those that can be found, mainly in the Amazon region. This factor can be defined by means of a specific study for the area to be managed, where the volume of the cubed tree is divided by the volume of the cylinder. To calculate the volume of the cylinder and obtain its sectional area, use Hc and DBH. Thus, the volume is wide as: $V_{cylinder} = [(\pi * DBH^2) / 40000] * Hc$, with the DBH in centimeters [1-3]. In the Brazilian Amazon, research on the volumetry of species in the region determined a general factor (equal to 0.7) for trees in the Amazon forest [4]. Although it was provisional in nature, it continues to be used for previewing wood stocks in forest inventories. Thus, this mini-review aims to list the variations of the form factor for different forest areas in the Amazon region in Brazil.

Form Factor in Tropical Forests

The form factor is an option used in situations where there is no information about the shape of the tree or, even when it is necessary to speed up the incentive work. It designates recognized, as long as the forest typology, species and diameter class are controlled. It may happen that trees with identical geometric shapes, but with different heights, produce different absolute form factors. This is transmitted by the influence of the bases of the bases, which in old and large trees exceeds the DAP region, which occurs mainly with tropical species [5]. It can also happen that two trunks with the same absolute form factor do not necessarily occur in the same form [6].

Hohenadl was able to express in the natural form the series of relative measures along the trunk by a single value or factor, in a way that allows us to say the algorithm on the development of the data series [7,8]. However, to define the form factor in the Amazon region, it is used to calculate

the volume according to Smaliam, according to normative instruction nº 5 of Conama [9], for forest management plans or a combination of methods (Smaliam and Hohenadl) in scientific research. Thus, there are several components that can affect the calculation of the form factor and its variation.

For 20 forest species in the state of Acre the form factor was 0.874, with a maximum value of 0.927 and a minimum of 0.804, this shows the great variation even for an area of forest with a form factor considered high, when compared with that of other species. regions [10,11]. In a comparative study of methods to estimate the volume of species in the Tapajós Forest, it determined an average form factor of 0.75, with oscillations between 0.62 and 0.79 for 710 trees distributed in 68 species, however when it was effective for each species, the variation was minimal. When comparing the 0.7 form factor used in forest inventories in the Amazon, the associated error was -10.96 to + 12.85%, when volumetric estimates are highlighted [12].

In the dense ombrophilous forest to the south of the state of Roraima, a variation in the form factor was found for species from 0.70 to 0.78 [13]. For other areas in the Amazon rainforest, values of 0.73 were found in the state of Roraima and 0.74 in Mato Grosso [14]. In the state of Rondônia, the form factor was 0.4488, lower than the value generally used in the Amazon [15].

For cubing 167 trees in the state of Pará, with combined methods by Smaliam and Hohenadl, the form factor was 0.82, which may be associated with the insertion of trees with DBH from 5 cm [16]. In a dense ombrophilous forest in the central Amazon, the form factor increased according to the diameter class where it was 0.745 and 0.781 for trees with DBH ≥ 10 and ≥ 50 cm, respectively. The overall form factor was 0.709, similar to that found by the RadamBrasil project (0.70) [17].

Conclusion

Deviation from the area where the forest is located and from the form factor analysis, there are different conicities that influence the wood volume indicators. The variability in the shape of the shaft can impact the determination of the volume explored in tropical areas of the Amazon biome. Therefore, it is essential to calculate the form factor for each site to be managed, as it helps in forest planning and demonstrates a variation along the log for vegetation of interest.

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