Determining Optimal Regression Models for Predicting Melia Azedarach Tree Growth in Sami Abd al-Rahman park

Prepared by :Asma shwan muhamed
College of agricultural Engineering Sciences
Department of Forestry
Supervised by : Mrs.ekhlas

Introduction

Forest trees contribute beyond wood production, providing essential services like air and water purification, habitat recreation enhancement, and carbon storage. Melia azedarach, a deciduous tree reaching 5-15m in height and 110cm in stem diameter, is prized for its ornamental value, shade provision, and drought resistance, making it popular for afforestation in Iraqi public parks. Despite its advantageous traits, there's a lack of comprehensive biometric studies to assess its volume, productivity, growth, and yield accurately.The crown, pivotal for tree survival and sustenance, significantly impacts the microclimate, especially in hot, dry regions. Crown dimensions vary between open-grown and stand-grown trees due to genetic and environmental factors, influencing tree shape and volume. Crown leaves play a crucial role in photosynthesis by capturing radiant energy. Notably, there's a significant correlation between crown width and tree volume growth, often used to predict individual tree growth and yield. However, measuring crown dimensions, including width, is complex and resource-intensive, particularly in dense forests.To overcome measurement challenges, mathematical models regress easily measured tree attributes to estimate crown dimensions. Various studies have explored innovative crown width models, offering insights into crown volume, production efficiency, and potential growing space estimation. Breast height diameter commonly predicts variable for crown width model development, with recent research focusing extensively on advancing crown width modeling techniques.

Methodology

Crown Width and Breast Height Diameter Measurements: Collect data on crown width and breast height diameter for Melia azedarach trees in specific locations, crucial for developing individual tree parameters models]. Statistical Software: Employ statistical software for regression analyses and model development, facilitating the calculation of crown width estimation and other tree parameters. Plant Long Non-Coding RNA Analysis: If applicable, involve genetic data and plant long non-coding RNA analysis for a comprehensive understanding of species behavior and response to environmental factors.

Discussion

Crown Volume Estimation: Goal: Develop a model to estimate crown volume based on breast height diameter (DBH).

Formula: The text presents the formula for crown volume based on crown radius (r) and simplifies it using crown diameter (CD), which is equivalent to crown width (Cw) for circular crowns.

Regression Model Integration: The established model for Cw based on DBH (Cw = 1.5168D) is incorporated into the crown volume formula.

Volume Estimation Example: The text demonstrates how to estimate crown volume for trees with different DBH values.

Impact of DBH: It emphasizes the significant increase in estimated crown volume (282.8%) when the DBH doubles.

	DBH	Ht	Cw
count	100	100	100
average	18.23	8.35	4.5035
Standard deviation	6.35	2.21	1.77
coffee of V	31.27%	23.80%	24.50%
minimum	7.1	4.5	3.1
maximum	39.5	13.54	10.3
range	33.2	10.12	7.5

Figure 1: Where x represents the value of the measured parameter, n is the number of observations, and ⁻x⁻ is the arithmetic mean of the parameter. A summary of descriptive statistics for the dataset is presented in Table 1
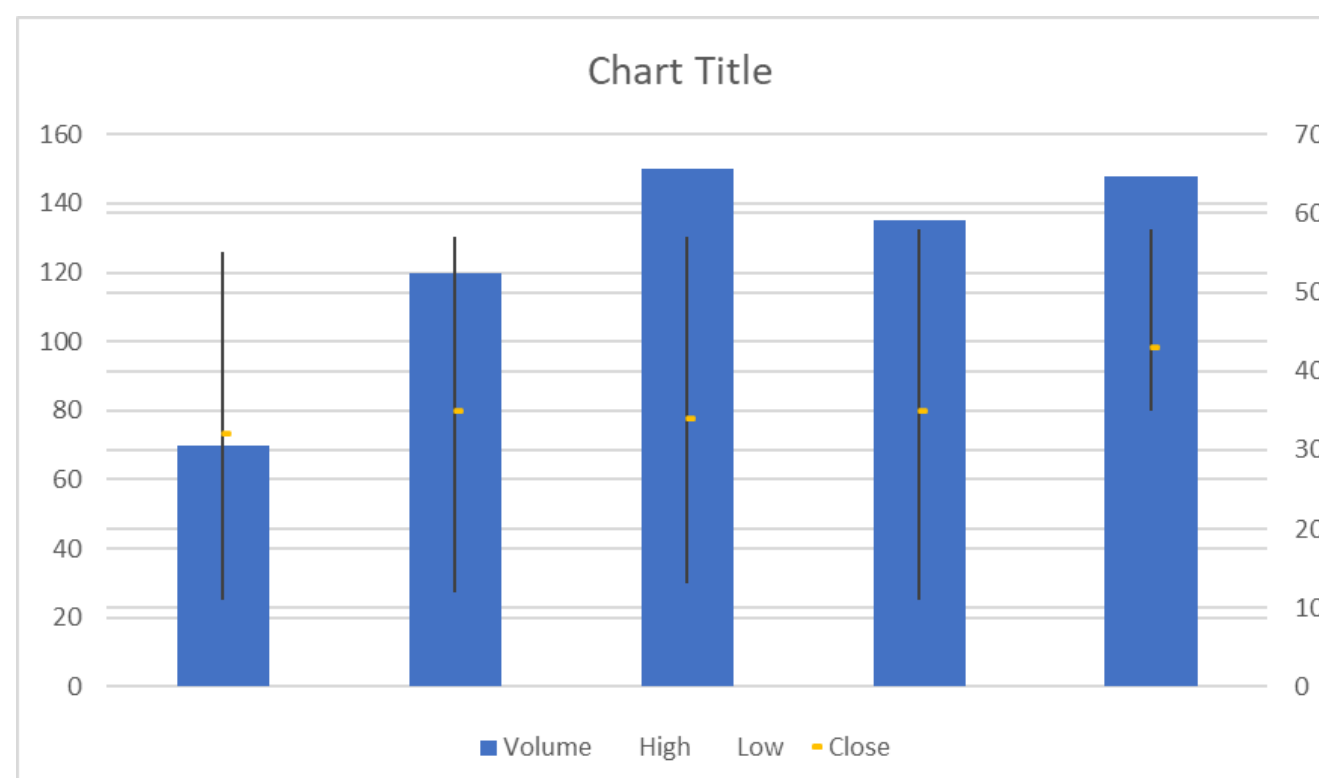
Figure 2: The crown of broadleaf trees is assumed to approximate a spherical shape, leading to the utilization of the following volume calculation formula:

Conclusion

The research discuss the importance of crown width estimation and crown volume calculation for Melia azedarach trees. Crown width is crucial for tree survival and overall health, as it affects food production for the entire tree Estimation of crown width involves regression analysis and understanding the relationship between crown width and breast height diameter .calculating crown volume is essential due to its direct relationship with carbon sequestration, particularly in broadleaf trees like Melia azedarach .The method involves using a formula based on crown radius or diameter, which can be derived from the selected crown width model. This calculation aids in understanding the tree's overall volume and its potential impact on the environment These paragraphs underscore the significance of accurate crown width estimation and crown volume calculation for understanding the growth, health, and environmental impact of Melia azedarach trees

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