Biomass prediction is of critical importance for national development planning, ecosystem productivity, carbon storage and sequestration, energy and nutrient cycling, and wildfire modeling. New techniques and procedures are brought together along with more traditional approaches in order to predict tree components and total aboveground tree biomass. The objective of this study is to suggest and finally provide an accurate approach for the prediction of the above-ground components (wood, bark, and crown) biomass for the brutian pine (*Pinus brutia* Ten.) of the Western Mediterranean Region of Turkey by using data measurements obtained from this forest environment. The data set consists of measurements obtained from 164 felled brutian pine trees included in 35 research plots. The potential applicability and accuracy of the Levenberg-Marquardt artificial neural network (LMANN) models for brutian pine biomass prediction was investigated by testing their performance against the predictions derived by the NSUR-NLR (nonlinear seemingly unrelated regression) models. The results reported in this research suggest that LMANN models achieved higher accuracy than the accuracy derived from the NLR models, showing that the use of this type of neural network architecture worth consideration in both dry biomass tree components prediction and total dry biomass prediction.