

Vol. 8 (3): 457-470 (2018)

## BIOMASS ALLOCATION IN RELATION TO PRECIPITATION, TEMPERATURE AND SOIL PROPERTIES IN THE GRASSLAND OF CORUH RIVER BASIN, TURKEY: USING STRUCTURAL EQUATION MODELLING WITH AMOS

Musa Dinc<sup>1\*</sup>, Ahmet Duman<sup>2</sup>, Mustafa Tufekcioglu<sup>2</sup>, Aydin Tufekcioglu<sup>2</sup>

<sup>1</sup>Forestry and Forest Product Program, Vocational School of Forestry, Artvin Coruh University, Artvin, Turkey;

<sup>2</sup>Artvin Coruh University, Faculty of Forestry, Artvin, Turkey;

\*Corresponding Author Musa Dinc<sup>1\*</sup>: [musa\\_dinc20@artvin.edu.tr](mailto:musa_dinc20@artvin.edu.tr); [dincmusa20@gmail.com](mailto:dincmusa20@gmail.com);

Received February, 2018; Accepted March, 2018; Published April, 2018;

doi: <https://doi.org/10.31407/ijeess834>

UOI license: <http://u-o-i.org/1.01/ijeess/73337637>

### ABSTRACT

Aboveground biomass (AGB) and belowground biomass (BGB) of grasslands are important parameters for characterizing regional and global carbon cycles in grassland ecosystems. Compared with the relatively detailed information acquired for AGB, data regarding the BGB has been poorly reported at the regional scales. In this study, AGB, BGB, and soil samples for their organic matter, texture and pH level were collected from the 49-plots across the grasslands of the four different sub-watersheds (Bicakcilar, Kilickaya, Oltu and Uzundere) within the Coruh River Basin to compare the differences in AGB, BGB, total biomass (TB) and the ratio of below to aboveground biomass (B/A) in those sub-watersheds. The relationships among parameters including AGB, BGB, TB, B/A, climate and soil were also examined. It was found that AGB, BGB and TB differed significantly among the grasslands of four sub-watersheds while B/A did not differ. Structural equation model (SEM) analyses indicated that mean annual precipitation (MAP) and mean annual temperature (MAT) were the strongest positive driver for the allocation of AGB, BGB and TB. AGB and TB were positively correlated with soil organic matter and negatively related with pH, whereas BGB and B/A were positively related with pH and negatively correlated with soil organic matter. Climatic variables, MAP and MAT, were negatively correlated. The results demonstrated that BGB and TB were positively correlated to MAP ( $p < 0.01$ ) and were negatively related to MAT. B/A was negatively related to AGB ( $p < 0.01$ ). With all data pooled, TB and MAP were strongly correlated, as the relationship between MAP and TB ( $R^2 = 0.72$ ). These results indicated that increase in precipitation positively influence grassland biomass production in Coruh River Basin grasslands. In addition to these, precipitation and temperature had strong control on AGB, BGB and TB in semi-arid grassland ecosystems.

**Keywords:** aboveground biomass (AGB), belowground biomass (BGB), precipitation, temperature, structural equation model.