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Estimation of Basal Area in West Oak Forests of Iran Using Remote Sensing Imagery

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ABSTRACT

The objective of this study is to evaluate the capability of satellite imagery for the estimation of basal area in Northern Zagros Forests. The data of the high resolution geometric (HRG) sensor of SPOT-5 satellite dated in July 2005 were used. Investigation of the quality of Satellite images shows that these images have no radiometric distortion. Overlaying of geocoded images with the digital topographic maps indicated that the images have high geometric precision. A number of 319 circular plots (0.1 ha) were established using systematic random method in the study area. All trees having diameter at breast height (DBH) (i.e. 1.3 m above ground) greater than 5 cm were callipered in each plot. Basal area in each plot was determined using field data. Main bands, artificial bands such as vegetation indices and principle component analysis (PCA) were studied. Digital numbers related to each plot were extracted from original and artificial bands. All plots were ordinated by major geographic aspects and the best fitted regression models were determined for both the study area without consideration of aspects and with consideration of major geographic aspects by multiple regression analysis (step wise regression). The results from regression analysis indicated that the square root of basal area without consideration of aspects has a high correlation with band B1 ($r = -0.60$). The consideration of aspects resulted in correlation of different indices with square root of basal area such that in northern forests, band B1 had higher correlation coefficient($r = -0.67$) among other indices. In Eastern forests, the same band showed correlation of basal area with different correlation coefficient ($r = -0.65$). In southern and western forests, the square root of basal area had higher correlation ($r = -0.68$) with RVI. The use of the square root of basal area as a dependent variable in multivariate linear regression improved the results. The assessment of model validity indicated that the proposed models are properly valid.

KEYWORDS

Northern Zagros Forests; Basal Area; SPOT-5 Data

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