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## ESTIMATING CROWN CLOSURE OF FOREST STANDS USING LANDSAT TM DATA: A CASE STUDY FROM TURKEY

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### Abstract

Remote sensing data has been broadly used in assessing and monitoring natural resources. Monitoring forest resources with Landsat Thematic Mapper (TM) and other fine resolution sensors has become a challenging work in a wide variety of forest applications. In this paper, the relationships between stand crown closure with spectral reflectance values and some vegetation indices (VIs) obtained from Landsat TM were investigated in a case study area. The Pearson correlation and multiple regression analysis were used to estimate the crown closure. The regression analysis showed that a linear combination of Soil Adjusted Vegetation Index (SAVI), normalized difference 32 index (ND32) and normalized difference 57 index (ND57) are better predictors for estimating crown closure (adjusted  $R^2=0.757$ ; root mean square error (RMSE)=2.5304%) than other TM bands (adjusted  $R^2=0.529$ ; RMSE=4.0782%). The Pearson correlation analysis results demonstrated that NDVI, Simple ratio (SR), Difference Vegetation Index (DVI), Transformed Vegetation Index (TVI), Soil Adjusted Vegetation Index (SAVI) had the highest positive correlation ( $r=0.84$ ) and Infrared Percentage Vegetation Index (IPWI) had the negative correlation ( $r=-0.84$ ) with crown closure measurements. Furthermore, the TM 4 band showed the highest correlation ( $r=0.64$ ) with crown closure between TM 1-5 and TM 7. This research concluded that forest managers could use Landsat TM imagery for estimating crown closure used for generating maps in developing forest management plans.

*Key words:* Landsat TM, regression analysis, stand crown closure

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