Studying of the MODIS Data Potentials to Assess the Pastureland Production in the Arid Region of Semirom-Iran

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Introduction Pasture management with domestic animal grazing should be based on an understanding of the spatial and temporal distribution of forage production . To estimate the pasture production in any region , reliable and repeatable techniques are needed for use by land managers . Traditional methods of estimating forage production have spatial and temporal limitations and can not be applied on vast areas . Application of remotely sensed data is a suitable method to evaluate the pasture production and sequentially detect changes . The aims of the present research were : the study of the MODIS data capabilities to estimate pasture production in the Semirom and Brojen regions-Iran , while also selecting the proper vegetation indices to estimate production , as well as studying the pasture production dynamics through the multi temporal data in arid conditions .

Material and method The study area is located in Central Iran with Irano-Toranian vegetation cover . Multi-temporal images from a MODIS sensor were used to study these pastures . Various preprocessing of image analysis , including image geo-referencing to topographic map with an RMSe 0 .5 pixel and the atmospheric and topographic corrections were applied using subtraction of dark objects and the Lambertian methods . Field data collections were begun on June 2005 on 800 ,000 ha and continued for about 4 months for repeated assessments . Various vegetation types were sampled using the stratified random sampling method . Twenty random sampling points were selected , and the pasture production was estimated using a double sampling method . Four multi-temporal MODIS images acquired from 21 May to 18 September were used . The resulting models were processed and the resulting images were categorized into 7 pasture classes . Finally the produced maps were field checked for accuracy . Also post classification method was used to determine changes in the 7 pasture classes .

Results and discussion The results confirmed that the NDVI and SAVI maps are closely correlated with the field data . In addition , the indices involving the SWIR bands are more closely correlated with field data where the cover and yield are high . On these sites the regression R square exceeded 85% . Most of the produced maps had higher accuracies .

Table 1 *Regression coefficient (R[2])between herbage production measurements and four vegetation indices in different dates .*

Indices	22 May 2005	11 July 2005	21 August 2005	18 September 2005
NDVI	0 .63**	0 .4*	0 .42**	0 .55**
SAVI	0 .68**	0 .41*	0 .44**	0 .55**
ARVI	0/6**	0/27*	0/25 ns	0/11ns
AFRI$_{1.6}$	0 .84**	0 .45**	0 .23 ns	0 .3*
AFRI$_{2.1}$	0 .75**	0 .43**	0 .37*	0 .43**

* Significant at the 0 .05 level , ** Significant at the 0 .01 level , ns : Non significant .

During the growing seasons , the most pasture production changes , belong to class 100-200 kg/ha to 10-30 kg/ha in the NDVI and SAVI indices map . The results of this study prove , that Monitoring herbage production changes and vegetation indices on different dates shows that phytomass increases in spring and summer and decreases in August . The pastureland forage production change is very rapidly during the growing season on over 90% of these lands . The results of this study prove that the MODIS data estimates the plant production very well in arid and semi-arid regions . Through this data , one can monitor the forage production , and this is very useful for sustainable resource management as well as decision making for planning pasture utilization .

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