Application of Digital Data for Grassland Monitoring in Northern Iran

Hossein Arzani
University of Tehran, Iran

S. Noori
Tarbiyat Modares University, Iran

S. H. Kaboli
University of Tehran, Iran

H. R. Moradii
Tarbiyat Modares University, Iran

H. Ghelichnia
Research Center of Agriculture and Natural Resource of Mazandaran Province, Iran

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Arzani, .H[1], S. Noori[2], S .H. Kaboli[3], H .R. Moradii[4], and H .Ghelichnia[5]
[1] University of Tehran, harzani@ut.ac.ir [2] Tarbiyat Modares university, [3] University of Tehran, [4] Tarbiyat Modares University, [5] Research Center of Agriculture and Natural Resource of Mazandaran Province

Key words : remote sensing, vegetation cover, production, vegetation index.

Introduction Rangeland resource management is dependent on increasing scientific capability and remote sensing can contribute information for range management applications (Tueller, 1989). The capability of remote sensing for providing information of changes in cover and biomass has been discussed by previous authors (eg. Arzani 2005). Selection of suitable vegetation indices was the objective of the present study.

Material and methods Simultaneous digital and field data of summer rangeland south of Mazandaran, were analyzed. During 3 years of monitoring, annual grass, forb and shrub cover, and total yield data of sixty 1 m^2 plots were collected. After correction of images, digital numbers were converted to reflectance numbers. Intrinsic indices, soil-line related indices and atmospheric corrected indices were generated. Suitable indices were determined using linear regression.

Results and discussion There were significant relationships between digital data and vegetative characteristics. Among indices VI_{10} with annual cover, VI_6, VI_{10}, $MIRV_1$ with grass cover, Pd_{312}, VI_9, $MIRV_1$, GVI indices with forb cover, $MIRV_2$, VI_6, VI_{10} with shrub cover, VI_{12}, $MIRV_2$, VI_5, fuse2 with total cover and $MIRV_1$, $MIRV_2$, VI_5, Tgr with total production, showed significant relationships in different sites (e.g. Table 1 for the site in Vaz rangeland). Jackson *et al*. (1983) argued that an ideal vegetation index should have the characteristics of high sensitivity to vegetation, insensitivity to soil background changes and be only slightly affected by atmospheric path radiance.

Table 1 *Correlation obtained between vegetation indices and vegetation parameters in Vaz grassland.*

Vegetation parameters	Vegetation indices	Correlation	Regression equation	Correlation coefficient (R)	SE	Significant level
G. cover%	$MIRV_1$	49	28+263$MIRV_1$	0.89	3.30	**
F. cover%	$MIRV_1$	51	19.3+129$MIRV_2$	0.58	5.40	**
S. cover%	VI_6	75	-22.5+50.8VI_6	0.74	1.10	**
T. cover%	VI_5	81	174-125VI_5	0.92	9.20	**
T. yield kg/ha	VI_5	82	75-55.7VI_5	0.82	1.30	**

** Significant at P< 0.01, G=Grasses, F=Forbs, S=Shrubs, T=Total.

Conclusions Generally, introduced indices, presented accurate estimation of the quantitative parameters. Therefore, it is possible to estimate cover and range production for range monitoring using Landsat ETM^+ data.

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