

Application of digital data for grassland monitoring in northern Iran

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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 m² 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 VI₁₀ with annual cover, VI₆, VI₁₀, MIRV₁ with grass cover, Pd₃₁₂, VI₉, MIRV₁, GVI indices with forb cover, MIRV₂, VI₆, VI₁₀ with shrub cover, VI₁₂, MIRV₂, VI₅, fuse₂ with total cover and MIRV₁, MIRV₂, VI₅, 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+263MIRV ₁	0.89	3.30	**
F . cover%	MIRV ₁	51	19.3+129MIRV 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.

References

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