

( : )

مرجان شفیعی زاده نصرآبادی<sup>۴</sup>

\*

( / / : // : )

( )

( )

( )

PCA

TWINSpan

CCA

...

اسیدیته (pH)

TWINSpan

(Kadmon & Danin, 1999)

DCA CCA

(Kumar, 1996)

(Burke, 2001)

Kaller, )

(Vetaas, 1993)

(2001)

) در پژوهشی دیگر، متغیرهای  
(

DCA

TWINSpan

(Chang *et al.*, 2004)

(Enright *et al.*, 2005)

متغیرها

TWINSpan

(Zhang *et al.*, 2006)

CCA متغیرها

(TWINSpan)

متغیرها

(Baruch, 2005)

TWINSpan

متغیرها

Kent )

متغیرها

(& Coker, 1996)

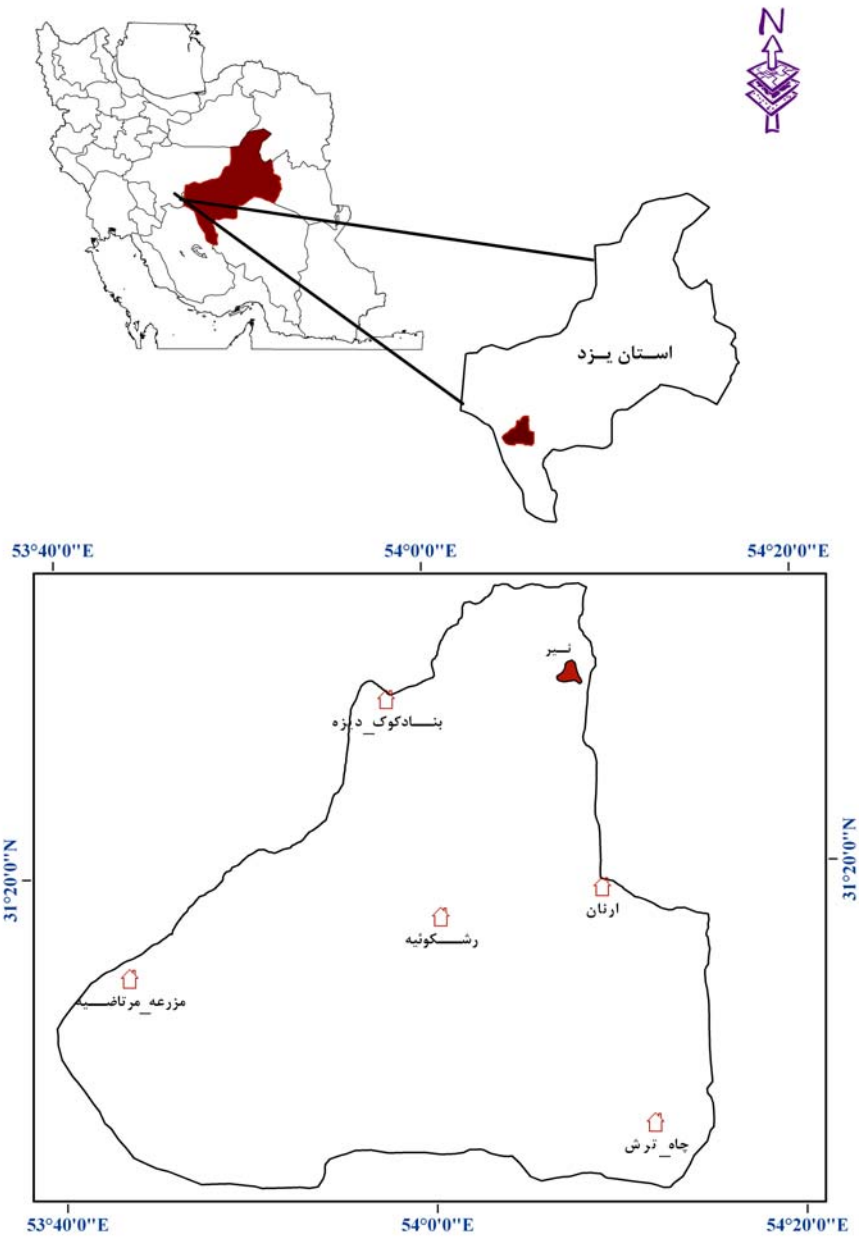
متغیرها

)                    ° ' "   ° ' "  
(

Zare Chahouki, )

(2006

° ' "   ° ' "



...

TWINSpan

( )

:

*Artemisia aucheri* :I

*Stipa Scariola orientalis Astragalus albispinus*

*S. parviflora barbata*

*Artemisia sieberi* :II

*Rheum ribes* .III

*Seidlitzia rosmarinus* :IV

*Ephedra strobilacea* :V

*Zygophyllum eurypterum*

*Cornulaca* :VI

*Salsola spp. Calligonum comosum monacantha*

*Stipagrostis plumosa*

*Tamarix ramosissima* :VII

TWINSpan

(Black, 1982; Jafari Haghghi, 2003)

TWINSpan

ویژگی های

(Alard *et al.*, 1994 & Barbaro *et al.*, 2004)

*Artemisia* I

*Scariola orientalis- Astragalus aucheri*

*albispinus*

TWINSpan

(PCA)

PC-ORD (CCA)

(McCune & Mefford, 1999) /

1 Principle Component Analysis

2 Canonical Correspondence Analysis



(Y)

متغیرها

: ( ) (x)

PCA

$$Y=a+bx$$

(

$$r^2= /$$

$$b= /$$

$$a= /$$

( BSE)

بنابراین (Jackson, 1993)

( )

BSE

/

/

/

/

:(Jongman *et al.*, 1995)

( )

ویژگی های

متغیرها

( )

)

( )

(

(Y)

(x)

: ( )

.( )

متغیرها

$$Y=a+bx+cx^2$$

(

:( )

$$c = / \times \quad b = / \quad a = /$$

$$r^2= /$$

*Artemisia aucheri* :I

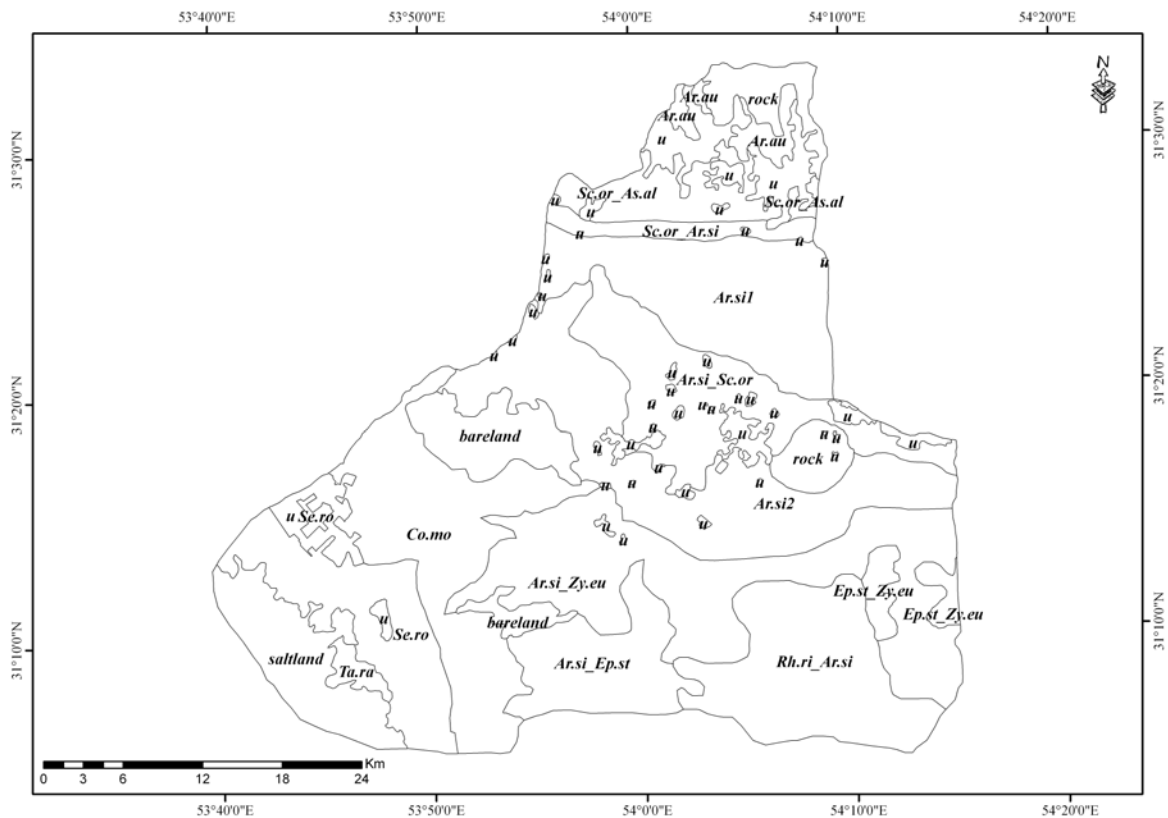
*Scariola orientalis*-

:II

*S. orientalis* - *Artemisia Astragalus albispinus*

<sup>1</sup> Broken-stick eigenvalue

I . . . . . A. *A. sieberi*<sub>1</sub> *A. sieberi-S. orientalis sieberi*  
 ( *A. aucheri* ) *A. sieberi-Zygophyllum eurypterum sieberi*<sub>2</sub>  
*Rheum ribes-A. sieberi*  
 ( *E. strobilacea- Z. eurypterum* ) IV *Cornulaca monacantha* :III  
*A. sieberi- Ephedra strobilacea*  
 III II *E. strobilacea- Z. eurypterum* :IV  
 S. ) V *Seidlitzia rosmarinus* :V  
 ( *rosmarinus* I متغیرهای V IV III II متغیرها  
 T. ) VI متغیرها  
 ( ) متغیرها  
 متغیرها



...

---

<b>Broken-stick eigenvalue</b>	( )	( )	( )
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/

---

PCA

---

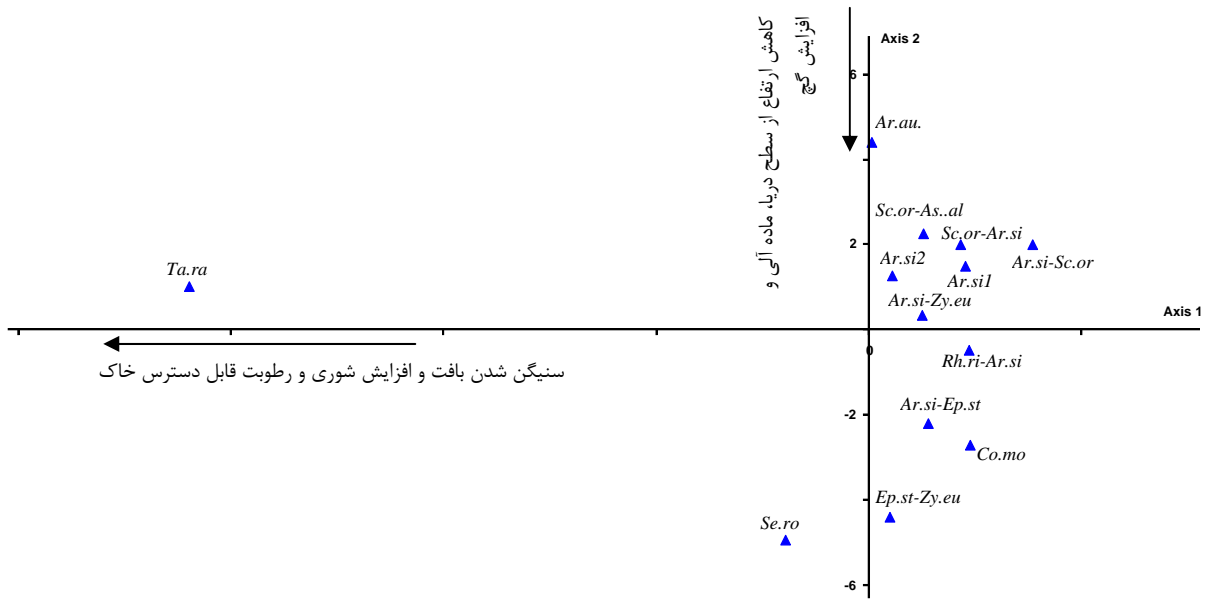
( )						
/	/	/	/	/	/	(utilze)
/	/	/	/	/	/	(abs)
/	/	/	/	/	/	(Aspect)
/	/	/	/	/	/	(Slope)
/	/	/	/	/	/	(Gravel1)
/	/	/	/	/	/	(Gravel2)
/	/	/	/	/	/	(Clay1)
/	/	/	/	/	/	(Clay2)
/	/	/	/	/	/	(Silt1)
/	/	/	/	/	/	(Silt2)
/	/	/	/	/	/	(Sand1)
/	/	/	/	/	/	(Sand2)
/	/	/	/	/	/	(Lime1)
/	/	/	/	/	/	(Lime2)
/	/	/	/	/	/	(OM1)
/	/	/	/	/	/	(OM2)
/	/	/	/	/	/	(SM1)
/	/	/	/	/	/	(SM2)
/	/	/	/	/	/	(AW1)



PCA

( )

/	/	/	/	/	/	(AW2)
/	/	/	/	/	/	(Gyps1)
/	/	/	/	/	/	(Gyps2)
/	/	/	/	/	/	(EC1)
/	/	/	/	/	/	(EC2)
/	/	/	/	/	/	(pH1)
/	/	/	/	/	/	(pH2)



)

PCA

(

...

\*

( )	( )	( )	( )	( )
	/ ± /	/ ± /	/ ± /	<i>Ar.au</i>
	/ ± /	/ ± /	/ ± /	<i>Sc.or_As.al</i>
	/ ± /	/ ± /	/ ± /	<i>Sc.or_Ar.si</i>
	/ ± /	/ ± /	/ ± /	<i>Ar.si_Sc.or</i>
	/ ± /	/ ± /	/ ± /	<i>Ar.si<sub>1</sub></i>
	/ ± /	/ ± /	/ ± /	<i>Ar.si<sub>2</sub></i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Ar.si_Zy.eu</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Ar.si_Ep.st</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Ep.st_Zy.eu</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Rh.ri_Ar.si</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Co.mo</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Se.ro</i>
/ ± /	/ ± /	/ ± /	/ ± /	<i>Ta.ra</i>

±

\*

CCA

*S. orientalis-As.*

*A. S. orientalis-A. sieberi A. aucheri albispinus*

Jongman et )

متغیرهای

*R. ribes-A. sieberi A. sieberi sieberi-S. orientalis*

(al., 1995

*A. sieberi-Z. eurypterum*

متغیرهای

CCA

*C. monacantha*

*E. strobilacea-Z. eurypterum*

*S. rosmarinus*

*T. ramosissima*

( )

/

P

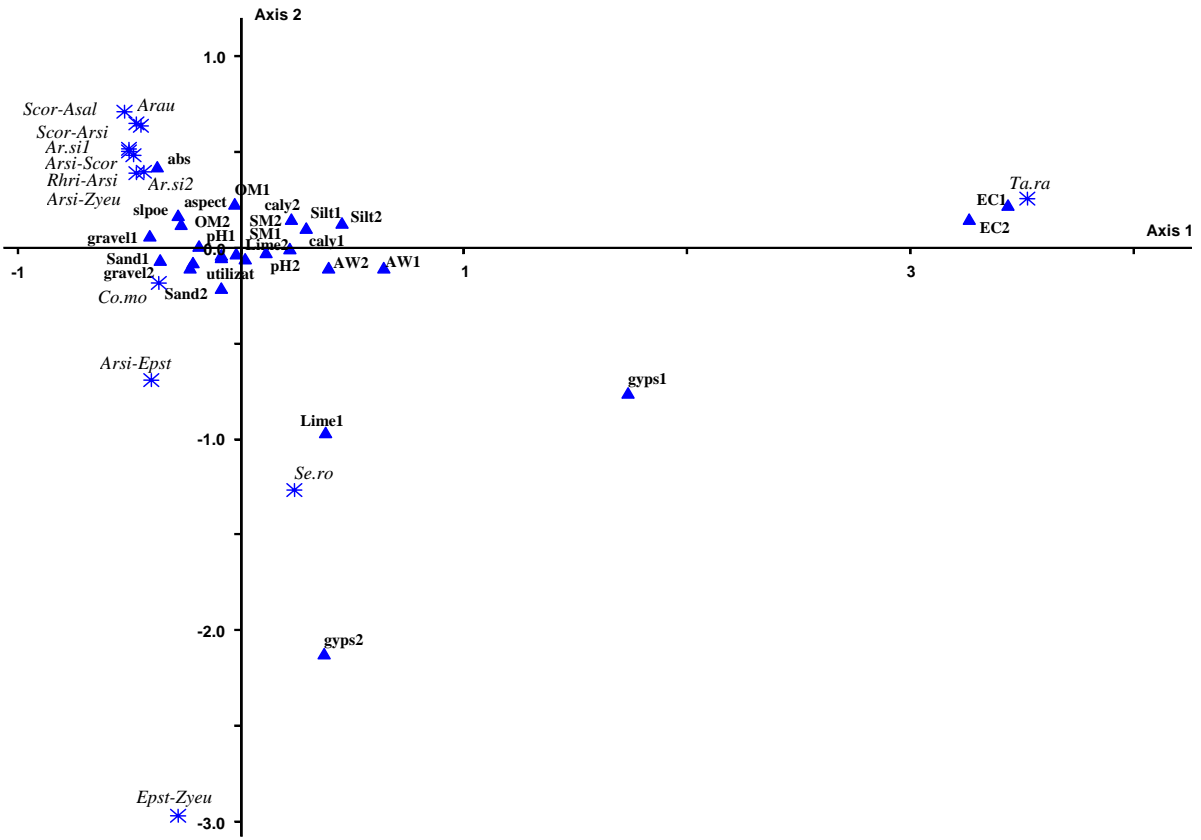
---

---

/	/	/	/	/	/	/
/	/	/	/	/	/	/
/	/	/	/	/	/	/

---

---



CCA

( . )

)

(

( / )

( )

/

(Bohera & Dorffing, 1993)

(Durey & Pessarakli, 1995)

(Arzani *et al.*, 1999)

*T.*

*C. monacantha*  
*ramosissima*

*Stipa*

*Salsola rigida barbata*  
(Baghestani, 2003)

Wilson *et al.*, )

(2004

(Barnes & Harrison, 1982)

*A. aucheri*

*Tamarix ramosissima*

PCA

*Artemisia aucheri*

)

)

(

(

A.

*aucheri*

Carneval & Torres, 1999; )

(Rogel *et al.*, 2001; Abd El-Ghani & Amer, 2003

(Moghimi, 2005)

EC)

( / pH

(Akbar Pourisaghi, 2005)

( )

*A. sieberi-Z. eurypterum*

*A. aucheri*

*Scariola orientalis-Astragalus albispinus*

*E. strobilacea*

*Astragalus*

*S. orientalis - Artemisia sieberi*

A.

*A. sieberi*

*sieberi- E. strobilacea*

CCA

CCA

*A. sieberi*

*A. aucheri*

متغیرهای

*A. sieberi*

CCA

A.

*A. sieberi- sieberi-Ephedra strobilacea*

*Rheum ribes-A. sieberi Zygophyllum eurypterum*

A.

*A. sieberi aucheri*

(Azarnivand et al., 2003)

*R. ribes-*

*R. ribes*

*A. sieberi*

( )

*A. sieberi*

|

*E. strobilacea-Z. eurypterum*

*R. ribes*

Z.

*E. strobilacea*

*eurypterum*

*S. plumosa* .

) (Bagheri, 2000)

*E. strobilacea*

(

.(Jafari, 2006)

.(Loghman & Ghodosi, 1996)

*Cornulaca monacantha*

C.

*monacantha*

*Calligonum comosum*

*Seidlitzia rosmarinus*

*Salsola E. strobilacea Stipagrostis plumosa spp.*

CCA

( )

*C. monacantha*

C. (Abd El-Ghani & Amer, 2003)

EC

*comosum*

) / / pH

( / / pH)

.(Taghvai, 1993) (

Gangizadeh, 1999;)

*S. rosmarinus*

.(Hasani, 1994

*Z. eurypterum*

Moghimi,)

.(Roshier *et al.*, 1996)

.(2005

*S. plumosa*

( ) *Tamarix ramosissima*

PCA . . . . .(Abd El-Ghani & Amer, 2003)

PCA CCA

CCA

## References

- Abd El-Ghani, M.M., and Amer, W.M. 2003. Soil–vegetation relationships in a coastal desert plain of southern Sinai, Egypt. *Journal of Arid Environments* 55, 607–628.
- Akbare Pourisaghi, H. 1995. Investigation on ecological factors of *Artemisia aucheri* in Gorgan Rangelands. MSc. Thesis, Faculty of Natural Resources, University of Gorgan. (In Persian).
- Alard, D., Bance, J.F., and Frileux, P.N., 1994. Grassland vegetation as an indicator of the main agro-ecological factors in a rural landscape: consequences for biodiversity and wildlife conservation in central Normandy. *Journal of Environmental Management* 42, 91-109.
- Arzani, H., Fattahi, M., and Ekhtesasi, M.R. 1999. Investigation on vegetation variation on Poshtokouh rangelands in 1986-1998. *Journal of Pajouhesh-va-Sazandegi* 44, 31-35. (In Persian).
- Azarnivand, H., Jafari, M., Moghaddam, M.R., Jalili, A., and Zare Chahouki, M.A., 2003. Environmental factors effects on *Artemisia* species in Vardavard, Garmsar and Semnan rangelands. *Iranian Journal of Natural Resources* 56 (1, 2), 93-99. (In Persian).
- Bagheri, H. 2000. Investigation on relationships between soil properties and vegetation in Mehrzamin region of Qom province. M.Sc. Thesis, University of Tehran. (In Persian).
- Baghestani Meibodi, N. 2003. Grazing intensity effects on vegetation properties in Poushtkouh rangelands of Yazd province. Ph.D. thesis, University of Tehran. (In Persian).
- Barbaro L., Anthelme, T.F., and Corcket, E. 2004. Respective influence of habitat conditions and management regimes in prealpine calcareous grasslands. *Journal of Environmental Management* 72, 261-275.
- Barnes, P.W., and Harrison, A.T. 1982. Species distribution and community organization in a Nebraska Sandhills mixed prairie as influenced by plant/soil water relationships. *Oecologia (Berlin)* 52, 192-201.
- Baruch, Z. 2005. Vegetation-environment relationships and classification of the seasonal savannas in Venezuela. *Journal of Flora* 200, 49-64.
- Black, C.A., 1982. Method of soil analysis, Vol. 2, Chemical and microbiological properties, American Society of Agronomy, INC.
- Boer, B. and Sargeant, D. 1998. Desert perennials as plant and soil indicators in Eastern Arabia. *Journal of Plant and Soil*, 199: 261-266.
- Bohera, J.S., and Dorffing, K. 1993. Nutrition of Rice varieties under NaCl salinity. *Journal of Plant and Soil* 152, 299-303.
- Burke, A. 2001. Classification and ordination of plant communities of the Naukluft Mountains, Namibia. *Journal of Vegetation Science* 12, 53-60.
- Carneval, N.J., and Torres, P.S. 1990. The relevance of physical factors on species distribution in inland salt marshes (Argentina), *Coenoses* 5(2), 113-120.

- 
- Chang, C.R., Lee P.F., Bai, M.L., and Lin, T.T. 2004. Predicting the geographical distribution of plant communities in complex terrain -a case study in Fushian Experimental Forest, northeastern Taiwan, *Ecography* 27, 577-588.
  - Durey, R.S., and Pessaraki, M. 1995. Physiological mechanism of nitrogen absorption and assimilation in plants under stress conditions. In *Handbook of plant and Crop Physiology*; Pessaraki M., Eds., Macel Dekker Inc New York, 605-625.
  - Enright, N.J., Miller, B.P., and Akhter, R. 2005. Desert vegetation and vegetation-environment relationships in Kirthar National Park, Sindh, Pakistan, *Journal of Arid Environments* 61: 397-418.
  - Famiglietti, J.S., Rudnicki, J.W. and Rodell, M. 1998. Variability in surface moisture content along a hill slope transect: Rattlesnake Hill, Texas. *Journal of Hydrology* 210, 259-281.
  - Ganjizadeh Zavareh, A.A. 1999. Investigation on ecological characteristics of *Calligonum* in Iran. M.Sc. Thesis, Faculty of Natural Resources, University of Tehran.
  - Goovaerts, P., and Chiang, C.N. 1993. Temporal persistence of spatial patterns for mineralizable nitrogen and selected soil properties. *Soil Science Society of America Journal* 57, 372-381.
  - Hasani, N. 1994. Autecology of *Calligonum* in arid rangelands of Semnan province. MSc. Thesis, Faculty of Natural Resources, University of Tehran. (In Persian).
  - Hovizeh, H. 1997. Investigation on vegetation and ecological factors of saline habitats in Hore-e-Shadegan. *Journal of Pajouhesh-va-Sazandegi* 34(1), 27-31. (In Persian).
  - Jackson, D.A. 1993. Stopping in principal components analysis: a comparison of heuristical and statistical approaches. *Ecology* 74, 2204-2214.
  - Jafari Haghighi, M. 2003. Method of Soil Analysis sampling and Important Physical and Chemical Analysis with emphasis on theoretical and applied principles. Publication Nedaye Zoha. 236 p. (In Persian).
  - Jafari, M. 1988. Investigation on relationships between salinity and vegetation in Damghan kavir. MSc. Thesis, University of Tarbiat Modarres. (In Persian).
  - Jafari, M. 2006. Rehabilitation of arid lands. University of Tehran Press, 247 p. (In Persian).
  - Jongman, R.H.G., Ter. Break, C.J.F. and Van Tongeren, O.F.R., 1995. *Data Analysis in community and landscape ecology*. Center Fire Agricultural Publishing and Documentation, wageningen.
  - Kadmon, R., and Danin, A. 1999. Distribution of plant species in Israel in relation to spatial variation in rainfall. *Journal of Vegetation Science* 10, 421-432.
  - Kaller, A. 2001. Vegetation-environment interactions in a boreo-nemoral forest in east central Sweden. MSc. thesis, Swedish University of Agricultural Sciences, 26 p.
  - Kent, M., and Coker, P. 1996. *Vegetation description and analysis, A practical approaches*. John Wiley & Sons. 395 p.
  - Kumar, S. 1996. Trends in structural compositional attributes of dune-interdune vegetation and their edaphic relations in the Indian desert. *Vegetatio* 124, 73-93.
  - Loghman, H., and Ghoddosi, J. 1996. Roadside landscaping using rainwater catchment systems and drought tolerant plants. Pub.: Soil Conservation and Watershed Management Research Center, 64 p. (In Persian).
  - McCune B. & Mefford, M.J. 1999. *PC-ORD for windows. Multivariate Analysis of Ecological Data, Version 4.17* MjM Software, Gleneden Beach, OR, USA.
  - Moghimi J., 2005. Introduce of suitable plant species for rangelands reclamation. Arvan Press, 970 p. (In Persian).
  - Rogel, J. A., Silla, R.O. and Ariza, F.A. 2001. Edaphic characterization and soil ionic composition influencing plant zonation in a semiarid Mediterranean salt marsh. *Geoderma* 99, 81-98.
  - Roshier, D.A., Böer, B.B. and Osborne, P.E., 1996. The vegetation of Abu Dhabi and a preliminary classification of its plant associations. In: *Desert Ecology of Abu Dhabi*. (Ed. P. E. Osborne.), National Avian Research Centre: Abu Dhabi 50-65.
  - Taghvai, H. 1993. Auoecology of *Seidlitzia* in saline Kavir catchment. MSc. Thesis, Faculty of Natural Resources, University of Gorgan. (In Persian).
  - van Rheenen, J.W., Werger, M.J.A., Bobbink, R., Daniels, F.J.A. and Mulders, W.H.M. 1995. Short-term accumulation of organic matter and nutrient contents in two dry sand ecosystems. *Vegetatio*, 120: 161-171.
  - Vetaas, O.R. 1993. Spatial and temporal vegetation changes along moisture gradient in northeastern Sudan. *Biotropica* 25, 164-175.



- 
- Wilson, D.J., Western, A.W., and Grayson, R.B. 2004. Identifying and quantifying sources of variability in temporal and spatial soil moisture observations. *Water Resources Research* 40, W02507. doi:10.1029/2003WR002306.
  - Zare Chahouki, M.A. 2006. Modelling the spatial distribution of plant species in arid and semi-arid rangelands. PhD Thesis in Range management, University of Tehran, 180 p. (In Persian).
  - Zhang, X., Mengben, W., Bo S., and Yang, X. 2006. Quantitative classification and ordination of forest communities in Pangquangou National Nature Reserve. *Acta Ecologica Sinica* 26(3), 754–761.

## **Classification and Ordination of Vegetation Cover in Arid and Semi-arid Rangelands (Case study: Nir Rangelands of Yazd Province)**

**M.A. Zare Chahouki<sup>\*1</sup>, M. Yousefi<sup>2</sup>, M. Jafari<sup>3</sup>, H. Azarnivand<sup>3</sup> and M. Shafizadeh NasrAbadi<sup>4</sup>**

<sup>1</sup> Associate Professor, Faculty of Natural Resources, University of Tehran, Karaj, I.R. Iran

<sup>2</sup> Senior Expert of Research, Education and Extension of Jihad Agriculture Ministry, Tehran, I.R. Iran

<sup>3</sup> Professor, Faculty of Natural Resources, University of Tehran, Karaj, I.R. Iran

<sup>4</sup> MSc. Degree in De-desertification, Natural Resources Faculty, University of Tehran, Karaj, I.R. Iran

(Received: 2009/May/13, Accepted: 2010/December/28)

### **Abstract**

The current research was carried out to find out the most effective environmental factors in plant species occurrence by classification and ordination methods. For this purpose, the study was conducted in Nir rangelands of Yazd province and topography, climate, soil and grazing intensity data of the region were determined. Sampling method was randomized–systematic and within each sampling unit 3-5 parallel transects with 300-500 m length, each containing 30-50 quadrates (according to vegetation variations) were established. Quadrate size was determined for each vegetation type using the minimal area; hence suitable quadrate size for different species was determined 1\*2m–10\*10m (2-100 m<sup>2</sup>). Soil samples were taken from 0-30 and 30-80 cm in starting and ending points of each transect. Measured soil properties included gravel, texture, available moisture, saturation moisture, organic matter, lime, gypsum, pH and electrical conductivity. To analyze environmental data, classification (using TWINSpan) and ordination (using PCA, CCA) were used. The results indicated that soil salinity, texture and available water play the main role in distribution of plant species.

**Keywords:** Classification, Ordination, Environmental factors, Nir rangelands, Yazd province