



RESEARCH PAPER

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**Comparison of growth forms and life forms of rangeland plants under different methods of rangeland management (case study: rangelands around Bojnourd city)**

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Article published on September 25, 2014

**Key words:** Species composition, vegetation plant, rangeland management, Bozdaghi enclosure.

**Abstract**

Planning and optimal management of rangelands is important to achieve to vegetation changes in enclosure and enclosure rangelands. In this study due to the lack of sufficient research was compared the effect of each of the four methods of rangeland management on the plant composition. The study area located in the rangelands around the Bojnourd city of Northern Khorasan province and management methods including enclosure (18 years), enclosure agricultural rangelands, key and critical rangelands. Sampling was done by 1 meter Plots and random distribution. The canopy cover divided by species and studied based on growth form and life form. Results was analysed by SPSS software, One-Way ANOVA exam, Dunkan average compare and Chi-Square exam. The results showed that plant composition in enclosure and enclosure agricultural rangelands had significant difference with critical area. Key area had significant difference with other management methods. The conopy cover in order was reduced in enclosure, enclosure agricultural rangelands, key and critical rangelands. in other words, conopy cover was increased with increasing in grazing.

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## Introduction

Cover vegetation is the most important structure of rangeland ecosystems, therefore cover vegetation study indicates the quantity and quality of changes in this ecosystems (Mosavi and Aghajanlo; 2006). It is possible to achieve to practical and optimized rangeland management through the identify the trends of cover vegetation changes, therefore planning and optimal management of rangelands is important to achieve to the vegetation changes in enclosure and under-grazing rangelands (moghadam; 2006).

Study on cover vegetation changes is possible through the study of plant composition. Different plant species ratio in certain area called plant composition and defined by canopy cover (Azarnivand and Zare chahoki; 2010).

In this field reviewing researches done is determined by the effects of enclosure has alter in different rangeland site and rangeland condition effect on result of enclosure. In some studies this effect is positive (Akbarzadeh and Mirhaji; 2006) in Rudshor, (Mosavi; 2001) in Semnan, (Hoveizeh *et al*; 2001) in Khozestan, (Yavari *et al*; 2001) in Northern khorasan, (Yavari *et al*; 2004) in Gomishan, (Vahabi and Khajedin; 1997) in Esfahan, (Heydarian aghakhani *et al*; 2010) in Bojnourd, (Asadian *et al*; 2009) in Hamedan, (Rose and Plat; 1992) In the sub-alpine rangelands reported that plant composition was improved caused to enclosure and palatable species was increased in enclosure.

But in some studies enclosure effect is negative. (West *et al*; 1984) reported that despite the good rainfall in semi-arid rangelands of Utah for 18 years was no significant increase in the grasses The plant community which the grasses is dominant in there received to the stable condition that is not possible to back to the some composition such as mixed of *Artemisia* and grasse community. (Basiri and irvani; 2009) to compare of inside and outside the enclosure 19 years old reported that enclosure caused to likelihood increase in enclosure plant type so

enclosure for 19 years caused to alter in plant composition in most places. (Arzani *et al*; 2007) in evaluation of the soil surface indexes and the performance characteristics of rangeland in response to grazing intensity and rangeland plowing reported rangeland plowing was caused to decrease in the performance characteristics of rangeland. Eliminate the good plant with increase in grazing intensity and remain the annual cover in high grazing intensity area.

Researches of (Yurks *et al*; 1992) in Utah, USA, (Walker; 1988) in Australia and (Sharp *et al*; 1990) in Idaho, (Arzani *et al*; 1999), in Poshtkuh Yazd, (Akbarzadeh; 2005) in Rudshur, (Khatir namani; 2007 ) in the chat of Gonbad, (Le Houerou; 1981) in North Africa, (Berg *et al*; 1997) in the rangeland of the U.S. Oklahoma, (Noor *et al*; 1991) in Pakistan reported that the changes in arid area is slow and for saw the real trend of rangeland condition and cover longer time was needed.

In study area rangeland managed under different rangeland management (enclosure, enclosure agricultural rangeland, key and critical rangeland) and there is not enough researches to understanding the positive and negative effect of each kind of management in this area.

The aim of this study due to different effect of rangeland management styles in various regions and climates is to achieve to cover changes has been created through different management practices in certain area. In this way the positive and negative effects of management styles will be identified and planning for optimal management of this rangelands will be possible due to certain climates and condition of the study area.

## Materials and methods

### Study area

This study was conducted in bozdaghi enclosure and rangelands around the Bojnourd city of Northern Khorasan in Iran. These distance of Northern of

Bojnourd city is 60 kilometer and located in 56° 41' 24" until 56° 50' 57" eastern longitude and 37° 49' 30" until 37° 53' 41" northern latitude. The area of this boundary is 6880 hectares. The annual average

rainfall is 262 mm, annual average temperature is 16.2 degrees. The climate is semi-arid by domarton method. Figure 1 showed the condition of study area in country.

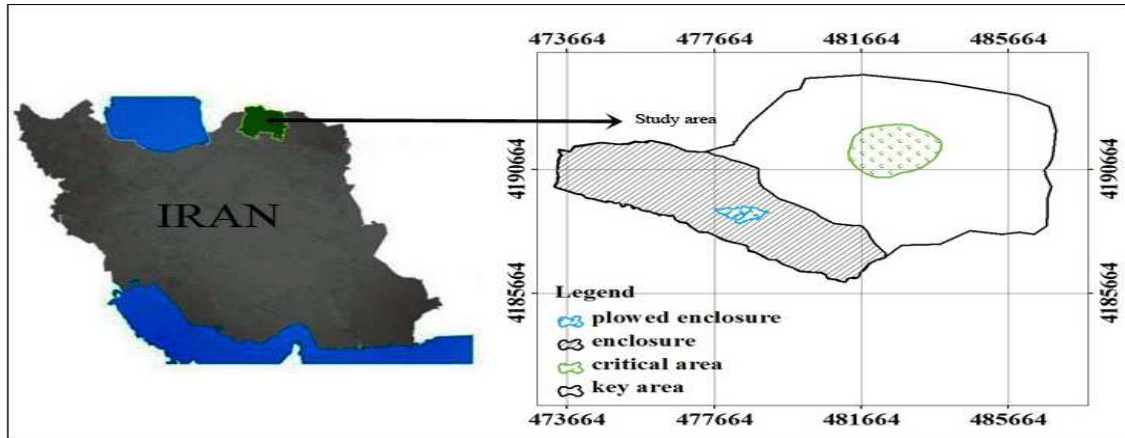


Fig. 1. Rangelands around of Bojnourd city, Northern Khorasan.

Data collection and Analysis

Geographical map of area was provided and mached with nature by G.P.S divice and google earth software. The sampling was done by plots. In this method deployed 50 plot in each management with the random distribution then the cover was stimated within each plot. The cover was separated based on life and growth form and was analysed by SPSS

software, One-Way ANOVA exam, Dulkan average compare and Chi-Square exam.

Results

Canopy cover in four different forms of management methods according to the division of growth and life forms in figure 2 was showed.

Table 1. significant relationship between defferent management method based on life and growth forms.

P-value	F	R Square	Life forms
0.000*	79.744	0.309	Shrub
0.000*	5.941	0.032	Grass
0.016*	0.039	0.000	Forb
0.000*	4.715	0.026	Terophytes
0.000*	79.435	0.309	Chamaephytes
0.005*	0.62	0.003	Hemicryptophytes
0.000*	14.262	0.441	Total cover

\*: significant difference.

Due to the results obtained the maximum amount of canopy cover was seen in enclosure, plowed land enclosure, key and critical area. The compare of persantage cover between growth and life forms have significant difference in different management methods specified based on one-way ANOVA and

Duncan test.

Plant composition compare based on life form

Based on the results obtained by Duncan Chamaephytes in enclosure had highest rate and the lowest rate was found in the plowed enclosure.

There is a significant difference of Chamaephytes in all areas of management ( $P < 0.05$ ). The highest rate of Terophytes was in plowed enclosure area and the lowest was in the key rangelands. Based on the results obtained by Duncan Terophytes of the plowed enclosure was significantly different from other management methods. lowest rate of Hemicryptophytes was in key area, but the Hemicryptophytes rate was no significant difference in four management style.

*Plant composition compare based on growth form*

According to figure 3 grasses have the greatest amount in enclosure agricultural rangeland and they

have the lowest amount in key rangelands. The amount of grasses in enclosure agricultural areas have the significant difference with the key and enclosure rangelands ( $P < 0.05$ ). Shrubs have the greatest amount in enclosure and they have the lowest amount of enclosure agricultural rangelands and amount of shrubs are significant difference in each 4 managements. Forbs in the enclosure agricultural area are the greatest and in the enclosure area are the lowest and forbs are significant difference in critical areas with the other managements. table 1 shows Statistical summary and significant relationship between deferent management method based on life and growth forms.

**Table 2.** Statistical survey of difference in plant composition in each of the areas.

Critical	Key	Abandoned	Enclosure	Management
0.053 <sup>ns</sup>	0.000*	0.000*	-	Enclosure
0.052 <sup>ns</sup>	0.016*	-	0.000*	Abandoned
0.016*	-	0.016*	0.000*	Key
-	0.000*	0.052 <sup>ns</sup>	0.053 <sup>ns</sup>	Critical

ns: The lack of significant difference

\*: significant difference.

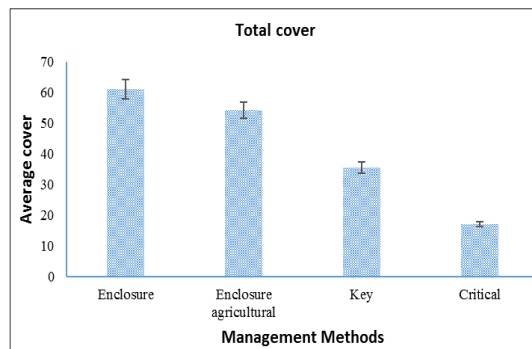
*The constitutive plant composition in management methods*

The defference between plant composition in management areas has been tested by the SPSS software and Chi-Squre statistic and the results are given in table 2 on this basis the plant composition in exclosure and exclosure agricultural areas are significant defference with critical areas. The plant composition in key area has significant defference with other management methods ( $P < 0.05$ ).

**Discussion and conclusion**

Factors of climate, soil, topography, and vegetation communities have roles on how to develop their communities, Thus the presence or removal of plants in a rangeland does not happen randomly (Moghadam, 1998). Changes in species composition and reduces forage quality and quantity of rangelands are the result of negligence on the utilize of rangeland management . planning and optimal

management of rangelands is important to achieve to vegetation changes in enclosure and enclosure rangelands.



**Fig. 2.** Canopy cover in four different forms of management methods.

The results obtained from the comparison of plants under different management indicate there is a large changes on the cover percent in the effects of different utilization. Thus, the study shows the cover have increase in effect of exert of principle management

method and its rate shows four-fold increase in (Figure 1).

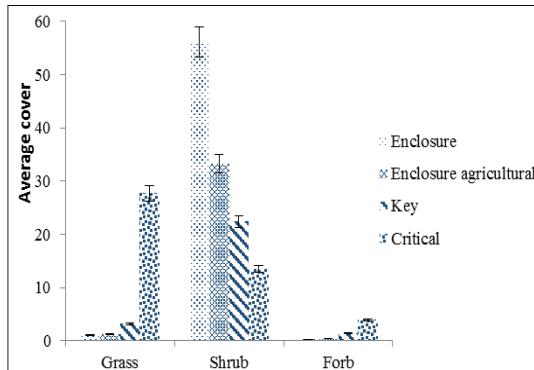


Fig. 3. Average of cover based on growth forms.

(Akbarzadeh and Mirhaji; 2006) in Rudshor, (Mosavi; 2001) in Semnan, (Hoveizeh *et al*; 2001) in Khozestan, (Yavari *et al*; 2001) in Northern khorasan, (Yavari *et al*; 2004) in Gomishan, (Vahabi and Khajedin; 1997) in Esfahan, (Heydarian aghakhani *et al*; 2010) in Bojnourd, (Asadian *et al*; 2009) in Hamedan, (Rose and Plat; 1992) In the sub-alpine rangelands reported that plant composition was improved caused to enclosure and palatable species was increased in enclosure.

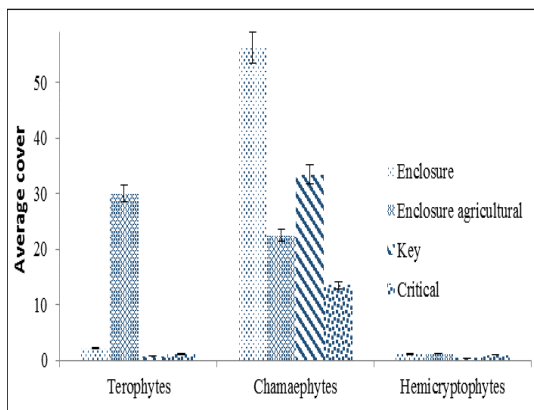


Fig. 4. Average of cover based on life forms.

*Artemisia* is dominant plant in enclosure. Due to the *Artemisia* is dominant plant with II palatability class in the enclosure rangelands during the 18 years and doesn't replace with plants have the higher palatability is related to climate condition of this region. In arid regions changing in plant composition is most related to climate condition. Management and enclosure have lesser effect and required the longer time to

effect on plant composition and this effect is no significant in the short term.

Researches of (Yurks *et al*; 1992) in Utah, USA, (Walker; 1988) in Australia and (Sharp *et al*; 1990) in Idaho, (Arzani *et al*; 1999), in Poshtkuh Yazd, (Akbarzadeh; 2005) in Rudshur, (Khatir namani; 2007) in the chat of Gonbad, (Le Houerou; 1981) in North Africa, (Berg *et al*; 1997) in the rangeland of the U.S. Oklahoma, (Noor *et al*; 1991) in Pakistan reported that the changes in arid area is slow and for saw the real trend of rangeland condition and cover longer time was needed. due to precipitation (220 mm) and cold-Steppe climate, enclosure rangeland has been covered to the maximum level.

In plowed enclosure due to human interference and conversion of land use, this area has major different with other management areas. This effect created by replacement of reliable plant with annual plant. The trend of main plant replacement can be observed caused to remove the degradation factors (agriculture). However, these alternatives require more time, but improve in plant composition changes and it changes to climax composition indicating efficient rangeland management are applied.

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