J. Appl. Environ. Biol. Sci., 3(5)36-41, 2013

ISSN: 2090-4215
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Studying Some Chemical Compositions of *Sphaerocoma aucheri* in Sandy Ranges of Persian Gulf

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ABSTRACT

Having knowledge about the quality of range plants for doing the effective management of ranges in order to evaluate the grazing capacity is essential and determining the forage quality is one of the important factors which is necessary for the correct management of ranges. In this paper, the forage quality of *Sphaerocoma aucheri* as one of the most important species of coastal ranges of Hormozgan was studies in 3 stages: growth, flowering and seeding and the other parts such as leaves, tip of branches and type of flower were studied. for analyzing this plants, at first, plants samples were collected in 3 stages and then the samples were transferred to the laboratory and these parameters were measured by the usual methods/AOAC as dry material/ DM, protein percentage/CP, unsolvable fibers in acidic detergent/ADF, ash, phosphorus/P, potassium/K, sodium/Na, and magnesium/Mg.

The results show that there is a significant difference between most of considered meta-measures in various phonological stages and in different parts of a plant. The amount of CP, ash, P, and Na in leaves is more than flowers and also amount of DM, ADF and P in tip of branches is more than leaves.

KEYWORDS: chemical composition, *Sphaerocoma aucheri*, phonological stages.

INTRODUCTION

Having knowledge about the quality of forages and its changes in different growth stages is one of the basic cases for determining the amount of forages for animals in order to evaluate and determine the grazing capacity of ranges in range plans and also determining this capacity is essential in creating a balance in animals and ranges.

For doing the correct programming and optimal management of available sources in a range, accessing the maximum of animals' performance and also determining the grazing capacity of a range, having knowledge about the quality of forages in a range is necessary because the quality of forages is one of the most important factors in determining the nutrient/feeding need of animals and consequently the grazing capacity in ranges.

This factor in different regions and based on the type of vegetative coverage is variable. Therefore, in association with the other factors as type of animals, age, weight, production amount changes the amount of animals' feed need from one region to the other part. Quality of range forage changes from one time to another time and from one region to another region, considerably (Garza,1988).

Nelson & Moser (1994) and Ranjan (1997) believed that the quality of range forage is affected by factors as chemical properties of soil, fertilization, moisture, growth stages of plants, frequency of grazing, weather, species and varies. *Goor Allen and Segara (2001)* believed that the quality of range forage is a degree upon which forage supplies the feed/nutrient needs of one type or especial class of animals.

Also Ball et al., (2001) reported that the quality of range forage relates to the usability of forage for animals and the role of nutrients from forages in the animals' production. Nutrient value of forage in ranges is different between various seasons. Cellular content, protein and P decrease by the increase of plant's age (Chen, 2001). Therefore, the most affective factor on the quality of range forage is the growth stage whereby it is possible to determine the time of animals' grazing.

Kook and Stevindick (1986), Minson (1987) and Arzani (1994, 2005, 2004) said that the CP (%), digestive dry material/DMD and metabolic energy/ME are the important properties of quality of range forage which is calculable with measuring the percentage of nitrogen/N and ADF with a cellular wall minus hemi-cellulose.

Arzani et al., (2004) said that the most properties of forage quality decreases with phonological stages development. They sampled the 5 types of Graminaea genus in a habitant includes 8 different climates in 3

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phonological stages. They have shown that there is a difference between the forage qualities of a kind of species in various phonological stages, statistically.

Ghadaki et al., (1974) by studying 33 native and range species in 3 arid *regions* of Iran found that the growth stage has the most influence on the nutrient value and quality of range forage and there is significant difference between species and different growth stages (for quality).

Crowder and Chhda (1982), Norton & Waterfall (2000) studied different types of range *plants* and all confirmed the difference between nutrient values of different kinds. Arzani et al., (2004), by comparing the quality of different organs in 5 range species, concluded that the quality of plant organs in different phonological stages has a significant difference and also in each growth stages, the quality of organs is different with each other.

The studies of *Chen et al., (2001)* have been shown that there is a significant difference between different factors of forage quality during growth stage. Various genus due to the inherent properties and environmental difference which exists among them, are different due to the nutrient value.

Different factors were defined for determining the quality of forage. The report of the other researches like *Garza and Foul Bright (1998), Khalili et al., (1986) and Arzai (1994)* is that the whole of digestive nutrient, raw protein, ash, lignin, raw fibers, free nitrogen, calcium, P, and carotene are the chemical compositions of the plant which are being measured but measuring the CP or raw protein, DMD, and EM are the suitable factors in evaluating the quality of forage (8) and also *Roudz and Scharu (1990*) considered the CP, DMD and EM as the suitable factors for evaluating the quality of forage.

Stodart et al., (1975) used the EM in evaluating the quality of forage extensively. *Noori Kia et al., (2009),* in comparison of mulch and aerial organs of Bromus tomentellus, have been shown that the amount of potassium in these organs is more than mulch and in the other cases, the amount of nitrogen, carbon and phosphors in the mulch is more than aerial organs.

Ahmadi et al., (2009), in their study about the variations of chemical compositions of some range plants from three growth forms, have been shown that amount of DMD, fibers, EM and CP decrease by increasing the age of plants and also non-digestive fibers increases.

Poorsh et al., (2009), in their study about the effect of phonological stage on the forage-quality of range genus, have been shown that the phonological stages affect the forage-quality, significantly. By the development of growth stages, CP, DMD and EM decrease and unsolvable fibers in acidic detergent increases.

Arzani et al., (2009), in determining and comparing the forage-quality of these two species as *Salsola arbuscula and Salsola richteriin* the ranges of Sabzevar, have been shown that indexes of forage-quality in these species in the growth stage is more than the other ones. Also they, in studying the quality changes of *Halothamnus glaucus* in different phonological stages, have been shown that the forage-quality of this kind in the growth stage is desirable than the other stages.

The high level of CP, DMD, EM and ADF decrease in this stage confirms this case. *Rasuli et al., (2009),* in studying the amount of nutrient value of *Seidlitzia rosmarinus* in different phonological stages, have been shown that indexes of quality in flowering stage have the most nutrient value and by increasing the age of this plant, the amount of raw fibers an ash decrease.

Ali Khah Asl et al., (2009), in studying the forage-quality of *Prangos uloptera* in different phonological stages, have been shown that the forage-quality of this kind in the growth stage is in the maximum level and decreases by the development of growth stages, gradually.

The highest quality of forage is allocated to the growth stage. The results have shown that there is a significant difference between growth forms, types in the growth forms and different phonological stages.

Piri Sahra Gerd et al., (2009), in studying the nutrient value of *Eryngium noeanum* in different phonological stages in the ranges of Kurdistan, have been shown that by the development of growth stages, the amount of CP, DMD, EM as the increasing factors of forage-quality increase and will be added to the amount of unsolvable fibers in the acidic detergent as a decreasing factor of forage-quality.

Ebne Abbasi et al., (2009), in determining the nutrient value of *Ferula hassknechtii* in different phonological stages in the ranges of Saral (Kurdistan), have been shown that the amount of protein was more in the growth stage and raw fibers was more in the seeding stage.

METHODS AND MATERIALS

1- CHARACTERISTICS OF THE CONSIDERED REGION

This region is in the west of Minab city around Sirik near Ziarat village in a sandy land, near the sea coast, with a height about 5 m. from the sea level; is located in the geographical coordinates about 26^0, 39 minutes and 12

seconds to 26 degree, 42 minutes and 7 seconds of northern latitude and 57 degree, 4 minutes and 26 seconds to 57 degree, 6 minutes and 37 seconds of eastern latitude.

The type of soil is fine and light and its annual rainfall is about 140 ml., annual evaporation is about 2940 ml. and relative moisture is about 60.86% with the annual temperature of 28^0C. In this region, *Sphaerocoma aucheri* is a prominent type.

2- PROPERTIES OF *SPHAEROCOMA AUCHERI BOISS*

It is a short shrub, its height is about 40-55 cm., has straight stems, its color is dark grey, young branches with massive fuzz, the old branches are without fuzz. Its flowering season is from the late of winter to spring and it is being observed in the sandy regions near the sea coast in the Oman Gulf (*Rechinger, K. H. 1980*).

This species means *Sphaerocoma auchri Boiss* belongs *paronychioidae* from *Caryophyllaceae*. The geographical dispersion regions of this plant are in the coasts of Sudan, Egypt, west of Pakistan, south of Iran. east south of Saudi Arabi and in Iran, in the south and south-east parts such as *Hormozgan* (*Qehsm, Bandare Abbas, Charak Port, Lark Island, Kish Island, Bandare Lengeh, Horomz Island, Jask and Minab)* and *Baluchestan (Chabahar and Konarak*).

Sphaerocoma aucheri is one of the most important genus of Hormozgan coastal regions which plays a role in soil-preservation and production of animals' feeding/grazing.

3- SAMPLING METHOD

For determining the nutrient value and forage-quality of *Sphaercoa aucheri* in each of the growth stages (late of Feb.), flowering (the beginning of April) and seeding (late of May), sampling from the aerial organs was done. And also a laboratory sample was provided from leaves, top of branches and flower as in each stage of sampling, 3 samples were provided and for each of them, 10 stalks were selected randomly.

Then the dry and milled sample were transferred to the laboratory for determining these parameters such as: DM, CP, ADF, Ash, P, K, Na, Mg. for determining the percentage of CP and ADF percentage, Kejdal device and Van Soueset method were used, respectively.

DATA ANALYSIS

For data analysis, SPSS software was used. The averages of chemical compounds were compared with Duncan Test in different phonological stages and in the aerial organs of this plant.

RESULTS

Table 1 and 2 are showing a comparison of different parameters in the different phonological stages and organs of this plant. Based on table 1, there is a significant difference between all factors in these organs as leaves, top of branches and flowers.

The greatest amount of CP, ash, P, Na and Mg were in the leaves, the mount of DM and non-solvable fibers in the top of branches were high and the amount of P was high in flowers. Table 2 shows that there is not a significant difference between raw fibers, ash and Mg in 3 stages; growth, flowering and seeding but the other factors have a significant difference.

The greatest amount of CP, non-solvable fibers and P were in the growth stage and the amount of P, Na and Mg were great in flowering stage but the amount of DM and ash were great during the seeding stage.

Table 1: comparison of average of parameters in different phonological stages

Seeding	Flowering	Growth	Factor
72/756 c	42/483 b	52/142 a	DM
4/625 b	2/542 b	14/937 a	CP
21/5 a	18/9 a	23/5 a	ADF
17/11 a	17 a	14 a	ASH
0/ 323 ab	0/ 283 a	0/ 436 b	P
1/ 623 a	2/ 493 b	2/ 0410 b	K
1/636 a	2/213 b	1/663 a	Na
0/66 a	0/86 a	0/6 a	Mg

The averages in each row with a common letter have not a significance difference in the level of Duncan Test, 5%.

Table 2: comparison of average of parameters in different parts of this plant

Flower	Top of the branches	Leaves	Factor
41/98 b	63/198 a	25/43 c	DM
7/87 b	5/437 c	9/52 a	CP
11/5 b	26 a	12/75 a	ADF
9/078 b	9/06 b	20 a	ASH
0/ 36 a	0/ 273 b	0/ 3067 b	P
1/ 80 b	1/ 826 b	2/ 69 a	K
0/984 c	0/06 b	2/613 a	Na
0/520 b	0/385 c	1/04 a	Mg

The averages in each row with a common letter have not a significance difference in the level of Duncan Test, 5%.

DISCUSSION

The results of this study show that the different phonological stages affect the forage-quality of this plant as the quality of this forage is not the same as each other in 3 phonological stages and by the development of growth, its elements decrease or increase. In this case, the mount of DM in the flowering stage is less but in the post-seeding stage shows the greatest level.

There is a significant difference between these three stages, statistically. Based on the amount of DM, there is a significant difference between these three stages as its amount in the flowering stage is less and in the seeding one is more.

Based on CP, there is not a significant difference between flowering and seeding stages but these is a significant difference between these two stages with growth stage. In this case, the mount of CP in the growing stage is more but in the seeding stage is less. also, the amount of CP decreases from the growth stage to the seeding one and this issue is in consistent with the study of *Zabo et al., (2010), Ahmadi et al., (2009), Puzesh et al. (2009), Arzani et al., (2009), Chareh Saz et al., (2009) and Piri sahra Gard et al., (2009).*

Based on the non-solvable fibers in acidic detergent, ash, and Mg, there is not a significant difference between these 3 stages. Based on the amount of P, there is not a significant difference between flowering and post-seeding stages, statistically. Although, the amount of P is so high is the seeding stage. There is not a significant difference between growth stage (before flowering) and post-seeding stage although the amount of P is so high in the growing stage.

Generally, the amount of P in this plant during the flowering stage is less and during the growth stage is more. Based on the amount of K, there is not a significant difference between flowering and growing stages, but there is a significant difference between these 2 stages and post-seeding stage, statistically as the amount of K decreases during seeding stage and increases during flowering stage.

Based on the amount of Na, there is not a significant difference between flowering and growing stages, but there is a significant difference between these 2 stages and post-seeding stage, statistically as the amount of K decreases during seeding stage and increases during flowering stage.

Based on the amount of Mg, there is not a significant difference between these 3 stages; although its amount decreases during growing stage and increases during flowering stage. According to the averages of different parts a plant, the following results obtained:

Based on the amount of DM, there is a significant difference between these 3 parts as its amount decreases in the leaves and increases in the flowers. Based on the amount of CP, there is a significant difference between these 3 samples as its amount decreases in the top of branches and increases in the leaves.

Based on the amount of ADF, there is not a significant difference between two types of flowers and leaves but there is a difference between these samples with a sample of top of branch as its amount decreases in the sample of flower and increases in that two samples of branches.

Based on the amount of ash, there is not a significant difference between flowers and branch but there is a difference between these samples with a sample of leaves as its amount decreases in the top branch and increases in the leaves. Based on the amount of P, there is not a significant difference between a sample of leaf and top branch. But there is a significant difference between these two types with a flower sample as its amount decreases in the top branch and increases in the flower.

Based on the amount of K, there is not a significant difference between a sample of flower and top branch but there is a significant difference between these two types with a leaf as its amount increases in the leaf and decreases in the flower sample. Based on the amount of Na, there is a significant difference between 3 samples as its amount

increases in the leaf and decreases in the branch sample. Based on the amount of Mg, there is a significant difference between 3 samples as its amount increases in the leaf and decreases in the top-branch sample.

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