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ASSESSMENT OF RANGE PLANTS COMPOSITION ON SEMI-ARID ZONE OF NORTH DARFUR STATE, SUDAN

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ABSTRACT
The research work was conducted at Alfashir locality for two consecutive seasons of 2012 and 2013 at three sites (Ummarahik 25km north of Alfashir, Fashar in eastern part of Alfashir about 5km and Berka 30km west of Alfashir) in semi-arid zone of North Darfur State. The aims of this study were to assess range components and species composition. Measurements of %plant, %litter, %bare soil, %feces or rocks and %species composition were assessed. The results showed the percentage of range components in different sites for two seasons; average plant composition was 52.33 and 68.04 for seasons 2012 and 2013, the average of %litter was (10.82%, 6.52%), bare soil (27.74%, 16.18%) and feces was (9.11, 9.26) for both seasons respectively. The species of highest composition was *Aristida sp* (26.75%, 26.56%) while species of *Sesamum alatum* had lowest percent (3.40%, 3.21%) for the seasons 2012 and 2013 respectively.The study concluded that unwise utilization and exploitation of the rangelands particularly by man causes range deterioration and serious reduction in range production in both quantity and quality, so, the study suggested that improvement and rehabilitation such lands rangelands should be done. Further research work is needed to assess rangeland attributes across different ecological zones in North Darfur State.

Keywords: Plant composition, Rangelands, vegetation, Litter, Bare soil.

1. INTRODUCTION
Rangelands are defined as the areas of the world which by reasons of physical limitations-low and erratic precipitation, rough topography, poor drainage, or cold temperatures- are unsuited for cultivation and which are a source of forage for free ranging native and domestic animals, as well as a source of wood products, water and wildlife (Miller, 1997). Their historic climax vegetation was predominantly grasses, grass-like plants, forbs, or shrubs (Butler *et al.*, 2003). It account for about 70% of all land surface (Fuhlendorf and Engle, 2001 and Holechek, 2001). Rangeland supports different vegetation types including shrub lands such as deserts, steppes, temporarily treeless areas in forests, and whatever grows on land today, sandy, rocky, saline, or wet soils, and steep topography for commercial farm and timber crops (Grice *et al*., 2008). Rangeland vegetation may be naturally stable or temporarily derived from other types of vegetation, especially following fire, timber harvest, brush clearing, or abandonment from cultivation (Heady and Childs, 1994) and it managed, typically, for livestock production (Holechek *et al.*, 2004). In the developing countries, there at least 40 million pastoralists who depend on natural grazing for their livelihood, most are subsistence herders (Elnour, 2007). The Greater

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Darfur region occupies approximately an area of 500,000 km2. It lies in the north western part of the Sudan and mainly consists of four main climatic zones. Rangelands in North Darfur State face many problems; these include seasonal fluctuation in feed quantity and quality, land degradation and desert encroachment, erratic rainfall and expansion of both traditional and mechanized rainfed cultivation. The balance between animals and feed does not exist in North Darfur State for the time being, and the number of animals is by far exceeding what the land is offering. Therefore, with the prevailing systems of production, the negative impact on the land and the environment would be expected to continue. Therefore detailed assessment of vegetation affected by grazing is necessary to describe the current status of rangelands in Alfashir locality, comparing these measurements over time to detect the change that has happened to rangeland, using ground measurements. The objectives of this study are to assess range components and species composition in Alfashir Locality, North Darfur State, Sudan.

2. MATERIALS AND METHODS

The research work was carried out at Alfashir Locality, North Darfur State, Sudan. The state lies between latitudes 12° 30' and21° 55' N and longitudes 24° 00' and27° 30' E within the arid and semi-arid zones, average annual rainfall about 287.7 and 252.5 for the seasons 2012 and 2013 respectively. The study was done at three sites: Ummarahik, Fashar and Berka. Three transect lines of 2 km length were selected randomly in each site. In each transect three points were taken with 500m apart, then loop was traced along each transect spaced at 1m intervals. All information about the range component was listed and recorded in composition form. This information included %plant species (P), %litter (L), %bare soil (B) and %feces or rocks (F/R). A total of 100 loop reading was taken along each transect.

Measurement tools used include the following: Measuring tape (100-meter), recording sheet and loop. Information used in the attainment of this study included both primary and secondary data. Primary data of vegetation measurements were collected from rangeland through intensive field surveys, and secondary data was obtained through various standard published and unpublished literatures.

The statistical package for social science (SPSS, version16) software program was used to separate between means.

3. RESULTS AND DISCUSSION

Results in table (1 and 2) showed the percentage of range components in different sites for two seasons; average plant composition was higher in the second season when compared with the first season, the low plant composition in these sites in the first season may be caused by heavy grazing, while good vegetation components may be attributed to the stability of the rain fall to some extent in the area. Skerman (1962) stated that the botanical measurement carried out during the Kordofan special fund project, indicated that the trend in the vegetation composition is towards the development and survival of the short-lived annual rather than perennial species.

Litter is any dead plant material that is in contact with the soil surface. Litter provides a major source of the soil organic material and the raw materials for onsite nutrient cycling (Nasra, 2008). Results in Table (1 and 2) and figure (1) illustrate that litter percentages was low in the different sites, the low litter percentage may be due to low rainfall characterizing the semi-arid areas, which resulted in low vegetation cover. Coleman, (1992) reported that litter in a pasture is a function of forage growth, senescence, harvest and decomposition. It may be also due to both the continuous grazing of the available sparse vegetation and the redistribution of litter by wind and water. Naeth *et al.,* (1991) and Jensen and Gutekunst, (2003) reported that the standing and fallen litter mass generally decrease with increased grazing intensity. The results of this study are in close agreement with the findings of Lazim (2009) and Altome (2011) who observed that standing and falling litter mass generally decreased while amount of bare soil increased with increasing grazing intensity.

Bare ground is exposed mineral or organic soil that is susceptible to raindrop splash erosion (Morgan, 1986). Table (1 and 2) and figure (1) show the bare soil percentage, the second season had higher bare soil than the first season. The high

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

bare soil percentage may be caused by low rainfall, overgrazing and agricultural practices. Heavy grazing can also cause soil erosion, loss of soil structure, and deterioration of soil environment (Scholl and Kinucan, 1996). The variations between sites may be caused by variable rainfall and sites potentialities. This variation was aggravated by grazing and agricultural practices. Bennett and Adams, (1999) reported that spatial and temporal variability of rainfall in dry lands results in a complex association between vegetation and soils, notably organic matter, nutrients and microbial activity.

Table (1): Mean vegetation measurements in all sites at seasons 2012

Parameter measured %	Berka	Fashar	Ummarahik	Average
Plant %	51.11	56.33	49.55	52.33
Litter %	11.78	09.56	11.11	10.82
Bare soil %	34.22	14.44	34.56	27.74
Fecal Dropping%	02.89	19.67	04.78	9.11
Total	100	100	100	100

Table (2): Mean vegetation measurements in all sites at seasons 2013

Parameter measured %	Berka	Fashar	Ummarahik	Average
Plant %	76.34	54.78	73.00	68.04
Litter %	07.00	07.56	05.00	06.52
Bare soil %	11.33	20.33	16.89	16.18
Fecal Dropping%	05.33	17.33	05.11	09.26
Total	100	100	100	100

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

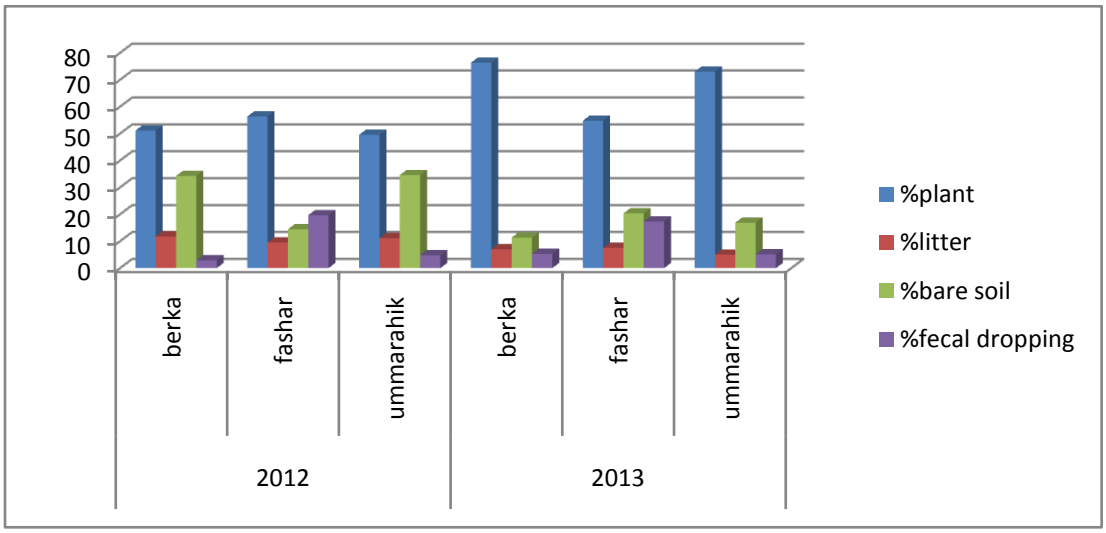

Figure (1): Average range composition at different sites.

Results in table (3) showed the percentage of range components in different sites for two seasons. Quite similar values were scored at two seasons, *Aristida sp* and *Cenchrus sp* had highest average species composition in both seasons, while some species like *Dactyloctenium aegyptium*, *Zalya pentandra* and *Alycicarpus ovalifolius* had lowest composition percent, this result may be due to the system of animal grazing selection in diet, animals select the most preferable species, this affect on species composition. Herlocker, (1999) declared that the degree of grazing strongly affects the structure, composition, quality and productivity of rangeland vegetation. Continuous intense grazing leads to vegetation changes such as the replacement of palatable grasses by less palatable plant species, replacement of perennial grasses by annuals, bush encroachment and reduced basal cover (Kelly and Walker, 1976; Todd and Hoffman, 1999).

Table (3): Average species composition % in the study area at seasons 2012 and 2013

Species Name	2012 Aver compo%	2013 Aver compo%
Alycicarpus ovalifolius	4.67	5.07
Aristida sp	26.75	26.56
Cenchrus sp.	26.25	24.55
Dactyloctenium aegyptium	10.48	10.83
Eragrostis sp.	20.46	22.87
Sesamum alatum	3.40	3.21
Zalya pentandra	7.99	6.91
Total	**100**	**100**

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(Scholarly Peer Review Publishing System)

4. CONCLUSION

Rangeland management plan should include grazing management with the purpose of increasing the vegetation cover and decreasing the grazing pressure on the natural vegetation, controlling kinds and numbers of animals (Proper stocking), when they utilize the rangeland is absolutely essential in regulating the effects of grazing on vegetation cover.

So management plan can include grazing management (proper stocking rate), protection of some areas, application of fertilizer, reseeding with the adapted and palatable grasses and legumes can be applied to the protected areas, utilization of the appropriate rainwater harvesting technique and utilization of supplementary feeds to decrease the pressure on the over graze areas.

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