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Study on range plants of Al-arshkol Mountains in semi-arid zone, White Nile State, Sudan

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Abstract. This study was conducted at Al-arshkol mountains in semi-arid zone, White Nile State, Sudan during rainy season. The sites selected included the Al-arshkol Mountains and open area nearby. The study aims to provide information that defines the range plants of the area and contributes to a better understanding of the utilization of range plants by domestic herbivores in constrained environments. A taxonomic study on range plants was conducted which was based on fresh plant specimens collected from the Al-arshkol Mountains. These specimens were prepared, examined, identified, described and documented. Traditional pastoralists' perceptions towards range plants utilization were assessed using interviews and group discussions. The taxonomic study of range plants revealed 85 species, belonging to 56 genera and 31 families. The five species that had high preference according to perceptions by pastoralists were *Cenchrus biflorus*, *Echinocloa colonum*, *Desmodium dichotomum*, *Leptadenia pyrotechnica* and *Ceratotheca sesamoid*. It was concluded that goats can select a diet superior to the average quality of the range plants. These findings may be considered as a basis for an informed management system in the Al-arshkol Mountains Locality which will be invaluable in developing sustainable management strategies for use by pastoralists.

Keywords. Range plants – Pastoralists – Interviews – Goats.

Etude des plantes de parcours des montagnes de l'Al-arshkol en zone semi-aride, dans l'état du Nil blanc au Soudan

Résumé. *Cette étude a été menée dans zones semi-arides de la montagne de l'Al-arshkol, dans l'état du Nil blanc, au Soudan pendant la saison des pluies. Les sites choisis étaient l'Al-arshkol et les espaces montagneux ouverts à proximité. L'étude avait pour objectif de fournir des informations pour mieux comprendre l'utilisation des plantes de parcours par les herbivores domestiques dans des environnements contraints. Cette étude comprenait une étude taxonomique des plantes de parcours qui se fonde sur des échantillons frais prélevés de plantes de la montagne de l'Al-arshkol. Ces spécimens ont été préparés, examinés, identifiés, décrits et documentés. Les perceptions des éleveurs traditionnels envers les plantes des parcours ont été évaluées au moyen d'entretiens et de discussions de groupe. L'étude taxonomique des plantes de parcours a révélé 85 espèces, appartenant à 56 genres et 31 familles. Les cinq espèces préférées par les pasteurs étaient* Cenchrus biflorus, Echinocloa colonum, Desmodium dichotomum, pyrotechnica Leptadenia, *et* Ceratotheca sésamoïde*. Il a été conclu que les chèvres peuvent choisir un régime alimentaire de qualité supérieure à la qualité moyenne des plantes de parcours. Ces résultats peuvent être considérés comme une base pour un système de gestion de la connaissance des localités montagneuses de l'Al-arshkol qui permettra de développer des stratégies de gestion durable des parcours par les éleveurs*

Mots-clés. *Plantes de parcours – Pasteurs – Interviews – Chèvres.*

I – Introduction

Grasslands in the wider sense are among the largest ecosystem in the world. Their area is estimated at 52.5 million km^2, or 40.5% of terrestrial area excluding Greenland. Although east African countries are in the tropics, yet their grasslands are quite diverse. Extensive grasslands are mostly in arid and semi-arid zones (Reynolds, *et al.*, 2005).

White Nile State is characterized by its strategic location in central Sudan; it is bordered by Khartoum State in the north, North Kordofan State in the west, South Kordofan State in the south east, Al-Gazira & Sinnar States in the east and the Republic of South Sudan in the south east. The state area is 39,701 km^2 and its climate is characterized by a hot, humid rainy summer and a warm dry winter. This paper provides information that contributes to a better understanding of the utilization of range plants by domestic herbivores in constrained environments at AL-arshkol Mountains in the White Nile State.

II – Materials and methods

The Al-arshkol mountains are located in EL- Dueim province, at 35 km west of the White Nile. Al-arshkol hills extend from latitude 14˚ 10' 15' to 14º 12' 00', and longitude 32º 6' 25' to 32º 7' 25'. Al-arshkol and El Hilla El Jadeeda villages lie at the foot of the mountains, which forms the catchments of the Al-arshkol mountains. The rainy season lasts from May to October, but 90% of the total rains fall in the months of July and August. Rain falls in the form of showers of varying intensity and duration which does not exceed few hours (PLAN Sudan, 1997).

First plant specimens were collected fresh from the field, during September 2007/2008, from sites representing all the study area. Whole plants were collected in case of herbs, whereas twigs with leaves and flowers or fruits in case of shrubs and trees.

Plant species were first verified using sets of keys (Anderws 1950, 52, 56), (Hutchinson and Dalziel 1963), (Arbonner, 2004), (EL safori, 2000) and (Baraun *et al*., 1991).

Group discussions and personal observations were then conducted to obtain an insight of resource utilization.

III – Results and discussion

Rainfall has a major role in determining the types, forms, density, and abundance of the plant species. Generally, three strata of plant cover were observed. Some broad leaved trees have less grazing importance form the higher or top stratum while the shrubs (mostly Acacias) form the second or medium stratum. Grasses and herbs dominate the lower stratum.

The vegetation of Al-arshkol Mountains was described as part of the vegetation zones of Sudan by Anderws (1948), Smith (1949), Harrison and Jackson (1958), Noordwijik (1984), and Wickens (1991).

The dominant tree species were *Acacia tortilis* sub-spp *raddiana, Acacia oerfula* and *Balanites agyptiaca.* Other common woody species *were Acacia mellifera, Leptadnia pyrotechnica* and *Ziziphus spina christi.* Associated grasses were *Schoenfelda gracilis, Aristida* spp*,* and *Cenchrus* spp (see Fig. 1).

In the present study, 85 species, belonging to 31 families were documented. Moreover a brief botanical description of 17 important range plants species was presented (see Table 1).

Livestock are the main assets of the pastoralists in the study area upon which the livelihoods of the pastoralists depend. Livestock in the study areas are used as a source of food (milk and meat), social functions, as a means of saving, income source, risk minimization and power. All pastoral groups in the study area keep more than one species of animal mainly, goats, cattle, and sheep where advantages can be taken of the various adaptation strategies of the different animal species to diseases, feed, water shortage, and drought.

Table 1. List of the important plant species

Scientific Name	Family	Local Name	Habit
Amaranthus graecizans L.	Amaranthaceae	Lissan EL-tairr	H
Aristolochia bracteolataLam.	Aristolochiaceae	Um Galagil	H
Celosia argentea L.	Poaceae	Danb Elkadis	G
Celosia trigyna L.	Amaranthaceae	El-Bueida	H
Cenchrus biflorus Roxb.	Poaceae	Haskanit	G
Celosia argentea L.	Poaceae	Danb Elkadis	G
Commelina kotschyi Hassk.	Commelinaceae	Ibrig Elfaki	H
Corchorus tridens L.	Tiliaceae	Khudra	H
Crotalaria senegalnsis (Pers.)	Fabaceae	Sofria	H
Echinochloa colonum (L.) Link.	Poaceae	Difera	G
Euphorbia aegyptiaca Boiss.	Euphorbiaceae	Um Malbeina	H
Indigofera hochstetteri Bak.	Fabaceae	Sharaia	H
Ipomoea cordofana Choisy.	Convolvulaceae	Tabar	H
Portulaca oleracea L.	Portulacaceae	Rigla	H
Senna alexandrina Mill.	Caesalpiniaceae	Senna Mekka	S
Solanum coagulans Forssk.	Solanaceae	Gubbein	H
Tribulus terrestris L.	Zygophyllaceae	Dereisa	H
Acacia tortilis sub-spp raddiana	Mimoseae	Sayel	T

Key: H = herb. G = Grass. S = Shrub. T = Tree.

Fig. 1. Plate 1 show the north side of AL-arshkol Mountains (source. Field survey, abdelkreim, 2007).

IV – Conclusions

About 85 plant species, belonging to 31 families were documented in Al-rashkol mountains west of EL-Dwium town, White Nile state. In addition 15 species considered as very important were described. A majority of these species have economic value, providing fodder to the animals besides the traditional uses. Due to human misuse some plants disappeared such as *Commphora africana, Cymbopogon nervatus, Cymbopogon proxmus,* and *Grewia tenax.*

The dominant annual herbs and grasses were *Cenchrus bilforus, Setaria acromelaena, Cleome viscose, Aerva javanica, Aristida rhiniochloa, Zaleya pentandra* and *Indigofera hochstetteri.* The dominant woody species were *Acacia toritilis sub-raddiana, Acacia oerfula, Balanites aegyptiaca* and *Ziziphus spina chiristi* and the other woody species found in the study area *were Capparis decidua, Leptadenia pyrotechnica,* and *Acacia mellifera.* This study recommended that giving due respect to the perceptions and awareness of local people and pastoralists should improve the conservation, protection, and management of the range plans in the mountains, and more ecological studies should be carried out in this area.

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