

## Rangeland Condition at Southern West Bank

Ayed Mohammad

Department of Animal Production and Protection, College of  
Agriculture, Hebron University, Hebron, Palestine

### Abstract

This study was part of a large project that was implemented by the Ministry of Environmental Affairs to combat desertification in the West Bank area. The study was conducted at two sites (Al-Dahria and Al-Samoo') located at the southern parts of the eastern slopes of the West Bank.

More than 40 plant species were identified in each of the study sites. At both sites the dominant plant species were *Poa bulbosa*, *Bromus syriacus*, and *Sarcopoterium spinosum*. The total plant cover percentage was low in both sites (54.34 and 57%), while rock cover was relatively high (21.33 and 18.8%) in Al-Dahria and Al-Samoo', respectively. The vegetation biomass was low (711 and 929 kg dry matter/ha in Al-Dahria and Al-Samoo', respectively). The soil survey revealed that at both Sites, the soil texture was clay to clay loam, with low fertility. Range condition was poor and soil was eroded. The first priority should be improving the vegetative cover, applying the suitable management programs, and using the suitable and practical conservation techniques.

### حالة المراعي في المناطق الجنوبية من الضفة الغربية

ملخص:

هذه الدراسة هي جزء من مشروع كبير تم تنفيذه من قبل وزارة شؤون البيئة ويهدف إلى مكافحة التصحر في الضفة الغربية. أجريت الدراسة في موقعين (منطقة الظاهرية و منطقة السموع) في الجزء الجنوبي من السفوح الشرقية إلى الجنوب من مدينة الخليل.

أظهرت النتائج وجود أكثر من 40 نوع من النباتات في كل موقع. النباتات السائدة كانت بشكل عام نفسها في الموقعين وتشمل النزعة (*Poa bulbosa*) , شعيره (*Bromus syriacus*) , والنتش (*Sarcopoterium spinosum*) . كانت نسبة الغطاء النباتي منخفضة في الموقعين (54.34% في موقع الظاهرية و 57% في موقع السموع). وكذلك كانت إنتاجية النباتات منخفضة في الموقعين (711 كغ وزن جاف/هكتار و 929 كغ وزن جاف/هكتار في موقع الظاهرية و موقع السموع على التوالي). بينما كانت نسبة الصخور مرتفعه (21.33% في الظاهرية و 18.8% في السموع). أما بخصوص مسح التربة فقد أظهرت النتائج أن تربة الموقعين كانت طينية إلى طينية طمية, وذات صوبه منخفضة. تشير هذه النتائج إلى أن الحالة العامة للمراعي الطبيعية في منطقة الدراسة فقيرة والتربة متدهورة. لإعادة تأهيل المراعي الطبيعية في المنطقة فإنه يجب تحسين الغطاء النباتي, وضع وتنفيذ البرامج المناسبة لإدارة المرعى, أضافه إلى استخدام طرق عمليه ومناسبة لحفظ التربة.

### Introduction:

The large variation in the West Bank topography (coast, mountains, Ghor , and desert) produce large variation in its climate. This environmental diversity of the West Bank provides a suitable habitat for a large number of plant species that belong to several important families. According to Bregheith (1995) the families are: Composite, Graminea, Leguminaceae, Crucifera, Labiatae and many others.

The total rangeland area in West Bank is about 218,000 ha, and mainly located in the eastern slopes. Because of the Israeli occupation, only 70,000 ha are currently accessible to Palestinian (Bregheith, 1998).

The number of sheep and goat in West Bank and Gaza is about 772,004 heads (PCBS, 1996/1997), and 31% (241,130 heads) of these are concentrated in Hebron District. However, the eastern and southern areas of Hebron district are major grazing lands of West Bank. A small proportion of these ruminants were raised totally under shed conditions while most of livestock utilize rangeland to obtain part of its feed requirements.

Currently, the West Bank rangeland suffer from a severe deterioration, due to rainfall variation, overgrazing, improper grazing time, uses of trees and shrubs as fuel source, and the cultivation of marginal land zone. In addition, the rangeland was neglected and the grazing pressure increased, during the years of occupation, tremendously beyond the carrying capacity of these land. These factors lead to vegetation damage, decrease in productivity, increased in poisonous and unpalatable plants, severe soil erosion in many areas where soil becomes shallow and infertile and finally the threat of desertification.

Halting the degradation of rangelands is urgently needed because of its social, economical, and environmental impacts. Since the establishment of the Palestinian Authority, special attention was given to the rangeland resources and several steps had been done to rehabilitate the rangeland, but the basic information on rangeland ecosystem is still lacking. However, this scientific information is necessary to set up suitable rangeland management that satisfies the economical and ecological needs.

### **Objective**

The objective is to build up a scientific database on the components of the rangeland ecosystem at the West Bank that enable specialist to set up a proper management program: in particular botanical composition, production and soil characteristics will be investigated.

### **Material and Methods**

#### **Study area:**

This study is part of the Initiative for Collaboration to Control Natural Resources Degradation (Desertification) of Arid Lands in the Middle East which has been implemented by the Ministry of Environmental Affairs. An investigation which is related to rangeland rehabilitation has been executed by the College of Agriculture at Hebron University. The overall objective of the initiative was to contribute in a sustainable manner to the improvement of the economic situation and the living standard in the arid region that is endangered by desertification.

The study was conducted at Al-Dahria and Al-Samoo' rangelands with an area of about 10 ha in each location. The distance between the two

locations is 8 km, and they are located 10 – 15 km Southern of Hebron city. The sites are used for grazing as a native rangeland. Grazing was excluded during 1999 and 2000. The topography of both sites is mountainous with an altitude ranges between 530 m to 600 m above sea level. The area has semi-arid Mediterranean climate. The rainfall is a local thunder storm that lasted for a short period. Tedmor et al (1974) and Guman and Seligman (1979) found that the peak dry matter yields was reached at late spring in the southern of Palestine.

Sample collection and data recording was conducted during early to mid April, 2000.

#### Soil characteristics:

Ten representative soil samples from the top 15 cm were collected from each site to determine the physical and chemical soil properties. Different lab analysis was conducted on these soil samples. The result was then averaged for each analysis at each site.

#### Ground cover:

Step- point method was used to determine the ground cover according to Bonham (1989). Five transects at Al-Samoo' site and three at Al-Dahria site was randomly selected and the sites were stratified according to the topography. At each transect, data were collected from one hundred steps. The collected samples were identified according to Al-Eisawi (1998) and Zohari (1966). The cover percentage of each plant species, the soil, and the rock were determined.

#### Production (biomass):

Twenty square quadrats (0.25 m<sup>2</sup>) were randomly distributed a long each transect the current year growth of the plants was clipped at the soil surface and placed in labeled paper bag as described by Bonham (1989). The fresh and dry weight was recorded in the lab. The average biomass in kg/ha of dry matter was calculated for each site.

## **Results and discussion**

### **Soil:**

The soil of both sites has generally the same characteristics with heavy, fine clay to clay loam. Many parts of the sites have shallow soil. Interpretation of the data according to Miller and Keeney (1982)

***"Rangeland Condition at Southern West Bank"*** \_\_\_\_\_

indicated that both sites have slightly alkaline (PH=7.5), non saline, calcareous soils with very low organic matter content (1.84 and 1.61%) in Al-Dahria and Al-Samoo', respectively (Table 1).

Table 1: The chemical properties of the soil in Al-Dahria (site 1) and Al-Samoo' (site 2) rangeland (year 2000).

<b>Soil Properties</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Interpretation of Data</b>	<b>Reference</b>
PH	7.5	7.5	Slightly alkaline	Miller and Keeney (1982)
% CO <sub>3</sub> <sup>-2</sup>	17.4	22.5	Moderate	Miller and Keeney (1982)
*% OM	1.84	1.61	Very low	Miller and Keeney (1982)
**CEC meq/100g	38	35	High	Clark, R. B. (1984)
Ca <sup>+2</sup> meq/100g	34	30	High	Clark, R. B. (1984)
Mg <sup>+2</sup> meq/100g	4	4	High	Clark, R. B. (1984)
N-NO <sub>3</sub> , mg/kg	17	32	Low, mainly site 1	Harmsen and Kdenbrander (1965)
P, mg/kg	6	5	Very low	Kim, H. (1996)
K, mg/kg	295	379	Moderate	Tan, K. H. (1994)

\*%OM: Percent Organic Matter. \*\*CEC: Cation Exchange Capacity.

Both sites were characterized by high Cation Exchange Capacity (38 and 35 meq/100g in Al-Dahria and Al-Samoo', respectively) and mainly saturated with calcium. Magnesium content (4 meq/100g in both sites) seems to be sufficient for plant growth and the exchangeable potassium content was moderate. Exchangeable Phosphate (6 and 5 mg/kg in Al-

Dahria and Al-Samoo', respectively) and Nitrate contents (147 and 32 mg/kg in Al-Dahria and Al-Samoo', respectively) were mainly low. The low soil fertility was mainly due to the lack of vegetation and the high soil erosion.

#### 2- Ground cover:

Rocks covered 21.3 and 24.2 % at Al-Dahria and Al-Samoo', respectively (Table2). The high percentage of the rock cover is mainly due to the severe erosion of the barren soil that resulted from continuous over grazing and poor range management for many years. Bare soils are continuously exposed to strong rainfall storms that created numerous gullies leading to severe soil erosion. Mohammad (2000) reported lower value (9%) of rock cover in less sloppy rangeland.

The vegetative cover was 54% and 57% in Al-Dahria and Al-Samoo', respectively (Table 2). More than 40 plant species were identified in each site, but the cover percentage of each individual species was low which may indicate the richness in plant species. Several reports mentioned the presence of high number of plant species at the West Bank (Breghieth, 1995; and Mohammad, 2000). This large number of different plant species can be considered as a promising indicator for the natural revegetation potential in the rangeland.

Both sites had the same dominant plant species (*Poa bulbosa*, *Bromus syriacus*, and *Sarcopoterium spinosum*) but its cover percentage was not similar. Whereas *Avena sterilis*, *Brassica nigra*, *Glaucium spp.*, *Erodium gruinum* had moderate cover. According to the herders in the study area and the surrounding, most of the plant species that have been identified in both sites are relatively palatable. Few of these plants are unpalatable and not grazed under normal conditions such as *Sarcopoterium spenosium*, but it was noticed that these species had an important role in protecting the soil from erosion and many small plants hiding inside the canopies of *Sarcopoterium* plants.

*Coridothymus capitatus*, *Sylibum mariamum*, *Brassica nigra*, *Chrysanthemum sp.*, *Adonis aestivalis*, *Papaver sp.*, *Carthamus tenuis*, *Erngium creticum*, and *Teucrium capitatum* were considered as medicinal plants (Hassan, 1993). In conclusion, the presence of medicinal and

ornamental plant species should be considered in managing the rangeland for multiple use.

3- Biomass or Herbage production:

Herbage production was about 710 and 930 kg dry matter/ha in Al-Dahria and Al-Samoo', respectively (figure 1). Mohammad (2000) reported slightly higher herbage production 990 kg dry matter/ha under similar environmental conditions. The study sites located at the southern parts of the eastern slopes. This area is affected by the dry and hot conditions from the Jordan Valley in the east and the Nejev Desert in the south, where the average annual precipitation during the last 50 years (Figure 2) was low (294 mm/year) and greatly varies between years and ranged between 107 mm and 609 mm, (MEnA, 2000). The area is characterized by short growing season and low soil potential.

Furthermore, the study sites were subjected to drought condition in 1999 (137 mm) and 2000 (173 mm) that associated also with poor rainfall distribution during the season (figure 2).

Determining the botanical composition and the herbage yield potential of the rangeland were essential to estimate its grazing capacity. Under our environmental conditions, other essential information were still needed to be investigated and determined such as: the existent plant palatability, its nutrient content and its resistance for grazing, and the suitable grazing time.

The rangeland condition is poor because of sever erosion, low vegetation cover, and presence of large percentage of weed (*Sarcopoterium sp*). Rocky land is not easy to become productive, but we have to protect the remaining soil.

Therefore, efforts should be directed toward minimizing soil erosion and increasing vegetative cover through proper management and improvement practices.

**Table 2:** Cover percentage (soil, rock, plant species) at Al-Dahria and at Al-Samoo' rangeland during the year 2000.

Item	Local name	Cover %	
		Al-Dahria	Al-Samoo'
<b>Plant:</b>			
<i>Poa bulbosa</i>	نزعہ	7.00	12.80
<i>Bromus syriacus</i>	شعيرہ	8.00	4.80
<i>Aegilopes geniculata</i>	شعير ابلیس	0.33	0.20
<i>Avena sterilis</i>	شوفان بري	2.00	0.40
<i>Hordeum sp.</i>	شعير بري	0.33	0.00
<i>Phalarisia sp.</i>	خافور, فلارس	1.00	0.00
<i>Hordeum murinum</i>	سبيلہ	0.33	0.00
<i>Stipa capensis</i>	بہمہ	0.00	1.20
<i>Echinops spinosus</i>	شوك البان	1.00	0.40
<i>Sylibum marianum</i>	شوك جمل	0.00	0.20
	شوك حمار	0.00	0.40
	شوك اندلس	0.33	0.00
<i>Brassica nigra</i>	لفيته, فجيلہ	0.00	4.60
<i>Sinapis alba</i>	خردل ابيض, سليج	0.00	0.40
<i>Anthemis sp.</i>	اقحوان ابيض, حليوان	1.00	1.20
<i>Chrysanthemum sp.</i>	اقحوان اصفر	0.00	2.00
	ذرس	0.00	0.20
<i>Lathyrus gorgonei</i>	سعيصعہ	0.33	0.40
<i>Pisum syriacum</i>	بريدہ	0.00	0.20
<i>Onobrychis squarrosa</i>	دریس	0.67	0.40
<i>Glaucium spp.</i>	حنون	0.33	2.60
<i>Adonis aestivalis</i>	حنون البس	0.00	1.60
<i>Papaver sp.</i>	دحنون, حنون الفرس	0.33	0.00
<i>Evax contracta</i>	قطنیہ, لبيدہ, ننبۃ خروف	1.67	1.00
<i>Centaurea procurrens</i>	مرار	0.00	0.40
<i>Sylvia dominica</i>	خويخہ, كريهہ	0.33	0.20
<i>Rhagadiolus stellatus</i>	کميثہ, رويسہ	0.67	1.80
	عنب الذنب, عنبيہ	0.67	0.60
<i>Gundelia tournefortii</i>	عکوب	0.67	0.40

Continue Table2



"Rangeland Condition at Southern West Bank"

<i>Carthamus tenuis</i>	قوس	0.00	1.00
<i>Erodium gruinum</i>	ابرة عجوز, خفير	0.33	2.60
<i>Clypeola jonthlaspi</i>	دريهمه	1.33	1.20
<i>Sieberex sprengel</i>	سفسون	0.00	0.20
<i>Eryngium creticum</i>	قرصعنه	0.00	0.40
<i>Rhaponticum pusillum</i>	جويظة ارض, كعوب حجر	0.33	0.60
<i>Chaetosciadium trichospe</i>	لزيقه	1.33	0.80
<i>Phagnalon rupstre</i>	قديح	1.00	0.20
	سر	1.00	0.20
	بقدونس بري	0.00	0.40
	حليبه	0.00	0.40
<i>Teucrium capitatum</i>	جعه	0.33	0.20
<i>Carrichtera annua</i>	قليلقه	0.33	0.20
	دريره	0.00	0.20
<i>Salvia hierosolymitana</i>	ورق اللسان, لسينه	0.33	0.00
	سميسمه	0.33	0.00
<i>Crocus hermoneus</i>	بلبوس	0.33	0.00
	بالق عينه	0.33	0.00
<i>Hedpnois cretica</i>	قطيعه, رويسة جبل	0.67	0.00
<i>Paronchia sinaica</i>	عصاة الراعي, رجل عصفوره	0.33	0.00
<i>Leontodon tuberosus</i>	ربيان جبلي	0.67	0.00
<i>Asphodelus aestivus</i>	قيصلان	0.67	1.00
<i>Tulipa agenensis</i>	تيولب احمر, قرن الغزال	0.33	0.40
<i>Panocratium sickenbrgeri</i>	عيسلان	0.33	1.20
<i>Arisarum vulgare</i>	وردة سراج الغوله	0.00	0.40
<i>Urginea martima</i>	بصيل اصفر	0.33	0.00
<i>Sarcopoterium spinosum</i>	نتش	14.67	5.80

Continue Table2

<i>Retama raetam</i>	رتم	0.00	0.20
<i>Coridothymus capitatus</i>	ز عتر فارسي, ز حيف	1.67	0.00
	بقوليات	0.00	0.40
	غير معروف	0.33	0.60
<b>Plant total cover %</b>		<b>54.34</b>	<b>57.00</b>
<b>Soil cover %</b>	تربه	<b>24.33</b>	<b>18.80</b>
<b>Rock cover %</b>	صخر	<b>21.33</b>	<b>24.20</b>

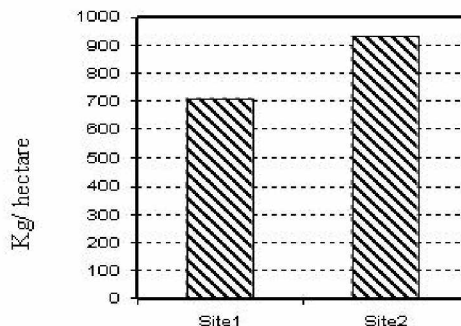


Figure 1: The average vegetation production (kg per ha) at Al-Dahria (site 1) and at Al-Samoo' (site 2) rangeland during the spring of 2000.

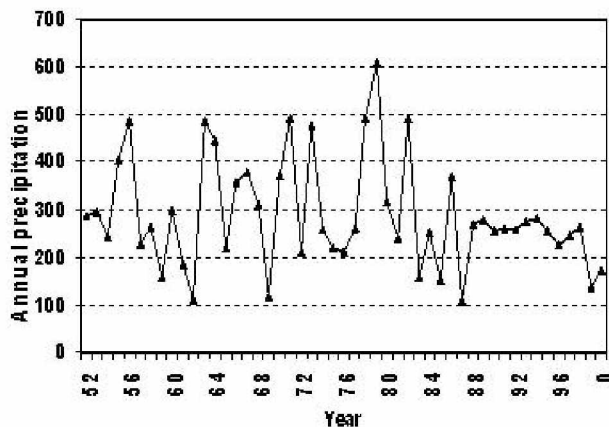


Figure 2: The annual precipitation (mm) at the southern parts of Hebron District (Source :MENA data base).

### Acknowledgment

I would like to express my thanks to the Ministry of Environmental affairs, the Swiss Government and the International Center for Agricultural Research in the Dry Areas (ICARDA). Also many thanks extended for Shawqi Sa'adah, Mohammad Al-Masri, Elena Bakir,

Omar Naser, and Bahar Al-Zatary for their great help in data collection and laboratory analysis. Special thanks are to Dr. Ahmad Atawneh and Dr. Samir Rammal, Hebron University, for thrie effort and time they spent in proofreading this paper.

## REFERENCES

1. Al-Eisawi, D. (1998). Field Guide to Wild Flowers of Jordan and Neighbouring countries. National library, Amman, Jordan.
2. Bonham, C. (1989). Measurements for terrestrial vegetation. John Wiley and Sons, Inc.
3. Braighith, A. (1995). Forest and Woodland in Palestine from 1950 to 1995. Palestinian Ministry of Agriculture.
4. Braighith, A. (1998). Palestinian Agricultural Policy, Forests, Pastures and Wildlife. Ministry of Agriculture (Report).
5. Clark, R. B. (1984). Physiological Aspects of Calcium, Magnesium, and Molybdenum Deficiencies in Plants. In: Soil Acidity and Liming. F. Adams (ed) Agronomy series No, 12. American Society of Agronomy, Inc., Madison, WI. Pp: 99-170.
6. Gutman, M., and Seligman, N. (1979). Grazing management of Mediterrean foothill range in the upper Jordan River Valley. J. of Range Management. 32: 86-92.
7. Harmsen, G. W. and Kdenbrander, G. J. (1965). Soil Inorganic Nitrogen. In: Soil Nitrogen. W. V. Bartholomens and F. E. Clarks (eds), Agronomy series No, 10. American Society of Agronomy, Madison, WI. Pp 43-92.
8. Hassan, Q. (1993). The Dictionary of Medicinal Herbs and Plants. The Scientific House Bocks, Beirut, Lebanon. (in Arabic).
9. Kim, H. (1996). Soil Sampling, Preparation, and Analysis. Marcel Dekker, Inc. New York.
10. Miller, R. H. and Keeney, D. R. (1982). Chemical and microbiological properties. Part 2. In Methods of Soil Analysis, 2<sup>nd</sup> ed. American Society of Agronomy, Inc. and Soil Science

- Society of America, Inc. No, 9, Madison, Wisconsin, USA. Pp. 581-594.
11. Ministry of Environmental Affairs, (2000). Data base.(unpublished data).
  12. Mohammad, A. (2000). Vegetation cover and productivity of the rangeland in the southern parts of West Bank. Bethlehem University Journal 19: 74-87.
  13. Palestinian Central Bureau of Statistics (PCBS), (1997). Agricultural Statistics. 1996/1997.
  14. Tan, K. H. (1994). Environmental Soil Science. Marcel Dekker, New York.
  15. Tedmor, N., Eyal, E., and Benjamin, R. (1974). Plant and sheep production on semi-arid annual grassland. J. of Range Management. 27: 427-433.
  16. Zohari, M. (1966). Flora Palaestina. Jerusalem Academic Press.