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Multipurpose plants in the Northern Libya rangeland area of Syrt

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Abstract. Urbanization and irrigation plans strongly implemented by the passed Gheddafi's government started the abandonment of rangeland in the northern part of Libya. Sedentarization also caused the loss of nomad traditions, including knowledge of wild forages, food and medicinal plants that could become new industries in the future after selection and analytical scientific investigation. A trial was carried out in 2009 in the Syrt rangeland just before the start of the war, in order to identify existing wild multipurpose plants and their traditional uses. The trial was managed thanks to agreements of The Italian Agronomic Institute for Overseas (Foreign Ministry), the University of Florence, and the University of Syrt (now destroyed). The results have shown the existence of a wide plant diversity and a good balance of the plants' specific contributions. The most common plants include wild grasses and legumes and few shrubs of the steppe vegetation. In spite of the traditions being lost, herders still know traditional uses of many plants, uses that have not been yet scientifically investigated. Further research would be needed as soon as new security conditions in the area will make them possible again.

Keywords. Multipurpose plants – Multifunctional rangeland.

Les plantes polyvalentes dans la zone de parcours de Syrte au nord de la Libye

Resumé. *L'urbanisation et les plans d'irrigation fortement mis en œuvre par le Gouvernement Kadhafi, avaient intensifié l'abandon de terres de parcours dans la partie nord de la Libye. Avec la sédentarisation des nomades les traditions ont été perdues, y compris la connaissance des plantes fourragères sauvages, des plantes vivrières et médicinales, qui pourraient devenir de nouvelles industries dans l'avenir après sélection et analyse des enquêtes scientifiques. Un essai a été réalisé en 2009 dans le parcours de Syrte juste avant le début de la guerre, afin d'identifier les plantes polyvalentes sauvages existantes et leurs utilisations traditionnelles. Le processus a été géré grâce aux accords de l'Institut Agronomique pour l'Outre-Mer (Ministère Italien des Affaires Étrangères), de l'Université de Florence et de l'Université de Syrte maintenant détruite. Les résultats ont montré l'existence d'une large diversité végétale et un bon équilibre de leur contribution spécifique. Les plantes les plus communes comprennent des herbes sauvages et des légumineuses et quelques arbustes de la végétation de steppe. Malgré la perte des traditions, les éleveurs connaissent encore des utilisations traditionnelles de nombreuses plantes, utilisations qui n'ont pas encore été étudiées scientifiquement. Des recherches supplémentaires seraient nécessaires dès que de nouvelles conditions de sécurité dans la région les rendront à nouveau possibles.*

Mots-clés. *Plantes polyvalentes – Parcours multifonctionnels.*

I – Introduction

The former Lybian Government have promoted sedentarization and strongly supported settled irrigated agriculture over 650,000 ha by the construction of the GMMR (*Great Man-Made River*) that was completed before the war of 2010 (Abdelrhem *et al*., 2008; Adrawi, 2009).

In the period before the rangeland had been overexploited and there was reduced productivity and biodiversity. Nonetheless animal rearing remains an important tradition and the reduced presence of livestock is a new opportunity for equilibrated grazing (Pardini *et al*., 2009). Equilibrated grazing is necessary mainly along the *wadis* (seasonal rivers), where livestock go to drink and consequently exploit the rangeland more often. The *wadis* are also important for the conservation of rare plant species that could be useful not only as forage but also for new

industrial and pharmaceutical industries (Azaizeh *et al*., 2006).The research has been done thanks to the collaboration of University of Florence (School of Agriculture) and the Agronomic Institute for Overseas of the Italian Ministry of Foreign, and the Al Tahadi University of Syrt, with funds of the Italian Cooperation.

is a preliminary investigation of the rangeland *wadis* of Shabiyat of Misurata (Bani Walid) and Syrt (As-Sultan and Marsa al Uwayja) which represent the pre-desert environment.

II – Materials and methods

rangeland of Syrt have been investigated (Bani Walid, As Sultan, Marsa al Uwayja). Each of the three areas had three sub-areas. Each sub-area had one area that is normally grazed and one nearby area that is not t grazed, a total 18 sub-areas. However, the condition of grazed or ungrazed areas is not strictly respected because there are no fences. The following measurements have been done in each area and sub-area:

(i) *Botanical composition*. Linear analysis: three transects in each of the three sub-areas in grazed and ungrazed areas, a total of 54 transects.

(ii) *Biomass*. Grass mowing per 1 m^2 beside each transect. After mowing and weighing fresh, samples of 500 grams were oven dried and weighted again to calculate DM percentage.

(iii) *Forage value*. Interviews of shepherds and local technicians (palatability) and comparison with scientific literature (chemical composition and palatability). These two parameters have been used to classify plant species into quality classes from 0 (minimum quality) to 9.

(iv) *Traditional uses of the plants found*. Interviews of shepherds and experts from the University of Sirte. Comparison with scientific literature (El Hennawy, 1997; El Darier and El Mogaspi, 2009). We considered forage and alternative uses, mainly medicinal.

All data were collected in February and March 2009, in the short period with good climate. The values of both parameters decreased rapidly in the following months due to severe drought. The research was conducted near *wadis* (occasional rivers), where the soil remains moist longer and can sustain the vegetation better. Grazing animals are mainly mixed herds of sheep and goats, with small groups of dromedars.

III – Results and discussion

1. Botanical composition

In total 98 species have been found, belonging mainly to *Asteraceae* (18 species), *Leguminoseae* (13), *Graminaceae* (12), *Chenopodiaceae* (6), *Brassicaceae* (6), *Plantaginaceae* (5), *Lamiaceae* (4), *Polygonaceae* (3). Only few species had high contributions (Table 1).

A few plant species had important contributions. In Bani Walid there was mainly *Reatama raetam* (18.02% of the average of grazed and ungrazed areas), *and Periploca angustifolia* (10.93%. In As-Sultan there were *Hordeum murinum* (16.26%), *Plantago phaeostoma* (15.50%) and *Matricaria aurea* (11.28%). In Marsa Al Uwayja there was mainly *Diplotaxis muralis* (13.62%) and *Plantaqo phaeostoma* (12.57%).In these locations we found the highest biodiversity (33 species).

Table 1. Botanical composition of grazed and ungrazed *wadis* in the three areas investigated. Percentage of the four most frequent species

Area and species	Specific Contribution (%)		
	Grazed	Not grazed	Average
Bani Walid			
Retama raetam	22.54	13.50	18.02
Periploca angustifolia	7.36	14.50	10.93
Haplophyllum tuberculatum	15.97	1.57	8.77
Avena fatua	16.83	0.00	8.41
As-Sultan			
Hordeum murinum	3.70	28.82	16.26
Plantago phaestoma	5.14	25.86	15.50
Matricaria aurea	4.17	18.40	11.28
Malva parviflora	9.92	0.00	4.96
Marsa Al Uwayja			
Diplotaxis muralis	13.83	13.41	13.62
Plantago phaestoma	19.40	5.73	12.57
Matricaria aurea	14.30	5.68	9.99
Hordeum murinum	4.90	12.25	8.57

2. Biomass

average quantity of biomass measured (Table 2) was very low (2.14 t ha^{-1}), as it usually is in arid environments. The average quantity of biomass available in the best months in the three areas was much larger in the ungrazed areas (2.72 t ha^{-1}) than in those grazed (1.56 t ha^{-1}); this also confirms the assumption that in the three areas investigated an equilibrated stocking rate was beneficial to vegetation rehabilitation.

Table 2. Biomass in the three areas investigated. Data with different letters in columns are significantly different at P=0.05, ANOVA by Sistat

Area	Biomass DM t ha^{-1}		
	Grazed	Not Ungrazed	Average
Bani Walid	1.27 b	3.17 a	2.22 a
As-Sultan	1.24 b	1.46 b	1.35 b
Marsa al Uwayja	2.18 a	3.53 a	2.86 a
Average	1.56	2.72	2.14

3. Forage value

Almost all the species found were of low quality classes (from 0 to 3). Only 4 species were graded as high as 6 or more (*Avena fatua* = 6, *Lolium rigidum* = 7, *Medicago polymorpha* = 7, *Vicia villosa* = 8). Unfortunately, all the high quality species had very short life cycles and were already dry in spring. This classification of the vegetation according to quality classes reduced by 35 times the rangeland carrying capacity of the area that could be calculated by common formulas that consider only the presence of biomass and not its quality.

4. Multiple uses

We found 38 species that are considered good forage by locals (like *Frankenia hirsuta, F. laevis, Haloxylon salicornicum, Neurada procumbens).* Moreover, 19 species were considered useful medicines and more than half of the uses mentioned by locals have not been investigated scientifically so far. Among these plants, some are much appreciated by locals for haemorrhoids, hypertention, menstrual cycle, diuretic, intestinal gases and hypertension, cough. Other Twelve other plants are traditional foods (for example, seeds of *Avena fatua* and *Bromus rigidus,* leaves of *Cynara cardunculus).* to by local people included 24 species with uses not yet described by scientific literature.

IV – Conclusions

Only few species found contributed prominently to the biomass, but they have short life cycles. Efforts should be made to increase the presence of shrubs that remain green longer than grass.

Only few species were of good quality in terms of palatability and chemical composition. The best species had probably been eaten early and could not set seeds. A management practice with equilibrated stocking rates could bring to renewed distribution of the high quality species.

Local people have much knowledge of alternative uses of the plants of the rangeland, although scientific literature has not yet investigated many of these plants and their possible uses. Any possible efforts should be made to preserve the species that are useful to rural populations and may play a role in the future development of new industries.

Biomass quantity is extremely low, and even after restoring good conditions for the vegetation, it cannot rise much. Consequently some integrated uses of the rangeland should be taken into consideration, including honeybees and tourism. This will also enhance the integration of rural people within the whole national economy.

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