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# Effect of the fence settings on the pastoral value of five stations of Southern Algeria

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**SUMMARY** – The Algerian steppe stretches on approximately 20 million hectares, laying between isohyets 400 north and 100 mm south, which corresponds roughly to the limit of extension of the esparto (*Stipa tenacissima* L.). This valuable species, in economic and ecological terms, undergoes such a serious degradation that is threatening its perennity. To face this, the authorities chose the fence setting solution. To fulfill the proposed objective, namely the fence setting on the pastoral value base, we have proceeded to a sample collection in the five stations set in fence by the High Commission of the Development of Steppes (HCDS), two in the department of Djelfa (Taadmit and Messaad) and three in the department of Laghouat (El Haouita, Ksar el Hirane and Ain el Mahdi); these stations are characterized by an arid bioclimate. Two methods permit the pastoral value to be evaluated, one is quantitative and the other is qualitative. We have opted for the latter that consists in giving a pastoral value to an entity from the value coefficients given to each species as well as to their relevant frequency. We conclude from this study that the pastoral value depends on the fence setting duration, the extent of their degradation and the rainfall.

**Key words:** Fence setting, rangeland, degradation, pastoral value.

**RÉSUMÉ** – "Effet de l'emplacement des palissades sur la valeur pastorale dans cinq stations du Sud de l'Algérie". La steppe algérienne s'étend sur environ 20 millions d'hectares, entre l'isohyète 400 mm au nord et 100 mm au sud, ce qui correspond approximativement à la limite d'extension de *Stipa tenacissima* L. Cette espèce précieuse au plan économique et écologique subit de plus en plus une dégradation tellement intense que sa pérennité est menacée. Pour faire face, les pouvoirs publics ont opté pour des mises en défens. Pour répondre à l'objectif fixé à savoir l'effet de la mise en défens sur la valeur pastorale, nous avons effectué des relevés à l'intérieur et à l'extérieur de cinq stations mises en défens par le Haut Commissariat pour le Développement de la Steppe (HCDS), deux dans la wilaya de Djelfa (Taadmit et Messaad) et trois dans la wilaya de Laghouat (El Haouita, Ksar el Hirane et Ain el Mahdi) ; ces stations sont caractérisées par un bioclimat aride. Deux méthodes permettent d'évaluer la valeur pastorale ; l'une est quantitative, l'autre est qualitative, qui consiste à donner une valeur pastorale à un groupement végétal à partir d'un coefficient affecté à chaque espèce en tenant compte de leur fréquence relative. Il ressort de cette étude que la valeur pastorale dépend de la durée de la mise en défens, du degré de dégradation et de la pluviosité.

**Mots-clés :** Mise en défens, parcours steppique, dégradation, valeur pastorale.

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## Introduction

The operation "Great work", was really launched the 2nd November 1994, with the aim of protecting the steppe, as the portion of the own territory delimited in north by the Atlas Tellien (isohyet 400 mm), and in the south by the southern piedmonts of the Saharian Atlas (isohyet 100 mm). It is made up primarily of pastoral use covering a surface of 20 million hectares supporting 20 million heads of ovine. This steppe does not stop being degraded under the combined effect of the anthropic action and the climatic aridity. In order to restore this rangeland, the High Commission of the Development of Steppes (HCDS) carried out a national program for the fence setting over 500,000 hectares.

The fence setting existed already in certain traditional pastoral structures. In fact, it is a natural technique able to give protection to a territory or a land against the man and/or the domestic animals actions. This well known technique was practiced during centuries by our ancestors like "Agdal" in the north Africa or the "Hema" in the middle East of Arabia (Le Houerou, 1995).

The example of Syria shows that it is possible to improve the pastoral exploitation by using these traditions as Bedouins promote systems. Excellent results were also obtained in Mauritania on experimental fence settings, but unfortunately they have been abandoned.

To reach the fixed objective concerning the effect of the fence setting on the pastoral value we chose five stations, two in the department of Djelfa (Taadmit with the fence setting for 4 years and Messaad, with two fence settings, one one year old and an other that is 10 years old) and three in Laghouat (Ain el Mahdi and El Haouita where the fence setting goes up for 4 years, and Ksar el Hirane that is one year old). We chose the fence settings with different ages to show the role of the fence setting duration on pastoral value.

## Geographical situation and ecology of the stations

The zone of survey belongs to the Saharian Atlas sector, depending on the Saharian Atlas Algeries under-sector (Quezel and Santa, 1962, 1963). The sampled stations are placed at the quaternary glacis one. Table 1 summarizes the geographical co-ordinates and the climatic characters of the stations.

Table 1. Geographical co-ordinates and climatic characters of the stations

Stations	Latitude 'N'	Longitude 'E'	Altitude (m)	P (mm)	m (°C)	M(°C)	Q2
Taadmit	34°18' 08"	2°18' 08"	1035	111.0	1.6	36.8	10.8
Messaad	34°09' 52"	3°29' 42"	780	110.1	2.4	38.2	10.5
El Haouita	33°39' 18"	2°27' 04"	900	132.6	1.3	36.2	13.0
A. el Mahdi	33°48' 09"	2°17' 41"	985	242.3	0.7	34.6	24.6
K. el Hirane	33°47' 21"	3°09' 33"	710	123.3	1.8	36.5	12.2

## Socio-economical aspect

Djelfa and Laghouat, areas of the survey stations, are places with pastoral vocation in Algeria. These areas had known a significant increase of their population during the two last decades and, this has been considered by the specialists as being the main cause of steppe ecosystems degradation. Tables 2 and 3 summarize the growth rates of the population and the livestock in the two areas.

Table 2. Evolution of the population over the period 1996-1998 according to the national office of the statistics (1998)

Department	Population			Town	Population		
	1996	1998	GR%		1996	1998	GR%
Djelfa	664,464	797,706	16.7	Taadmit	7708	6172	24.9
Laghouat	281,127	317,125	11.4	Messaad	66,032	77,754	15.1
				El Haouita	1314	1290	1.9
				Ain el Mahdi	5076	6263	19.0
				Ksar el Hirane	13,880	14,910	6.9

GR: Growth Rate

Table 3. Livestock in Djelfa and Laghouat according to the National Office of the statistics, 1998

Department	Bovine			Ovine			Caprine		
	1990	1998	AGR	1990	1998	AGR	1990	1998	AGR
Djelfa	19,440	21,950	1.4	1,679,420	2,194,290	3.9	113,450	200,290	5.4
Laghouat	16,200	23,300	3.8	875,620	1,644,910	5.9	141,880	278,410	6.1

AGR : Annual Growth Rate

## Materials and methods

The site of the groups in each station, inside and outside the fence setting, was selected according to the physiognomic and geomorphologic homogeneity of the station.

For this study we retained subjective sampling. We determined, for the five selected stations, the minimal surface according to the method of Braun-Blanquet (1957), in relation with the shape of the curve surface-species. The surface selected was 64 m<sup>2</sup>. The vegetation of the five stations is sampled by means of floristic groups inside and outside the fence setting.

### The phytocological groups

A floristic inventory of the vegetation with a coefficient of abundance predominance which makes it possible, by the method of Tomasili *in* Long (1954), to calculate the specific contribution of the vegetable species which is a significant parameter to determine the pastoral value.

Measurements or estimates of the station ecological data concerning the geomorphology, topography, lithology and altitude.

To evaluate the pastoral resources of a steppe ecosystem, we generally consider the clear primary productivity, expressed in fodder units (UF) or pastoral productivity, and calculated starting from the ponderal primary productivity and from the energy value of plant species (Rodin et al., 1970; Loiseau & Sebillote, 1972 ; Floret et al., 1973).

For this study we considered the pastoral value (VP) which is a synthetic value that takes into account on the one hand the specific indices of quality (Daget & Poissonet, 1972) and that affected in an empirical way to each species, and on the other hand quantitative information of the vegetation recorded from the specific contributions to the vegetable carpet.

This pastoral value (VP) is obtained by multiplying, for each species, its specific contribution to the vegetable carpet by its index of quality and then adding the results obtained for the unit with the species of the station put in fence and the station left at the free pasture. The pastoral value is expressed by the following formula:

$$VP = 0.1 \sum_{i=1}^{i=n} CS_i \times IS_i$$

VP: Pastoral value

CS<sub>i</sub>: Specific Contribution index

IS: Species quality index

## Results and discussion

In Table 4 the results of the pastoral values as well as vegetable covering and the floristic richness obtained, inside and outside the fence setting, are shown.

At first sight we notice that the fence setting of the degraded stations initially knew an increase in phytomass and a diversification of the floristic richness. Except for the fence setting, the pastoral values are low varying between 7.1 and 8.1. This is due to the degree of degradation of these stations related to the overgrazing.

Table 4. Pastoral Value, vegetable covering and floristic richness of the stations sampled.

Stations	Pastoral Value			Vegetable covering (%)		Floristic richness (%)		
	HMD	MD	MD	HMD	MD	HMD	MD	MD
Taadmit	7.5	21.1 <sup>††</sup>		25.0	48.5	40	62	
Messaad	7.4	17.3 <sup>††</sup>	9.7 <sup>†††</sup>	22.5	37.5	15	31	21
Ain el Mahdi	8.1	15.8 <sup>††</sup>		25.0	35.0	25	50	
El Haouita	7.3	16.4 <sup>††</sup>		25.0	41.0	14	59	
Ksar el Hirane	7.1	7.6 <sup>†</sup>		35.0	40.0	12	15	

HMD: without fence

MD: fence setting

<sup>†</sup>Fence setting, one year old

<sup>††</sup>Fence setting, 4 year old

<sup>†††</sup>Fence setting, 10 year old

In the fence settings, the pastoral value is higher than the remainder with the free pastures, in particular at the stations or the fences back to 4 years. Indeed, the pastoral value even passes from simple to the double and then three times. That is the case of Taadmit, Messaad, Ain el Mahdi and El Haouita. In these fence settings, we noted a prevalence of the therophytes, whose specific index of quality is significant; this therophytisation is related to the phenomena of self-mulching.

In the fence setting one year old, the pastoral value increased weakly from 7.1 to 7.6 (the case of Ksar El Hirane). This slight difference would be explained by the low rainfall of the 2000 year (110mm) which could not support the development of the therophytes. In the 15 tax present, only two were transitory (Amghar, 2002).

As for the fence setting aged 10 years, the pastoral value passed from 7.4 to 9.7. This small increase is due mainly to the thickness of the stranding accumulated during 10 years which ended up choking the vegetation (Kadi-Hanifi Achour, 1998).

In addition, we tried to find a bond between the rainfall and the pastoral value of the rangeland. For that we plotted 2 curves, the first one for the stations without fence and the second one for the stations with fence during 4 years (Fig. 1).

We notice that the stations without fence have the same pastoral values, due to the severe constraints of nature (climatic and edaphic) and to the overexploitation of the rangelands as a consequence of the man harmful action.

In the fence settings 4 years old, we note the existence of a positive correlation between the pastoral value and the rainfall. Indeed the latter supports in the semi-arid and arid areas the development of annual species, generally very appreciated by the livestock, and whose contribution to the vegetable carpet is not negligible inducing strong pastoral value.

## Conclusions

The beneficial effect of the fence settings in temporary is recognized by all the specialists and very often by the stockbreeders themselves. Indeed, the answer to the question on the effect of the fence setting on the pastoral value appears obviously positive, because we attend an increase of quantitative and qualitative floristic richness and palatable species, as in the fence setting certain

species disappear with the profit of species palatable. Many therophytes with high index of specific quality developed inside the fence setting promoting an increase in the rate of vegetation covering and the pastoral value of the station.

This favorable results depend closely on the duration of the fence setting, the degree of degradation of the station and the rainfall.

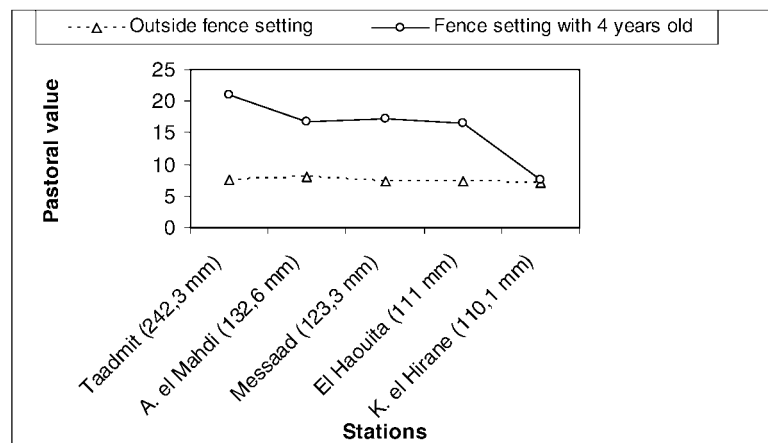


Fig. 1. Pastoral values of the stations sampled according to a decreasing climatic gradient.

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