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Study of the impact of the anthropological actions and the climate on the degradation of *Retama monosperma* (L.). Boiss growing in natural conditions in the Algerian western coast

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Abstract

The kind *Retama* belonging to the family of Legumes, it is endemic of the Mediterranean Basin; Distributed in the various bioclimatic floors, of the wet in the dry characterizes the dune ecosystems, the scrublands and the desert. In Algeria, three species belonging to the kind *Retama* are indicated: *Retama monosperma* Boiss., *Retama retam* Webb and *Retama sphaerocarpa* L. *Retama monosperma*, develop particularly on the littoral dunes of Algeria. The observations made on the station of study show that *Retama monosperma* shoot on sandy grounds, weakly wet, averagely alkaline and generally poor in nourishing elements. The low floral diversity noted in this station is certainly understandable by the combined effects of the increasing anthropological pressure and the severe weather conditions. The increase of the anthropological processes represents at the moment a major factor of degradation of the ground and the vegetation in Mediterranean region and in other regions of the world.

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Introduction

Legumes represent a family important and varied to angiosperms. Indeed, it is about the third biggest family to the superior plants with more than 720 kinds and 20000 species going of the lucerne, specie Herbaceous, in trees composing the rain forests of Latin America and tropical Africa (Cronk and al., 2006).

The kind *Retama* belonging to the family of Legumes, it is endemic of the Mediterranean Basin, Distributed in the various bioclimatic floors, of the wet in the dry. He characterizes the dune ecosystems, the scrublands and the desert (Allen and Allen, 1981).

In Algeria, three species belonging to the kind *Retama* are indicated: *Retama monosperma* Boiss. , *Retama retam* Webb. And *Retama sphaerocarpa* L. (Quézel and Santa, 1962; Boulila, 2009).

Retama monosperma, object of our study, develops particularly on the littoral dunes of Algeria. She has the property to establish symbiotic mycorrhizien associations favoring the biofertilization of the salt and poor grounds in which they prosper (Hatimi, 1995; Mosbah et al., 2008). She also contains produced which can be exploited in medicine, as alkaloids (El-Shazly and al., 1996), Flavonoids (Akkal and al., 2010).

She presents an ecological interest which lives in the stabilization of dunes, the fixation of grounds and reconstruction of the plant place setting of the semi-arid and dry ecosystems (Caravaca and al., 2003 ; Espigaresa and al., 2004, Munoz Vallés and al., 2010 ; Alguacil and al., 2011).

Retama monosperma, Specie submitted to diverse offences, essentially to anthropozoogène action. The conjugation of this one in the difficulties even the absence of natural regeneration by sexual way has ends in his progressive regression.

The present deals with the influence of the human

activities and climate on the degradation of *Retama monosperma*, the aimed objectives:

- Identify the factors of degradation of *Retama monosperma* (Anthropological and climatic factors).
- List the botanical species which accompanies *Retama monosperma*.

Material and methods of study

Geographical situation

Our zone of study is located in the daïra of Ain El Türk (on the West of the wilaya of Oran, at a height of 30 m. His coordinates Lambert corresponds to latitude of 35° 44' 36" N and longitude 0° 45' 30" W. The climate which reigns is there Mediterranean, characterized by a soft winter and a relatively hot summer (Quézel, 2000).

Climatic and bioclimatic characteristics

The Southern position of the Oranie with regard to the Mediterranean climatic zone, the prolonged summer drought and the irregularity of rains are so many threatening ecological factors perpetually the natural regions.

To estimate the influence of the main climatic elements, diverse systems are proposed. The most used in Mediterranean region are: The diagram ombrothermique of Bagnouls and Gausson (1953) and the pluviometric climagramme of Emberger (1952).

These two systems summarize the bioclimate of a station given by three fundamental elements of the climate: The precipitation (in mm), the maximal and minimal temperatures (°C).

For Belgat (2001), the intensity of rains and their frequencies play a leading role on:

-The stability or the instability of grounds, combined in the physical factors of the ground, can favor or disadvantage the structural stability of the ground.

-The solubility and the migration of nutriments in the ground. Consequence they participate in the space distribution of the sorts species.

-The evolution of the organic and mineral materials, and intervene in the formation of grounds.

The climatic characterization of the region of study is made from the data supplied by the national office of the meteorology (O.N.M) of Oran, corresponding to the period 1987-2011.

The diagram ombrothermique established from the data relative to the monthly average pluviometry and to the monthly average temperature of period 1987-2011 is illustrated by the Fig. 1. He shows that:

-The wet season spreads out over a period about six months, of the beginning of January till the end Mars on one hand, and on the other hand of in the middle of October till the end of December.

The intersection of both curves (pluviometry and temperature) allows estimating the duration of the dry period which is stressed during the hottest months of the year (summer). She extends over a period going of the first week of March until in the middle of October, is almost 06 months.

Seasonal distribution of rains

Defined by Musset (1935), the method consists in an arrangement of the seasons in decreasing order of rainfall, what allows defining a seasonal area code of every station.

This seasonal distribution is particularly important for the development of the annual ones the role of which is often dominant in the face of the vegetation. If spring and autumn rains are sufficient, they will be prosperous; If on the other hand the quantity fallen during these two seasons is weak, their extension will be mediocre (Corre, 1961).

The seasonal distribution of the precipitation in the region of Ain el Türk is represented in the Table.1. This distribution constitutes, for the region of Ain el Türk, type H.A.P.E's seasonal area code.

Pluviometric quotient of Emberger

The use of the pluviometric quotient of Emberger (Q2) the application of which is appropriate to the Mediterranean regions allowed to Classify Ain el Türk in the semi-arid bioclimatic floor in hot winter

Analysis of the ground and the vegetation

The substratum of the station of study (Ain El Turk) where evolves *Retama monosperma* and where was taken the studied plant material was characterized by a series of physico-chemical analyses. The floral procession of our species was also identified.

For that purpose, at the level of this station of study, nine small places were chosen according to three levels different from the dune: In the bottom of dune, middle of dune and summit of dune. For every level, three small places were analyzed. The surface of everyone is 100 m², Corresponding to the minimal area which represents a surface where the ecological conditions are homogeneous and the vegetation is uniform.

Analysis of the ground

The study of the ground is essential because the latter establishes the unique and the main support for the development of the vegetation (Chamly, 2002).

The ground of every small place was analyzed. Samples were taken in a depth going of 10 and 20 cm. These samples were all accompanied with a descriptive index card informing about all the parameters of characterization of grounds from observations of ground (structure, color).

The various pedological parameters were analyzed by referring to techniques developed by Aubert (1978).

Analysis of the vegetation

Used Method

We used the method of the statements phytoécologiques of Braun-Blanquet (1952) said also stigmatiste or the method of the minimal area. This method is usually used in vegetable ecology:

-Note the ecological conditions of the statements.

-To raise a list of species.

-A coefficient of abundance - dominance, of sociability as well as one indication of presence or frequency of appearance in every statement.

Results and discussion

The grounds of nine studied plots of land have a structure particular, a yellow color and a strictly sandy texture, the rocky fraction appears in the form of fragments and fragments of roots.

Globally, the rate of humidity is weak. We notice that the rate of humidity is more important in the samples of the ground of the plots of land situated at the foot of the dune level 1 with a 0.047 % rate.

The pH presents values between 8.83 - 9.09 and reflects the basal character of the dune grounds of Ain el Türk.

The electric conductivity varies between 0.02 and 0.04 ms / cm for all the samples of ground. After projection of the results on the scale of saltiness, we notice that the various grounds belong to the category of the not salty grounds.

The projection of these results on the scale of the determination of the content in organic matter shows that the reserved samples belong to the category of poor ground in organic matter. It is a criterion common to the grounds of the dry and semi-arid zones (West *and al.*, 1994).

Table 1. Seasonal distribution of the precipitation (in mm) in the region of Ain el Türk (1987-2011).

Seasons	Autumn			Winter			Spring			summer		
Month	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Mai	Ju.	Ju.	Aug.
Monthly average pluviometry (in mm)	15,00	22,72	52,88	37,76	38,45	33,75	31,60	24,20	15,16	20,40	1,25	1,72
Seasonal accumulation	90,60			109,96			70,96			23,37		
Seasonal percentage	30,72			37,28			24,06			7,92		

Table 2. Staff and indications of presence of the species of every family.

Families	Number of species	Indication of presence (%)
Apiaceae	01	09.09
Astéraceae	02	18.18
Boraginaceae	01	09.09
Caryophyllaceae	02	18.18
Fabaceae	02	18.18
Plantaginaceae	01	09.09
Poaceae	01	09.09
Rubiaceae	01	09.09

The projection of the results of the total limestone on the scale of the interpretation of carbonates shows that samples are averagely calcareous. As regards the active limestone, the results are heterogeneous varying from 3.6 % to the 7.9 %.

Analysis of the floral procession of Retama monosperma

The littoral dunes establish additional spaces of beaches behind of which they are situated. These dunes are characterized by the presence of a plant cover, a variable density, which fixes more at least

their sand. So that a dune is built on a quotation, it is necessary the wind, the sand and the vegetation. The wind plays an essential role by its direction its frequency, its duration and especially its speed. The vegetation which grows immediately at the back of

beaches plays a major role in the formation of the bordering dunes, Slow down the wind, the trap and stabilizes the sand in movement (Hatimi and Tahrouch, 2007).

Table 3. Classification of the species inventoried according to their biological types.

Biological types	Number	Presence (%)
Phanerophytes (Ph)	01	09.09
Hemicyptophytes (He)	05	45.45%
Therophytes (Te)	05	45.45%
Totals	11	100

The action of the wind is determining in the dune middle as well from the physical point of view (Evaporation, humidity, erosion, salt content, etc.) that from the point of view biotic (dessechement of the ground, the increase of the evapotranspiration of

vegetables, their burying by sands, etc.). He acts by his intensity and the duration of his action as well as by his responsibility in humidity which depends on its direction (Bendimered, 1997).

Table 4. Classification of the species inventoried according to their morphological types.

Morphological types	Number	Presence (%)
Herbaceous perennials (H.V)	05	45.45
Annual herbaceous (H.A)	05	45.45
Woody perennial (L.V)	01	09.09
totals	11	100

The dune grounds are generally poor in nourishing elements and in water (Fisher and Turner, on 1978; West and *al.*, on 1994; Hatimi, on 1995). The majority of the dunes of the coast know a destabilization

increased because of the degradation of their vegetation. To contribute to restore the vegetation of these dunes, analyses edaphique, botanical of their grounds are necessary.

Table 5. Classification of the species inventoried according to their biogeographical types.

Biogeographical types	Number	Presence (%)
Méd.	06	54.54
Euro-Méd.	01	09.09
Méd-Atlant.	02	18.18
Méd-Occid.	01	09.09
Euro-Asi.	01	09.09

The studied site presents homogeneous vegetation dominated by *Retama monosperma*.

-*Ononis variegata* (Fabaceae)
 -*Anthemis maritima* L, *Carthamus lanatus* (Astéracées)

Eleven accompanying species *Retama monosperma* were inventoried:

-*Plantago coronopus* subsp. *coronopus* (Plantaginacées)

- Echium arenarium* (Boraginaceae)
- Logurus ovatus* (Poaceae)
- Paronychia argentea and silene ramosissima* (caryophyllaceae)
- Eryngium maritimum* L (Apiaceae)
- Crucianella maritima* L (Rubiaceae)

All the listed species is preferential psammophytes of the littoral dune formations (Alcaraz, 1982).

Systematic composition

The listed species are connected with eight botanical families represented in the Table.2.

The study of the distribution of the botanical families at the level of the station of study allowed to classify them in decreasing order:

Three (03) families in two species (Fabaceae, Asteraceae and Caryophyllaceae) with an 18.18 % presence.

Five (05) monospecific remaining families, represented by a single species with a 09.09 % presence.

(Apiaceae, Boraginaceae, Plantaginaceae, Poaceae and Rubiaceae).

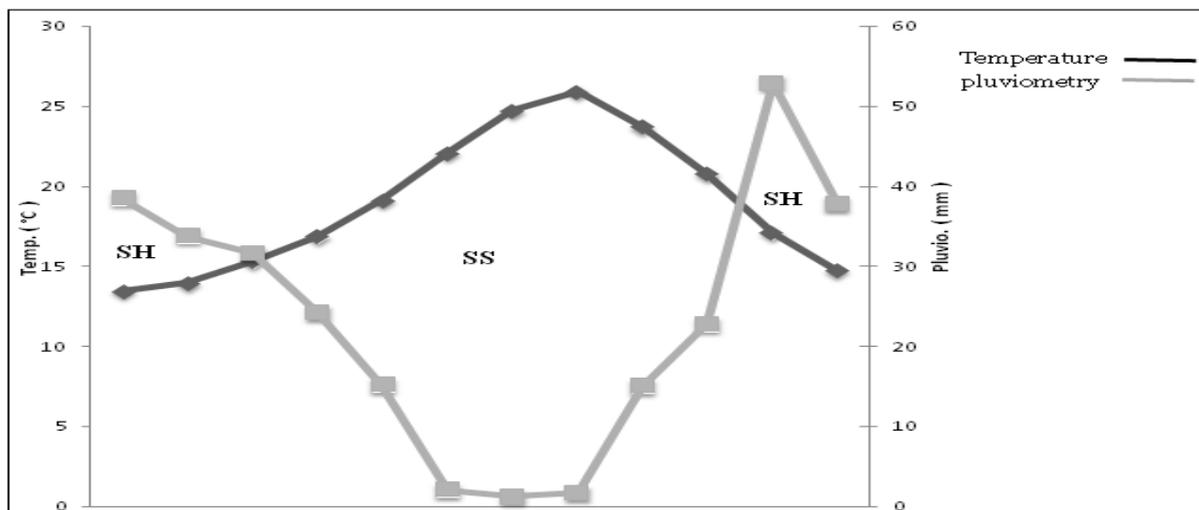


Fig. 1. diagram ombrothermique (P=2T) of Bagnouls and Gausson of the station of Ain el Türk (1987-2011).SS: dry season; SH: wet season.

Biological characterization

The classification of the botanical species by biological types is made on all of the inventoried species. The results are summarized in the Table.3.

-The analysis of the biological spectre makes three biological types go out:

-The ascendancy of thérophytes (Th) and hémicryptophytes (He) with 05 species with a 45.45 % presence.

-Phanérophytes (PH) contains 01 species with a 09.09 % presence.

Morphological characterization

The characterization of the botanical species met according to their morphological types in highlighted the results grouped included in the Table. 4.

Biogeographical characterization

The phytogéographique study establishes an essential base in any attempt of preservation of the biodiversity (Quézel, 1991).

The biogeographical types of the listed species are illustrated in the Table.5.

The analysis of the biogeographical spectre highlighted the dominance of the Mediterranean element (Med). Which constitutes more than half of the listed species With 06 species with a 54.54 % presence, follows then successively.

The Mediterranean-Atlantic element (Méd-Atlant). With 02 species with a 18.18 % presence, the western Mediterranean element (Méd-Occid); Euro-Mediterranean (Euro-Méd). And Eurasian (Euro-Asi) with 01 species for each of them, is a 09.09 % presence.



Pl. 1. Factors of degradation of the housing environment of *Retama monosperma*.

A and B: Impact of the pasture;

C and D: Impact of the pressure of urbanization;

E and F: Impact of the pollution (rejections of household waste).

In view of the low number of inventoried species, we can move forward that our site of study is weakly diversified. Our observations join those of Hatimi and Tahrouch (2007) Make on the littoral dunes of Souss-Massa (Morocco) where they found a low vegetable diversity with 17 species inventoried, dominated by two legumes (*Retama monosperma* and *Ononis natrix*) And a poaceae (*Schismus*

barbatus). This low floral diversity is certainly understandable by the combined effects of the increasing anthropological pressure natural resources and the severe weather conditions so engendering dysfunctions of the ground ecosystem generally and dune in particular (Quézel and Barbéro, 1985; Benbrahim *and al.*, 2004; Weise *and al.*, 2008 ; Benabadji *and al.*, 2009).

The littoral dunes are threatened by the tourist developments which reshape housing environments by destroying the plant groupings which colonize these circles. (Pl .1).

-The uncontrolled pasture which entrain afterward the destruction of the plant place setting.

-The construction of tourist complexes deteriorates the degradation of the environment.

-The agricultural activity scattered almost everywhere around the dune complex.

-Pollution of the environment.

In this environment, it is also noted that the wind has an important role by its frequency and its intensity (Aime *and al.*, 1982) by asserting that the wind dynamics is the cause of the seriation of the vegetation in this zone. Under the effect of the wind, the seeds of thérophytes are transported far from their production site, what also explains the absence or the disappearance of several species known in this region.

Whether it is at the foot of the dune, in the middle of the dune or in the summit, stratum shrubby is essentially represented by *Retama monosperma* presenting a better vigour. The number of annual species in the bottom and in the middle of the dune is more important with regard to compared with the summit.

The number of the annual species could vary according to the correlation of the variables of the environment for the same region (Djebaili, 1984). He is to indicate that in our site of study, stratum raised is non-existent.

In the procession of the plants which accompanies *Retama monosperma* in its stabilizing role, species of the family of apiaceae co-dominates. It is about *Eryngium maritimum*.

The bottom of the dune corresponds to the vegetation of the coastal dunes such as *Anthemis maritima*, *Plantago coronopus*, *Echium arenarium*, *Logurus ovatus* which dominate in stratum herbaceous, we note the presence of *Paronychia argentea* and *Ononis variegata* in small proportion.

Conclusion

The observations made on the station of study show that shoot on sandy, weakly wet, averagely alkaline and generally poor grounds in nourishing elements *Retama monosperma*.

The low floral diversity noted in this station is certainly understandable by the combined effects of the increasing anthropological pressure and the severe weather conditions So engendering dysfunctions at the level of the ground ecosystem generally and dune in particular (Quézel and Barbéro, 1985 ; Benabadji *and al.*, 2009).

In epilogue, it appears that *Retama monosperma* is a vegetable resource of a big interest which can play an important role in the ecodevelopment of our country .current state calls out to take measures of putting défens rigorous, in the creation of production sites of seeds and plants on the basis of ecological data And in the implementation of a legislation which values, protects this resource.

Acknowledgements

The nature is eternally young, beautiful and generous. She possesses the secret of the happiness of which *no* one has ever robbed her.

George Sand/

Thank you for nature's bounty.

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