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THE BIOLOGICAL AND PHYTOSOCIOLOGICAL STUDY OF RIPISYLVES OF THE TLEMCEN REGION, ALGERIA

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Abstract

The vegetal landscape of the Ripisylves, which naturally border the rivers, has a character linked to a high instability of the intermittency of the latter. These floods rejuvenate the riparian vegetation, creating their renewal. Temporary streams (oueds) are characterized by Mediterranean-type vegetation and flora (*Tamarix*, *Nerium*, *Vitex*, *Phoenix*...) unlike the permanent streams present at the level of the major bed a tree vegetation of European type, mainly based on poplars, ash or alpnes. To inventory and quantify the Ripisylves of the southern Mediterranean coast, especially in western Algeria, we have developed an interpretation by analysis of correspondences (A.F.C), which aims to identify the Ripisylves of the middle and low Tafna, located in the north-west of Algeria; and classify these Ripisylves by degree of vis-à-position - opinion of the stream, the degree of position and the salinity. Using biological, phytosociological and phyto-dynamic data, we were able to understand the evolution of this vegetation, and its diversity.

Key words: Riverine Vegetation. Phyto-sociological; dominance; Wadi Tafna; Tlemcen; Western Algeria; phyto-dynamic; ecology; hydro-system.

Introduction

The temporary nature of water courses in the Mediterranean region in terms of ecological and biological environments very heterogeneous and therefore extremely varied and rich.

In the Mediterranean, the riparian forest is a physiological all peculiar and still poorly understood from the point of view typology and especially dynamic, particularly in Western Mediterranean QUÉZEL and MÉDAIL (2003).

Riverine forest are forest formations temporarily saturated wet soil-climate of the edge of a stream, the analysis of the structures of riparian forest vegetation is still poorly known. Only a few countries or regions have been the subject of work; This is the case in Mediterranean France, are to include the work of BRAUN – BLANQUET and *al*. (1952), TCHOU (1948 – 1949) in lower Languedoc, LOISEL (1976, 1983), La PRAZ (1948) and VARESE (1994) to the South - East of the France and in Corsica those of DIERSCHKE (1975) and GAMISANS (1991) for the Paca region, south of the France BARBERO, (2006) for the Spain ALCAZAR – ARIZA and *al*. (1987); RIVAS – MARTINEZ and *al*. (2001), the Italy and Sicily BRULLO and SPAMPINATO, (1990); PIGNATTI, (1998), but also the Algeria and the Western Mediterranean basin as a whole BENSETTITI and LACOSTE, (1999).

The work we present here concerns the recovery of vegetation in the region of Tlemcen. It is associated with a high percentage of salt, always greater than 60%. These represented formations and primarily relate to the importance of the salt deposits and the presence of gypsum and water QUÉZEL 2003.

The purpose of this study is to identified vegetation riverine forest of the middle and lower Tafna place Northwest of the Mediterranean southern part Algeria.

The inventory of ripisylves is required along the Tafna wadi from north to south. The use of a factor analysis of matches will allow us to better perceive the ecological factors that govern this extremely complex ecosystem.

This study was conducted on the basis of phytosociological surveys, to determine the close affinities of different plant groups of *Tamarix africana*.

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Material and Method

Study Site

The study area Fig. 1 covers the middle and lower Tafna. The Tafna with an area of 7245 km^2 watershed is located northwest of the Western Algeria. It extends over the whole of the region of Tlemcen (77% of the total area) and extends to the realm of the Morocco. The Interior of this basin, there are three main areas:

- East zone: Its main wadis are Oued Chea, Oued Isser and Oued Sikkak and Confluence the Mafrouche.

- West zone or high Tafna: its main wadis are Wadi Tafna, Oued Mouilah and Oued El Khemis.

- North zone or middle and lower Tafna: it starts virtually after the Hammam Boughrara dam and extends effective ‘ at the mouth of WadiTafna on Mediterranean Sea.

The main drains in this area are the Wadi Tafna with wadi Zitoune on the South side and Boukiou on the north side.

The main watercourse of the Tafna, long about 170 km, originates in the Tlemcen Mountains to the cave of Ghar Boumazaa (Tafna High) level downstream of the dam of Béni Bahdel stream formed the maze by carving steep gorges, leading to the plain of Maghnia.

This western part is mainly fed by the Oued Mouilah and the wadis of the slope north of mountains of Tlemcen to the dam of Hammam Boughrara (average Tafna). The watercourse of the Tafna crosses Remchi Plains, or it receives its major tributary Oued Isser, his journey ends in an estuary in the middle of the beach of Rachgoune Fig. 1 and table 1.

Some tributaries of the Tafna as Oued el Khemis,

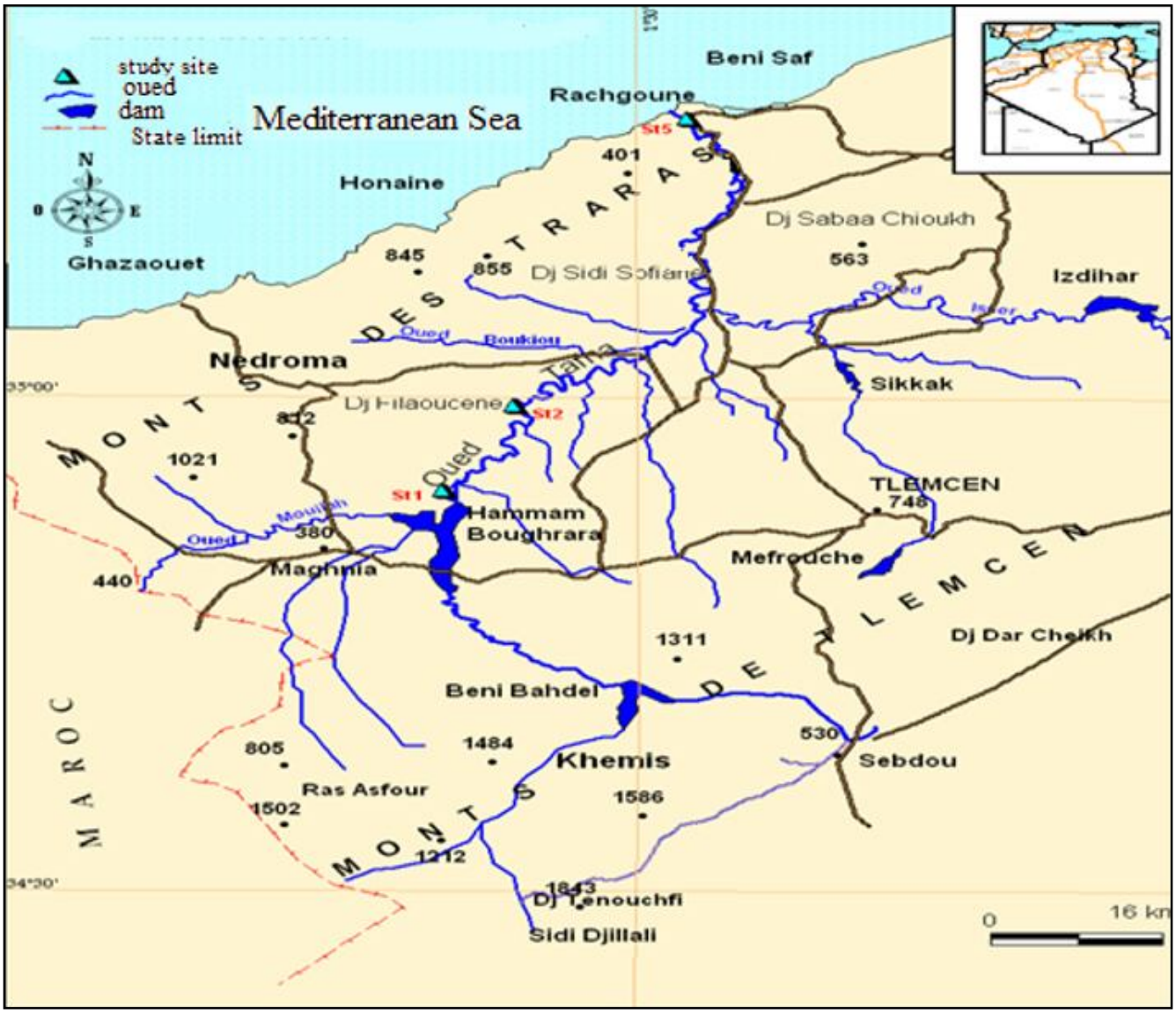

Fig. 1: Location of the study area.

Table 1: Location of stations of studies.

Stations	Latitude	Longitude
Station 1 Sebdou	34.906448°	-1.647157°
Station 2 Dj Fellaoucene	35.245958°	-1.437833°
Station 3 Rechgoun	35.284316°	-1.456887°

Oued Mouilah, Oued Isser, Wadi Sikkak and Oued Chouly, are permanent and are never full; on the other are temporary, non-powered and that depend on rainy seasons.

The bioclimatic study for two periods (1913-1938) and (1970-2002), Fig. 2 showed vertical indent of each station in direct relation with the Q_2 (Emberger 1955) Station Beni – Saf, despite falling on of the value of Q2 always under floor lower semi-arid to hot winter.

This climate favors the extension of a vegetation therophytic xerophyte...

To enhance riverine vegetation we have made 50 surveys in total; and each survey was conducted in a floristically homogeneous surface.

The surface of the record must equal at least to the minimum area, containing almost all of the species present.

The execution of statements is accompanied by the rehabilitation of the site characters. (Location, altitude, exposure, recovery rate, substrate, slope etc....); then, each species is affected by two indices, the first relates to the abundance – dominance, the second sociability.

Abundance – dominance expresses the space occupied by the projection on the ground of all the individuals of each species. This coefficient allows the following scale (BRAUN BLANQUET 1952).

+ Species introduced to recovery and low abundance until the number

5 top recovery 75 with abundance any

Sociability expresses the mode of distribution of individuals of the same species contribution to the other one. It is assessed according to the scale proposed by (BRAUN BLANQUET 1952)

1 individual of the species are isolated.

5 individuals of the species are in continuous stands.

Once made statements, they were ordered by a factorial analysis of correspondences (A.F.C) and a hierarchical ascending classification (C.A.H).

For this analysis we will focus on the environmental determination of the floristic diversity and syntaxonomique analysis which will be devoted to the description of the phytosociological units of the riverine vegetation.

The software calculates the statistical distance between surveys based on the frequencies of the listed species.

The cloud "point's lines" or "points columns" stretches along a preferred direction which corresponds to the factorial axis of analysis. Every factorial axis is characterized by an Eigen value which translates the inertia of the cloud of point along the axis. The inertia rate represents the percentage of the axis in the total inertia of the cloud. The Eigen value and the rate of inertia are higher that the cloud of points is well structured along a factorial axis.

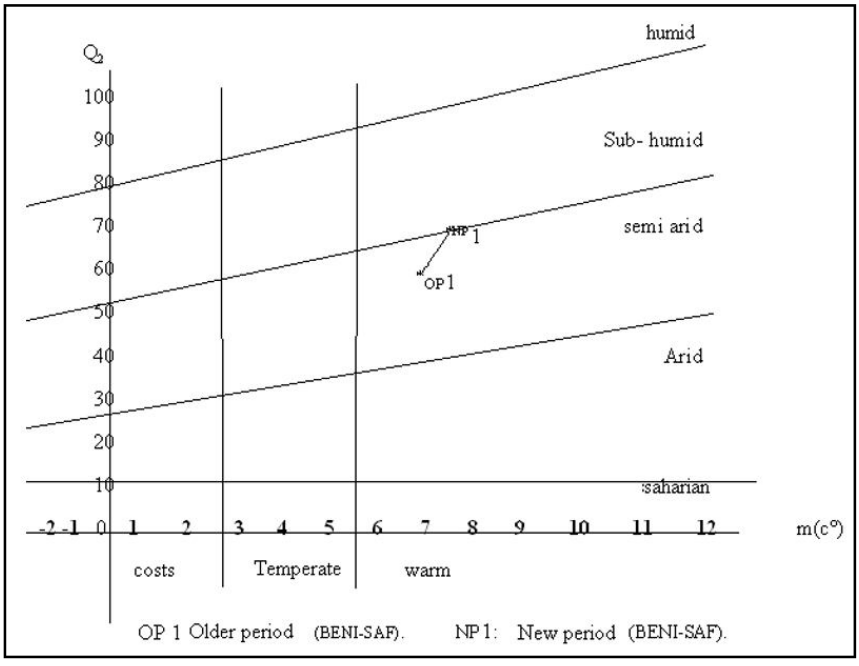

Fig. 2: Climagramme pluviothermic Emberger.

The hierarchical ascending classification begins with the construction of a table of distance between statements of the Starter Kit. From the first table of distance, the algorithm finds the couple's statements with the shortest distance so the more homogeneous.

Coding

For computer processing of the data, a number is assigned to each of the surveys, in the order of their execution for example: expenditures.1 R1.

Similarly, taxa have been coded by the first letter characterizing the kind followed by a number in order of repetition of the corresponding kind, in

the following manner:

- *Achillea leptophylla* A1.
- *Aegilops triuncialis* A2

Digital processing

Basic data consist of a dual input matrix where surveys are arranged in rows and plant species in column, at the intersection is the index of abundance – dominance or presence-absence.

In this regard, we have opted for the second index since according to all Phyto-ecologues

Preference is given to him for the identification of plant groupings. This index takes the value '1' in the event of presence and the '0' if there is no value that also has the advantage of simplicity and universality.

Results and Discussion

Ecological significance of axes

The factorial analysis of correspondences of the 200 surveys conducted is divided on 03 stations with :

Variance	6,8748	3,9745	3,7460	14,5953
% var	0,137	0,079	0,075	0,292

The Eigen values of the axis (1 and 3) are respectively 0, 137et 0.075. They demonstrate a heterogeneous structure of the cloud.

Factorial maps showing plans for projections 2/1 and 3/1 exam at finding 03 sets very contrasting and coarser in plan 3/2.

Despite the low percentage of the Eigen values, the majorities of species have a contribution greater than or equal to 0.50.

Research of the ecological significance of the factorial axes will rely on the confrontation of species with strong contributions and its distribution on the one hand the positive side and on the other hand the negative side of each axis. We will thus attempt to specify what will be the major ecological factors in the diversification of the sword.

- Plan 2/1: Fig. 3

• The negative side:

Daucus carota; Marrubium vulgare; Scolymus hispanicum; *Echinops spinosus; Rumex bucephalophorus; Hordeum murinum; Tamarix africana; Chenopodium album; Alopecurus muricatus; Nerium oleander; Marrubium vulgare.*

· The positif side :

Bryonia dioica; Avena sterilis; Withania frutescens; Arthrocnemum glaucum; Atriplex halimus; Acacia sp;Arundo donax;Typha latifolia; Calycotome intermedia; Ziziphus lotus; Zygophyllum sp; Suaeda fructicosa.

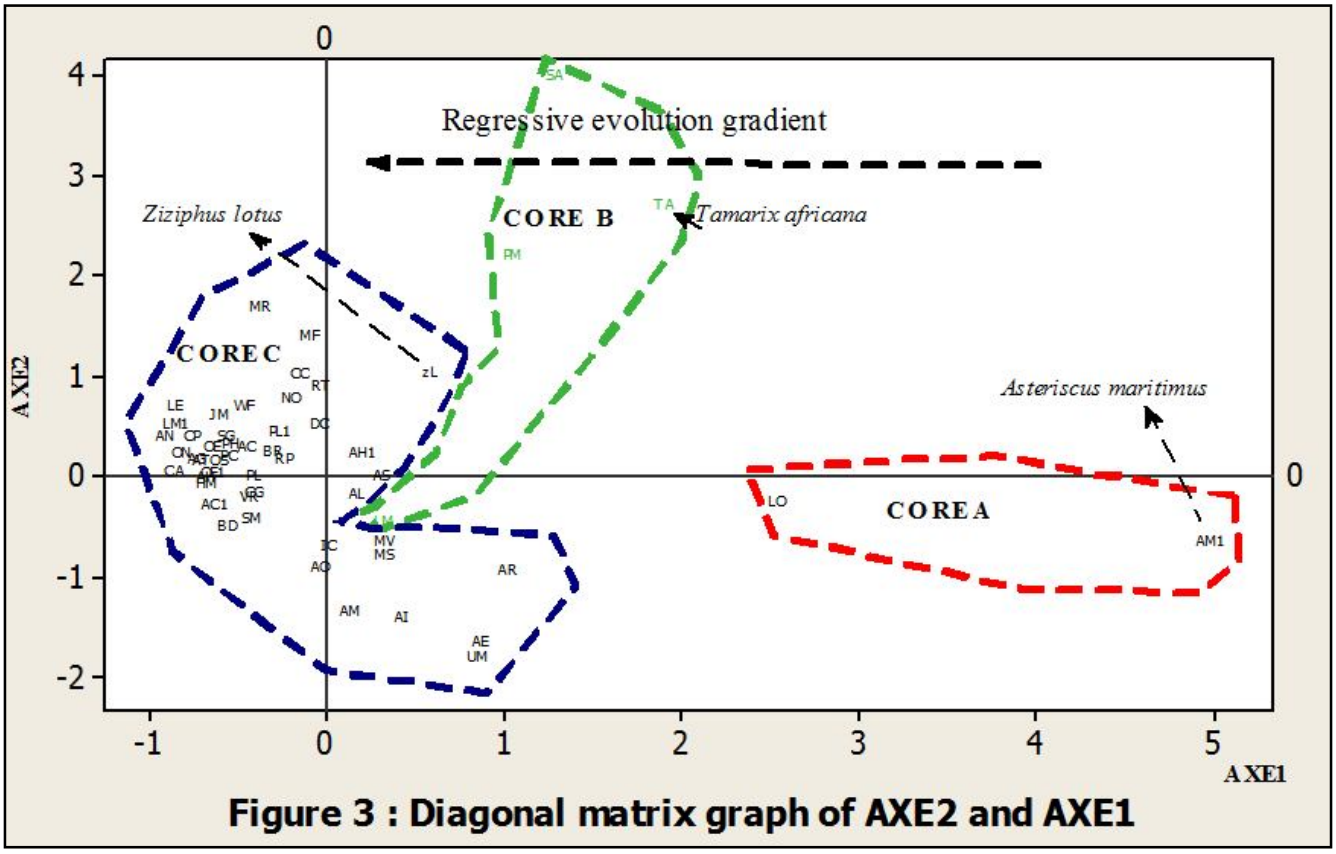

Figure 3 : Diagonal matrix graph of AXE2 and AXE1

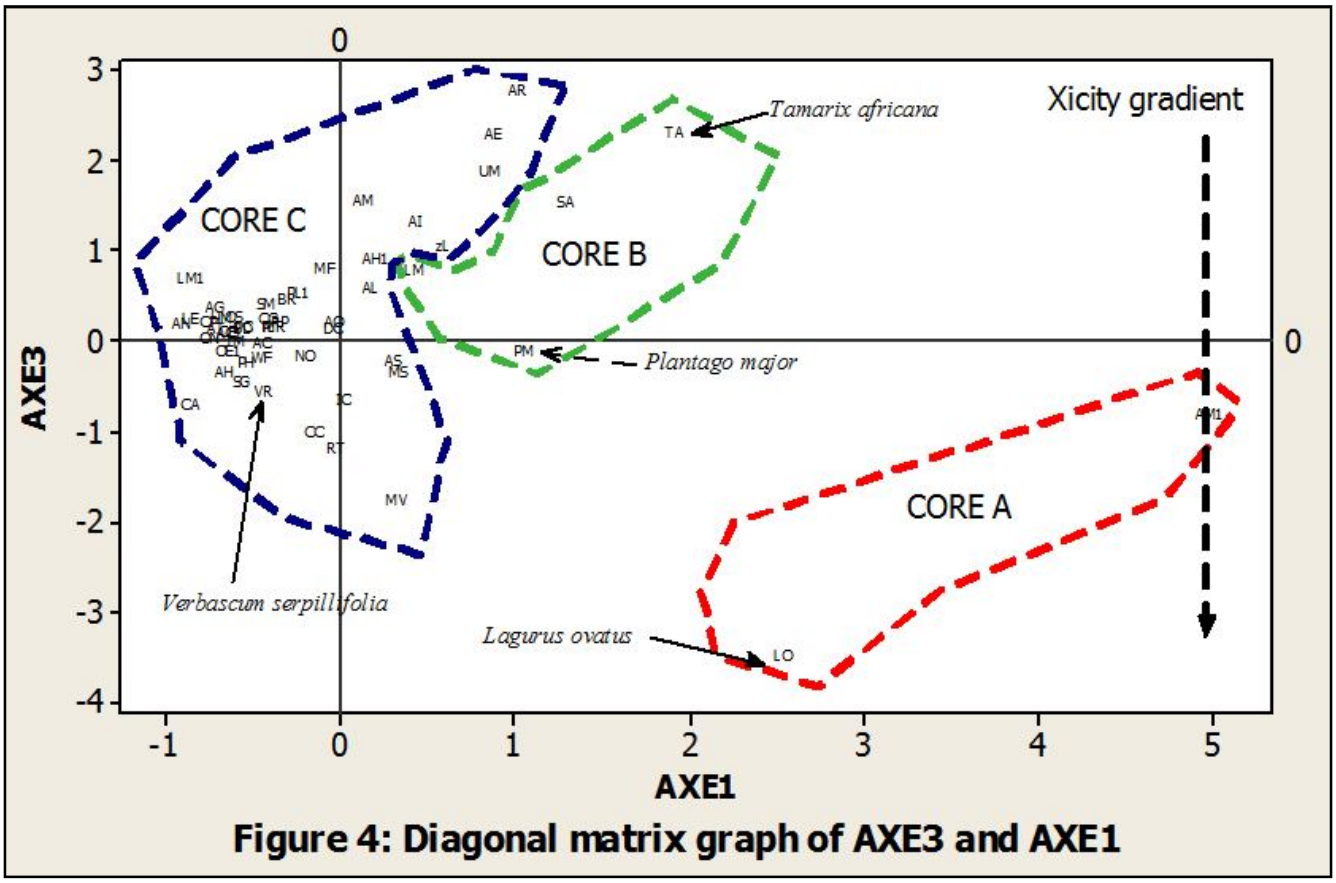

Figure 4: Diagonal matrix graph of AXE3 and AXE1

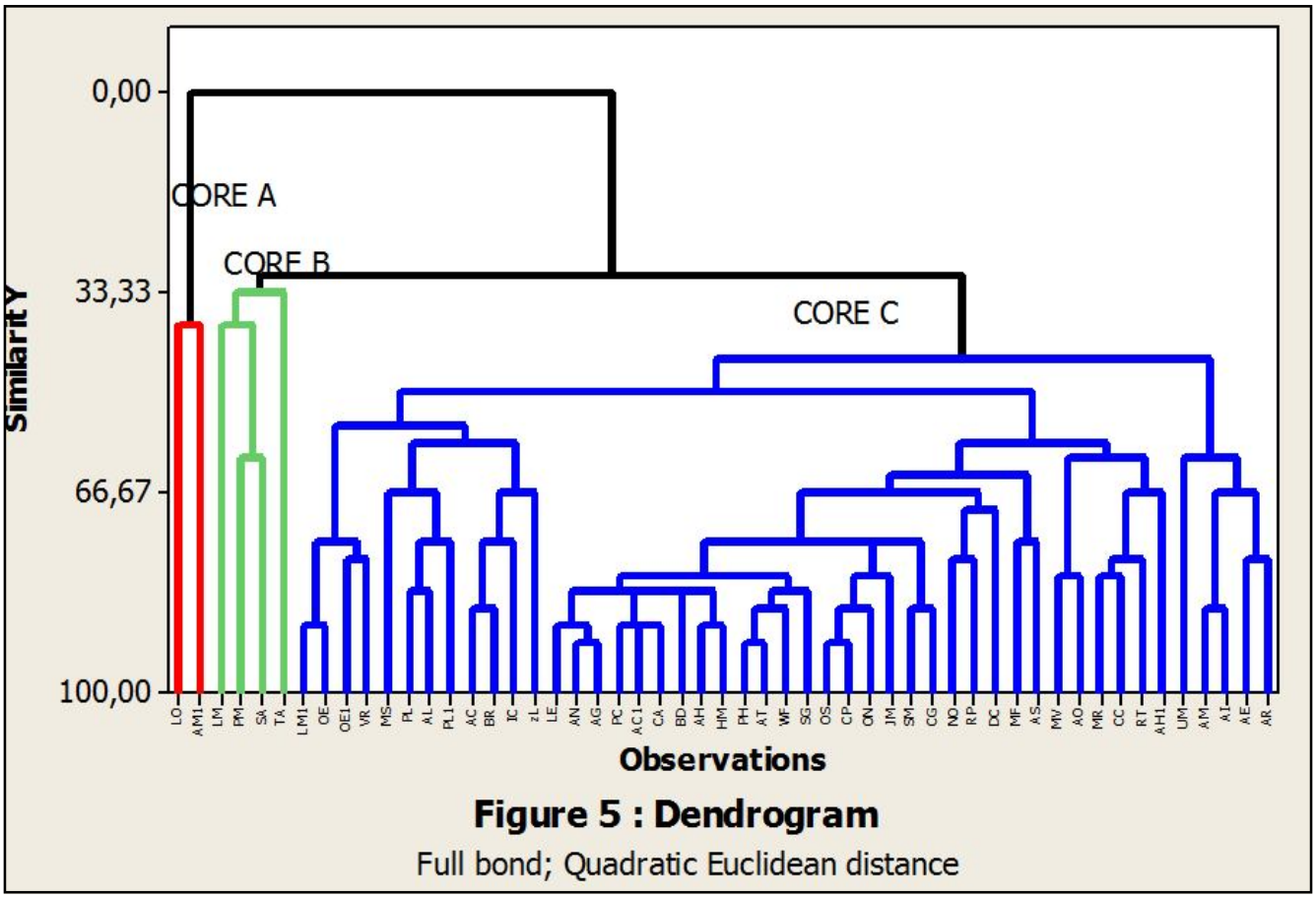

Figure 5 : Dendrogram

Full bond; Quadratic Euclidean distance

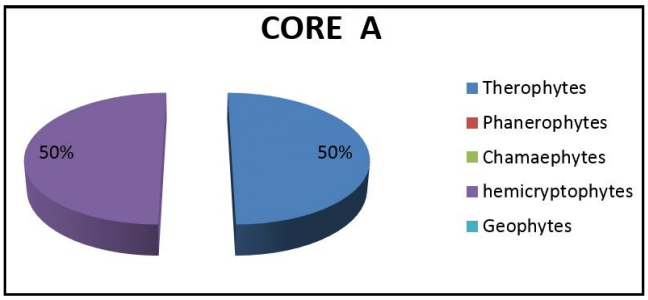

Fig. 6: Biological types of Dendrogram CORE A.

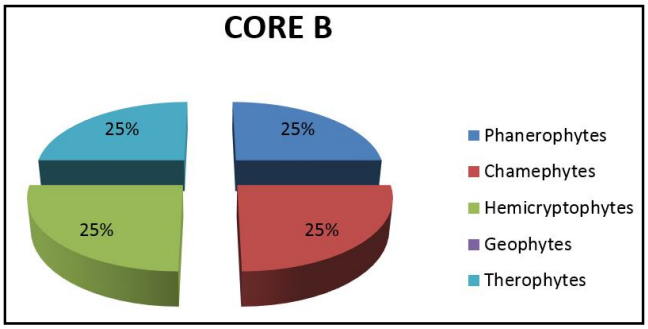

Fig. 7: Biological types of Dendrogram CORE B.

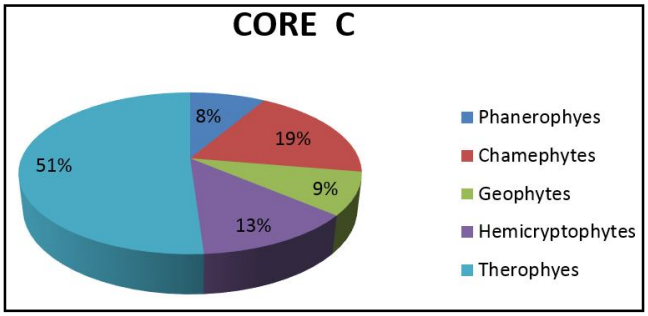

Fig. 8: Biological types of Dendrogram CORE C.

The negative side is dominated by the species settling on for the Tafna High flood level, while the positive side is dominated mainly by species that settled on the upper part of the Wadi Tafna characterizing thus Matorral training by the presence of *Arthrocnemum glaucum;Suaeda fructicosa* and *Calycotome intermedia.*

This axis shows the species indifferent substrate and independent deputy in a changing gradient substrate.

The riverine vegetation for upstream (station 3 Rachgoun) under semi-arid climate arid a (Sebdou station 1), one of the species planted the most tolerant at these conditions is *Tamarixafricana* in wet depressions and near the lightly soiled marshes; While the halophytes species (*Zygophyllum*, *Atriplex, Suaeda*) and hydrophytic vegetation (*Nerium oleander*) are the most suitable for freshwater and brackish water bodies respectively.

The vegetation of the watercourse transitional (wadis) or for low rate, essentially thermomediterranean upstairs, dominated by various *Tamarix* (Tamaricacaies) and *Neriumoleander* (Neriaie) and this mostly to the South and east of the Mediterranean belongs to the order of TAMARICETALIA AFRICANAE Br.-Bl. & O. BOLÒS 1954.

- Plan 3/1: Fig. 4.

· Negatif side :

Daucus carota; Marrubium vulgare; Scolymus hispanicum; *Echinops spinosus; Rumex bucephalophorus; Hordeum murinum; Tamarix africana; Chenopodium album; Alopecurus muricatus; Nerium oleander; Marrubium vulgare; Acacia radiana; Ricinus communis.*

· Positif side:

Pistacia lentiscus; Bryonia dioica; Avena sterilis; Withania frutescens; Arthrocnemum glaucum; Atriplex halimus; Acacia cyanophylla; Arundo donax; Asparagus stipularis; Typha latifolia; Calycotome intermedia; Ziziphus lotus; *Zygophyllum* sp; *Solanum* sp; Robinia pseudoacacia.

The positive side of this axis is in particular species that characterize Matorral formations, and the negative side revealing a less degraded than the first pole. *Acacia radiana; Ricinus communis; Acacia cyanophylla; Solanumsp; Robinia pseudoacacia* are allochthonous species that arrive to play a physiognomic role in communities, and contributes to the procession of hygrophilous associated species such as (*Typha latifolia; Juncus maritimus;Arundo donax; Carex* sp).

The positive side dominated by the thorny xerophytic species, while the negative side contains hygrophilous species. This axis translated a moisture gradient in the opposite direction of the axis.

Ecological Meanings of the Dendrogram Fig. 5.

CORE A: this nucleus is represented by two species, one of which is hemi-cryptophytes and the other is Therophytes which gives us a nucleus of 50% for each species. These can be explained by the same ecologicals that these two species represent Fig. 6.

- CORE B: This nucleus is represented by four species that represent four biological types and the total absence of geophysicists Fig. 7.

These species settle on the same type of silica substrate with sandy texture.

CORE C: This nucleus has a biological type dominated by therophytes with a percentage of 51% 5 Fig. 8.

The diagram is as follows: TH>CH>HE>GE>PH.

Table 2: Contributions of the taxa for the first three lines of the A. F.C.

Genres Especes	Code	AXE1	AXE2	AXE3
Lagurus ovatus	LO	2,53933412	-0,42679539	-3,6978039
Lavatera maritima	LM	0,32475073	-0,62145285	0,66754035
Lobularia maritima	LM1	-0,84682431	0,33969513	0,48168573
Lycium europaeum	LE	-0,85388651	0,52369037	0,04255401
Malva sylvestris	MS	0,33425859	-0,9576729	-0,54659919
Marrubium vulgare	MV	0,33115519	-0,82627367	-1,96764974
Medicago falcata	MF	-0,09691748	1,23406923	0,59521456
Medicago rugosa	MR	-0,37039779	1,51841935	-0,04667729
Nerium oleander	NO	-0,20370008	0,58965857	-0,37372541
Oxalis pes-caprae	OE	-0,63934191	0,126567	-0,08745338
Olea europaea	OE1	-0,63665045	-0,14262996	-0,31422551
Ononis spinosa	OS	-0,60073685	-0,03382526	0,0674391
Ononis natrix	ON	-0,74731935	-0,03412641	-0,17214978
Papaver rhoes	PH	-0,53849407	0,14555023	-0,45028209
Phalaris communis	PC	-0,55026544	0,01784518	-0,0557858
Pistacia lentiscus	PL	-0,40063663	-0,15983764	-0,04620673
Plantago lagopus	PL1	-0,23992285	0,06155472	0,3266007
Plantago major	PM	1,05647433	2,02586789	-0,32594877
Reichardia picrioides	RP	-0,34977594	0,02358968	0,01419448
Reichardia tingitana	RT	-0,02223447	0,71209567	-1,38242756
Scolymus hispanicum	SG	-0,55802142	0,21854724	-0,65867691
Sylibum marianum	SM	-0,4146029	-0,60807812	0,20223439
Sinapsis arvensis	SA	1,29247082	3,81606164	1,31692238
Tamarix africana	TA	1,91035293	2,52770518	2,1087035
Bryonia dioica	BD	-0,55181175	-0,68310509	-0,07509979
Verbascum serpyllifolia	VR	-0,43017716	-0,37588963	-0,7865662
Withania frutescens	WF	-0,45215662	0,52847176	-0,40714758
Juncus maritimus	JM	-0,59079916	0,43849317	-0,19805903
Acacia cyanophylla	AC	-0,45053941	0,11898977	-0,23322963
Anagallis arvensis	AN	-0,90722182	0,2136112	-0,03126223
Arthrocnemum glaucum	AG	-0,72419287	0,00596195	0,15800085
Atractylis carduus	AC1	-0,63369676	-0,45953141	-0,13316253
Atriplex halimus	AH	-0,67012517	-0,19058101	-0,56318542
Bromus rubens	BR	-0,30089776	0,07182366	0,24971671
Centaurea pullata	CP	-0,74665285	0,21295052	0,00294652
Chenopodium album	CA	-0,85069678	-0,11014552	-0,91126629
Chrysanthemum coronarium	CC	-0,14206564	0,83099286	-1,21629937
Chrysanthemum grandiflorum	CG	-0,40203393	-0,33533249	0,03575982
Daucus carota	DC	-0,04119435	0,33550187	-0,07894754
Hordeum murinum	HM	-0,67390025	-0,25164385	0,04064901
Inula crithmoides	IC	0,02280095	-0,85652466	-0,84737782
Ziziphus lotus	ZL	0,58911994	0,86333036	0,83601032
Urginea maritima	UM	0,85196603	-1,98331371	1,69147826
Asphodelus microcarpus	AM	0,13544648	-1,50916182	1,35826943
Asteriscus maritimus	AM1	4,98003475	-0,81391332	-1,00441847
Ajuga iva	AI	0,42936647	-1,58832036	1,12364821
Althaea hirsuta	AH1	0,20705619	0,04611099	0,71623515
Anthyllis tetraphylla	AT	-0,70767565	-0,03494961	-0,07162485
Arenaria emarginata	AE	0,87304858	-1,82143495	2,08914544

Table 2 Continued.....

The dendrogram showed an evolution of biological types from two biological types to five biological types on the one hand, and a regression of the ripisylve plant cover on the other hand by the dominance of therophytes with 50% and a low percentage of phanerophytes of the order of 8%.

The therophytization of the environment is explained by the intense action of man and his herds on the vegetation cover (grazing, urbanization, installation of crops in forest formations, arson and involuntary etc.).

Conclusion

The riverine forest formations are relatively more complex and are integrated into a few separate units, since depending on whether they are related to fresh or brackish water, communities vary: these thickets consist of *Tamarix africana* and *T. gallica* (Tamaricionafri-canae) to the West and South.

GAMISANS (1991) has defined various groups organizing themselves around T. *africana*; the *Tamaricetum gallicae* J. BRAUN –BLANQUET and O. BOLÒS (1954) are also in the Western Mediterranean. HalophilicTamaricaies are very much present in Spain and the South of the Mediterranean where various groups have been defined by RIVAS-MARTÍNEZ and *al*. (2001). The rate of soil salinity is a preponderant factor in the distribution of riparian vegetation in bioclimates semi-arid and arid as well demonstrated SALINAS and *al*. (2000).

In Western Algeria, riverine forest is complex and fragile environments to multiple utilities.

• The riverine vegetation of great diversity and developed root system will promote the anchor, so limiting the erosion of the banks.

• The riparian forest has a vocation of ecotone: buffer zone, interface between the floodplain and stream water

Table 2 Continued.....

Aegilops ovata	AO	-0,03703187	-1,09081094	0,01138383
Agropyron repens	AR	1,02045375	-1,10726524	2,57222619
Aristolochia longa	AL	0,17998459	-0,35559235	0,39481851
Asparagus stipularis	AS	0,30452381	-0,16894705	-0,42011864

(water quality).

• The riparian forest is a mosaic of environments complex and interactive, fruit of the influence of the course of water and human. All of these structures of vegetation have suffered and suffered heavy damage under the influence of anthropogenic actions of all kinds. Despite the very large global ecological value of these eco-complex, they are unfortunately almost everywhere away from interim measures while threats remain very strong.

The inadequacy of our knowledge of the biology and ecology of riverine forest of our region requires a multiscale and multidisciplinary study to better understand the structure and operation of all of the relevant hydro-systeme.

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