Environmental Research Journal 2 (5): 271-277, 2008
ISSN: 1994-5396

Ecological Characterization of the Vegetable Groupings of the Mounts of Tlemcen and Their Facies of Degradation (West-Algeria)

[1]K. Mesli, [1]M. Bouazza and [2]M. Godron
[1]Ecological and Natural Ecosystem Managements Laboratory,
University of Tlemcen, 13000 Algeria
[2]Grouforchar, F 18410 Brinon, France

Abstract: To study the vegetables groupings of the mounts. Tlemcen and their facies of degradation we carried out 490 phytoecological statements between 2001 and 2006 and cash 499 let us tax. The vegetation was observed on transects of 50 m where, the stratification of the vegetation, topography, the rate of covering, the dominant species, the substrate, the exposure and altitude were recorded in mixed vegetable formations, dominated or mixes some with the *Aleppo pine*, the Holm Oak, the Cork Oak, the Algerian Oak or the Thuja. In front of this significant mass of data we had recourse to the frequential Analysis to know what can bring to us these non-inferential and not-parametric statistical methods in the study of these groupings and their facies of degradation. We used the method of the ecological descriptions and the statistical analysis of the interspecific connections which highlighted 56 groups of species which deserve to be called coenological groups of species. We then retained 10 coenons who emphasize the main part of the ecological characters of the vegetation of the study area. The joint use of the 2 methods made it possible to know the sensitivity of the vegetable formations with respect to the medium: it proves that altitude, the substrate and the rate of covering of the vegetation are the most significant elements for the knowledge of the units of vegetation.

Key words: Ecological characterization, phytoecological statements, vegetable groupings, interspecific connections, ecological profiles, Tlemcen (West, Algeria)

INTRODUCTION

With the reading of work on the area of Tlemcen (Benabdelli, 1983, 1996; Hadjadj, 1995; Dahmani, 1997; Bouazza *et al*., 2004, 2001), all the vegetable formations are regarded as degraded, because of the pejoration of the climate (lowers precipitations and a light rise in the values of the minimal temperatures m) and especially of the anthropic action (overgrazing, fires, clearings). It is thus necessary to carry out a reflexion on this degradation by taking readings by using the statistical tool which appears most suitable today to specify the width of it. The statistical treatments most usually used in ecology consider the observations collected on the ground as of the samples drawn from a statistical universe of infinite size of which they are supposed being representative and then apply the traditional methods of the statistical inference and of the multivariate analyses. For several years, it has proven that the frequential analysis (Godron, 1966; Daget et Godron, 1982; Godron, 2005) gives information which converges with those of the multivariate analyses and which are generally more precise since they indicate directly the ecology of the species (Kadik, 2003; Kadik and Godron, 2004; Correra, 2006).

We propose in this article to use the frequency analysis to select the observations that provide as much information through statistical methods non-inferential and non-parametric.

We proceeded in several stages:

- Study of the interspecific connections and highlighted of the coenological groups of species.
- Analyze sensitivity of the species to the descriptors of the medium and research of the descriptors to which the coenologic species of the groups are most sensitive.
- Interpretation of the coenologic groups thanks to the analysis of the ecological profiles of the species.
- Ecological characterization of the species by the exploitation of the existing phytoecological statements and which proves to be essential for the detection of the sequences of vegetation of the study zone.

Corresponding Author: Kheira MESLI, 4 Rue, Yadi Sid Ahmed, Tlemcen 13000, Algeria

The results of these analyses have shown that coenological groups plants or groups identified are marked by human activity (fire, grazing, logging) and the characterization by exploiting ecological survey has enabled the detection of a sequence vegetation of a final stage of the group Pine Aleppo-Rosemary present in limestone marl and limestone and that of the Esparto in the old pine forests.

The zone of study covers the Mounts of Tlemcen, in the Western end of Algeria. It is characterized by a semi-continental Mediterranean climate, where the dry season can last up to 6 months. Two bioclimatic stages characterize our zone of study, the semi-arid climate and the subhumid climate in the Mediterranean one with, respectively an average of precipitations of 450 and 600 mm the average temperatures lowest are at January with an average of 9°C; as for the average temperatures highest, they are always located at August with an average of 25°C. These mountains consist of grounds which concern the Jurassic superior and the lower Cretaceous and which is mainly made of carbonates. The formations present are limestones, calcareous sandstone, calcareous marl, dolomitics-limestones and shale (Benest, 1985). The Mounts of Tlemcen have a great diversity of vegetable formations.

Formations are found forest where 4 Oaks are found, the Holm Oak (*Quercus ilex* subsp. ballota (Desf.) Samp.), the Cork Oak (*Quercus suber* L.), the Algerian Oak (*Quercus faginea* subsp. tlemcenensis (A. cd. Greuter and Burdet), the Kermes Oak (*Quercus coccifera* L.) and also of the formations with Pine and Thuja (*Pinus halepensis* Mill.), (*Callitris articulata* (Vahl) Link.), as well as a certain number of mixed formations and matorrals dominated by mediterranean fan Palm (*Chamaerops humilis* L.), (*Ampelodesmos mauritanicus* (Hard Poir. and Shinz.), Juniper (*Juniperus oxycedrus* L.), the Esparto (*Stipa tenacissima* L.).

MATERIALS AND METHODS

The method of the transects was used to evaluate the floristic composition of the vegetation and its structure.

The georeferenced transects using a GPS have a 50 meters length X 10 m of width. This method makes it possible to count all the species, their height and to record their aspect, their rate of covering, their stratification as well as altitude, the exposure, the substrate of each statement (Godron *et al*., 1968). Total 490 phytoecological statements were carried out and 499 let us tax distinct were identified there. Let us tax were given using the flora of Algeria (Quézel and Santa 1963), the nomenclature of certain species was reactualized following work of Dobignard (www.telabotanica.org/page: bdafn).

Analyze connections between species The ad hoc test is the probability calculus of the contingency table which summarizes the number of presences, absences and coexistences of the species taken 2-2. Let us consider a contingency table between species X and Y (Table 1).

The probability without skew of realization of Table 1 is:

$$P = (a+b) ! (c+d) ! (a+c) ! (b+d) ! / n! a! b! c! d!$$

where has, B, C and D are the values of the heart of the contingency table and a+b, c+d, a+c, b+d and n the values of the margins of this contingency table.

According to the formula of Brillouin (1962), the quantity of corresponding information is equal to: $\log^2 1/P$ and it is expressed in a unit named sha and equipped with the sign about according to whether the number of co-occurence between the 2 species is higher or lower than its awaited value. This quantity of information is a measurement within the meaning of the mathematical theory of measurement.

Coenoligical groups of species: The groups of species for which the contingency tables bring a great quantity of information are named coenons since they result from a coenologic analysis. They can be regarded as cores of constellations within the meaning of West (1966). They are highlighted thanks to the algorithm of the archipelago whose result is presented about in the form of that of a AHC (Ascending hierarchical clustering), while being less subjected to choices discussed for the index of similarity (Sorensen, Jaccard, etc). This algorithm seeks the species which have the strongest connection, then the other species which have a strong connection with one of the preceding ones in order to place it below. The first groups thus made up is the outline of an island of the future archipelago. The algorithm incorporates the species for the construction of the islands until exhaustion of the calculated connections. This algorithm makes it possible a species to be present in several groups of which some can thus be peaks included entirely in an island or be located in a peninsula. Other groups are related to several islands. The value of connection (sha) for this couple of species is written on the right in the line which separates the species.

Ecological profiles and mutual information species-descriptor: For each descriptor (altitude, substrate etc.) and for each species, an ecological profile is carried out. This method rests on the examination of the frequency distribution of a species in the classes of each descriptor many times used (Loudyi *et al*., 1995; Belghazi *et al*.,

Table 1: Table of contingency

Presence and absence	Present	Apsent	Total
Presence of X numbers	a	b	a+b
A number of presences of Y	c	d	c+d
Total	a+c	b=d	n

2001). The reaction of the species to the states where the descriptor is shows the preferences of each species and makes it possible to carry out a card of description for each species. These profiles are carried out initially in absolute values, then in relative values and corrected values (in order to give the possibility of comparing species of very different frequencies). To facilitate the reading of the Table 3 possibilities are offered to us - The frequency of the species in the class of the descriptor is very highly significant (+ + about - -) according to whether the frequency of the species is very strongly higher than the frequency awaited or much lower than the frequency awaited the threshold of 1 per thousand):

- It is highly significant (+ about - with the threshold of 1%).
- It is only significant with the threshold of 5% (about).

The descriptors which we carried out for each statement are: altitude, the substrate, the cover, 3 dominant species, topography, fires and the Pasture.

RESULTS

Coenological groups highlighted ecological and their profiles: The interspecific connections calculated for the whole of the statements, highlighted 56 groups of species which deserve to be called groups coenoligic or coenons. We retained 10 of them, whose ecological characterizations are very significant with the threshold of 1 per thousand. For our statements, the 2 species which bring the most information are *Pinus halepensis* Mill. and *Rosmarinus eriocalyx* Jordan and Fourr.) and they are at the head of the first Coenological group. It would take too a long time to present all the profiles of the ten coenons in detail. However, the ecological profiles of the species of the first coenon are presented, as an example, in the Appendix 1 (Table 2-7) which gives mutual information species-descriptor (Altitude, Cover, Substrate, Physionomy, First dominant species, topographic Situation and Intensity of the pasture).

Coenological group no 1: It gathers 3 frequent trees or shrubs in the study area and the Esparto: it acts, by order descending of the degree of relationship, of *Pinus halepensis*, *Rosmarinus eriocalyx*, *Stipa tenacissima* and *Pistacia lentiscus* (Fig. 1). The connections are: between *Pinus halepensis* and *Rosmarinus eriocalyx*, 135 sha; between *Rosmarinus eriocalyx* and *Stipa tenacissima* 48 sha; between *Stipa tenacissima* and *Pistacia lentiscus*, 32 sha.

The ecological descriptions show that the species composing this coenon live in forests and even in groves *Aleppo pine*. We will reconsider this coincidence in the discussion and we will turn our attention on the 3 woody species, which are especially present at the altitudes ranging between 300 and 500 m, on substrates limestones marl or limestones, with the exposures North, in closed enough settlements (where the covering of the vegetation is often higher than 75%, grazed, having undergone a fire, often on tops of slopes.

Coenological group no 2: It is primarily made up by woody plants and plants living in the forests: *Arbutus unedo*, *Cistus ladanifer* subsp. mauritanicus, *Lonicera implexa*, *Quercus suber*, *Smilax aspera*, *Cytisus villosus*, *Arisarum vulgare* subsp. transiens, *Asparagus acutifolius*, *Aegilops triuncialis* subsp. triuncialis. The first 4 species have positive connections of 78, 73, 69 and 63 sha, the 3 other species are, respectively dependent 2-2 by 61 sha. As for the 3 last, they are linked by 59, 57 and 55 sha.

Coenological group no 3: It includes/understands *Ornithogalum umbellatum*, *Sideritis Montana*, *Catananche caerulea*, *Centaurea pullata*, *Dactylis glomerata*, *Lotus edulis*, *Centaurea incana*, *Gagea arvensis*, *Ajuga chamaepytis*, *Plantago afra*, etc. The species of this coenological group are the herbaceous present ones at altitudes higher than 1000 m, often on flat ground and in rather open formations of esparto of slick (covering of the vegetation frequently ranging between 25 and 40%) and of some Matorral average, often in North-Western exposure. The traces of fire are rare, but the pasture is often intense

Coenological groups no 4 and 5: Primarily species gather which were present in the island of the coenological group 2 of which the culminating top reached 78 sha and who constitute in this island 2 mountains whose top are located at 70 sha and with 69 sha. The ecological descriptions show that these mountains are well located in the ecological island of the 2 coenon, but the presence and even sometimes the predominance of *Ampelodesmos mauritanicus* indicates a beginning of degradation of the Cork Oak forest, since this species lives especially in the matorral low and means, whereas the Cork Oak is dominating in the high matorral.Certain species are related to the scarcity of the fires.

Table 2: Mutual Information Species-Altitude

Altitude descriptor (m) 14 classes

Classes (meter)		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	Species
Statements		2	11	22	7	20	18	19	37	83	123	78	30	28	
Fr. sp.	I.M	0	374	280	59	62	160	65	78	94	80	100	137	15	*Pinus*
119	0.14	.	+++	+++	.	.	.	.	.	.	.	.	.	--	*halepensis*
109	0.15	0	367	347	64	45	75	142	61	108	69	69	164	64	*Rosmarinus*
		.	+++	+++	.	.	.	.	.	.	.	.	+	.	*eriocalyx*
214	0.14	0	166	104	0	80	102	108	19	83	106	135	76	139	*Stipa*
			+	.	-	.	.	.	---	-	.	++	.	+	*tenacissima*
141	0.18	0	221	236	248	69	154	146	131	134	107	31	35	0	*Pistacia.*
			+	+++	+	.	.	.	.	+	.	---	--	---	*lentiscus*

Sp. Fr.: Species Frequence; M.I: Mutual Information

Table 3: Mutual Information Species-substrate

Substrate descriptor offer 2.19 sha (for 6 classes)

Classes		Limestones	Dolomitics limestones	Calcareous sandstones	Sandstones	Calcareous marl	Shale	Total	Species
Statements		129	39	132	39	141	10	490	
Fr. esp	I.M	131	53	56	0	161	0		*R. eriocalyx*
119	0.10	++	-	---	---	+++	.		
109	0.11	118	0	41	81	179	0		*P. halepensis*
	+		---	.	+++	.	.		
214	0.21	137	18	42	9	122	0		*S. tenacissima*
	+++	---	---	+++	++	--	.		
141	0.08	75	107	97	9	150	70		*P. lentiscus*
	-		.	---	+++	.	.		

Sp. Fr.: Species Frequence; M.I: Mutual Information

Table 4: Mutual information species-cover

Cover descriptor offer 2.19 sha (for 11 classes)

Classes (%)		5	15	20	25	30	40	50	60	70	80	90	Utiles total	Species
Statements		4	2	21	41	38	38	132	76	83	35	20	490	
Fr. esp.	I.M	0	0	39	60	43	76	106	81	119	176	247		*P. halepensis*
119	0.09	.	.	.	.	-	.	.	.	.	++	+++		
109	0.09	0	0	43	77	47	118	112	89	65	206	225		*R. eriocalyx*
		.	.	.	.	-	.	.	.	-	+++	++		
214	0.07	172	229	76	128	121	96	106	69	91	98	126		*S. tenacissima*
		.	.	.	+	.	.	.	--	.	.	.		
141	0.08	0	0	50	68	73	37	137	114	92	119	122		*P. lentiscus*
		.	.	.	.	.	--	+++	.	.	.	.		

Sp.Fr.:Species Frequence; M.I: Mutual Information

Table 5: Mutual information species-physionomy

Physionomy descriptor offer 2.19 sha (for 11 classes)

Classes		Forest	Clearing	High forest	Low matorral	Average matorral	High matorral	Slick espato	Park	Coppice forest	high forest	Total	Species
Statements		57	7	54	80	68	141	30	1	43	9	490	
Fr. esp.	I.M	253	0	297	36	30	64	0	0	19	412		*P. halepensis*
119	0.29	+++	.	+++	---	---	--	---	.	---	+++		
109	121	197	0	275	51	26	83	0	0	31	450		
		+++	.	+++	--	---	-	---	.	--	+++		*R. eriocalyx*
214	0.17	96	0	123	92	47	89	229	0	112	229		*S. tenacissima*
		.	-	+	.	---	-	+++	.	.	+++		
141	0.09	146	0	129	117	107	99	0	0	48	116		*P. lentiscus*
		++	.	+	.	.	.	---	.	-	.		

Sp.Fr.:Species Frequence; M.I: Mutual Information

Coenological group no 6: Includes/understands in particular *Chamaerops humilis*, *Pallenis spinosa*, *Asphodelus ramosus*, *Adonis dentata*, *Calicotome intermedia*, *Ballota hirsuta* subsp. hirsuta, *Lobularia maritima*, *A. vulgar* subsp. transiens, *Plagius grandis*, *Ampelodesmos mauritanicus* and *Erodium moschatum.* It is present at altitudes a little lower than scoenons them 2, 4 and 5 and constitutes matorrals or tops

Table 6: Contingency table first species dominant- topographic situation

Horizontal descriptor: 10 1st dominant species
Vertical descriptor: 15 topographic Situation

d1		d2		ha		hb		hab		iab		iab/a		iab/b		iab/ab			
10		15		2.67		2.04		4.34		0.37		0.14		0.18		0.08			
A/B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LS	4	0	0	0	6	3	0	0	2	0	-14	0	0	2	4	0	3	4	3	5
DEP	0	0	0	0	0	0	0	0	0	0	0	5	0	0	1	2	0	0	0	0
SCAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
HS	-5	2	3	0	0	0	1	0	0	2	17	2	1	0	-15	4	0	3	0	0
MS	2	4	2	2	0	0	0	4	2	1	-6	0	0	3	4	3	0	0	0	0
TER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0
RS	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0	0	2	0	0
SS	0	0	0	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
FF	0	0	0	0	0	0	0	2	0	0	3	0	0	0	3	0	0	2	0	0

A /1st dominant species 1:*Ampelodesmos mauritanicus*; 2: *Callitris articulata*; 3: *Calicotome intermedia*; 4: *Celtis australis*; 5: *Chamaerops humilis*; 6:*Cupressus dupreziana*; 7: *Erica arborea*; 8: *Juniperus oxycedrus*; 9:*Olea europeae*; 10: *Pistacia atlantica*; 11: *Pinus halepensis*; 12: *P. lentiscus*; 13: *P. pinea*; 14: *Quercus coccifera*; 15: *Quercus ilex subsp.ballota*; 16: *Quercus suber*; 17: *Rhamnus alaternus*; 18: *Stipa tenacissima*; 19: *T. ciliatus*; 20; *T. sativum;* B/ Topographic situation: LS: Low Slope; DEP: Depression; SCA: Scarp; HS: High Slope; MS: Mid Slope; TER: Terrace; RS: Rounded Summit; SS: Summit Strong; FF: Field Flat

Table 7: Contingency table first dominant species- Intensity of the grazing

Vertical descriptor: 10 1st dominant species

d1		d2		ha		hb		hab		iab		iab/a		iab/b				iab/ab	
14		10		1.02		2.67		3.48		0.21		0.21		0.08				0.06	
A/B	1	2	3	4	5	6	7	8	9	10	11	12	14	16	17	18	19	20	
I	4	0	0	0	1	0	0	0	6	0	-8	2	0	0	0	2	4	0	
II	1	2	0	0	8	0	0	5	0	0	-6	0	2	12	0	-9	0	0	
III	0	0	3	0	-7	0	0	0	0	1	12	0	2	-9	0	7	0	1	

Horizontal descriptor: 14 *Intensity of the pasture* (I, II, III); A / 1st dominant species 1:*Ampelodesmos mauritanicus*; 2: *Callitris articulata*; 3: *Calicotome intermedia*; 4: *Celtis australis*; 5:*Chamaerops humilis*; 6: *Cupressus dupreziana*; 7: *Erica arborea*; 8: *Juniperus oxycedrus*; 9: *Olea europeae*; 10: *Pistacia atlantica*; 11: *Pinus halepensis*; 12: *Pistacia lentiscus*; 13: *Pinus pinea*; 14: *Quercus coccifera*; 15: *Quercus ilex* subsp.*ballota*; 16:*Quercus suber*; 17: *Rhamnus alaternus*; 18: *Stipa tenacissima*; 19: *Thymus ciliatus*; 20; *zTriticum sativum*; B/ I: Topographic situation: Low intensity of grazzing; II: Average intensity of grazing; III: High intensity of grazing

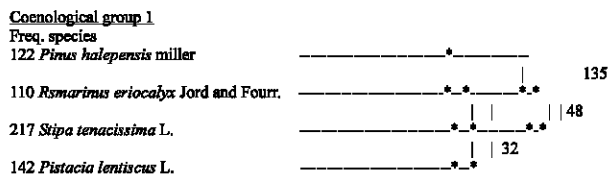

Fig. 1: Intrespecific connections in the coenological group 1

low. The dominant species are often fan Palm (*Chamaerops humilis*), *Callitris articulata*, *Calendula arvensis*, *Calicotome intermedia* and the Cork Oak. The traces of fire are almost always present and the pasture is frequent. The statements are often located on the tops of slopes or the tops rounded. It is thus also about a stage of degradation of the Cork Oak forest.

Coenological group no 7: A good number of species includes/understands which we did not meet yet in the first islands though they are however rather frequent in the study area. They are *Cistus villosus*, *Phillyrea angustifolia*, *Quercus coccifera*, *Cytisus villosus*, *Erica arborea*, *Muscari comosum*, *Osyris alba*, *Pistacia lentiscus*, *Rhamnus lycioides*, *Ruscus aculeatus*. It is frequent between 800 and 1100 m and can go down up to 400 m, covering is a superior with 50% on various substrates (marls hard limestones, limestones and clacareous sandstone), in high matorral or forests. The dominant species are the Kermes Oak, *Calendula arvensis*, *Ampelodesmos mauritanicus* and the Cork Oak. The statements where the Kermes Oak is present are intensively grazed and regularly set fire to, in particular in the sectors of Maghnia and Ouled Mimoun.

Coenological group no 8: Is frequent in the steppe of Esparto and it is pledged with the coenological group 3. It includes/understands *Centaurea pullata*, *Plantago afra*, *Anthyllis tetraphylla*, *Centaurea incana*, *Gagea arvensis*, *Biscutella didyma* and *Centaurea involucrata*. It lives at various altitudes, often in horizontal ground, in open formations where the covering of the vegetation is often lower than 40% .

Coenological group no 9: Includes/understands in particular *Lonicera implexa*, *Rubia peregrina*, *Viburnum*

tinus, *Ruscus aculeatus*, *Rosa sempervirens*, *Crataegus oxyacantha*, *Galium aparine*, *Stauracantus boivinii*, *Aristolochia longa*, *Quercus faginea* subsp. tlemcenensis, *Malva sylvestris*, *Arisarum vulgare* subsp. transiens, *Plagius grandis*, *Nepeta multibracteata*. It appears especially in the high matorral more closed than the average, where the dominant species are the Cork Oak, Juniper and even sometimes the Holm Oak, often on bottoms of slopes. It announces the sequence of the Algerien Oak.

Coenological group no 10: The arrival of the Holm oak and Juniper sees. One can be astonished that they did not appear in coenons preceding, whereas they are present,, respectively in 233 and 242 statements.

To include/understand that this great frequency is not a sufficient reason to appear in the first coenon, it is enough to seize that a species which would be present in all the statements would not have any connection with the other species (the probability of all the contingency tables would be equal to 1). The Holm Oak and Juniper are not in such an extreme situation, but they are present with the majority of the other species and thus constitute the bottom of table of the landscapes of the study area. In phytosociological language, that means that the majority of the vegetable groupings of the study area belong to the class of *Quercetea ilicis* whose characteristic species set up the ecological group of the forests of the stages semi-arid and subhumid climates. The third species of coenon numbre 12 is generally the Gorse Stauracanthus boivinii, which is present 90 times, above 1000 m and in particular 15000-1600 m. The coenological group number 3 is more particularly present on limestones, in the average matorrals or the little grazed and not very burnt coppices.One of small coenons following is the coenon of *Carthamus pectinatus*, *Foeniculum vulgare* and *Galium parisiense*, which characterizes the Cork oak forest located on the sandstones limestones and the marls limestones.

A very particular coenon is that of *Triticum sativum*, *Vaccaria pyramidata* and *Sinapis alba* which is in the clearings cultivated in the medium of the forest.

DISCUSSION

On the whole, it appears that the algorithm of the archipelago and the descriptions ecological revealed groups of species which correspond well so that we observed on the ground. The overall picture of these vegetable communities shows that the study area is very marked by the human activities (wood cuts, pasture, fire). The mediterranean Fan Palm *Chamaerops humilis*, *Calicotome intermedia* and *Ampelodesmos mauritanicus*, are frequent (their frequencies in the statements are, respectively 148, 98 and 163) even in the grazed formations, because they are not consumed by the cattle. From the point of view of the series and sequences for vegetation, it appears that the 83 statements where the *Aleppo pine* and Rosemary are present include/understand the 9 statements of mature standing timber, 32/54 of the statements of grove and 22/57 of the statements classified in the state forest. The vegetable grouping *Aleppo pine* - Rosemary is thus a final stage of a sequence of vegetation present on the marls limestones and limestones, especially at low altitude and in the sectors of Maghnia, Ouled Mimoun and Sebdou. The first stages of this sequence are not obvious, undoubtedly because the bionomic type of the *Aleppo pine* is not characterized a great capacity of conquest of open spaces.

The ecological profiles of the Esparto are remarkable: This Graminaceous formerly covered so great extents which one esparto of slick (Bouazza *et al*., 2004). It is still present 214 times in the study area and we saw that it presents strong connections with the *Aleppo pine*, the Rosemary and the Mastic tree which justify its membership of coenological group 1. It almost does not present positive connections with other species but of many negative connections with the species of the Cork oak forest. Most astonishing is that it is more present in the mature standing timbers of *Aleppo pine* than in the matorrals. It will be thus interesting to see to which sequences of vegetation the *Esparto belongs*.

CONCLUSION

The frequential analysis starts to be used more and more in ecology and the validity of this method was often tested by comparison with other means of investigation. For the study of the vegetation of the Mounts of Tlemcen, it reveals directly the broad outline of the ecological groups which correspond well to the coenological groups of species and it makes it possible to think that the degradation of the vegetation is not radically irreversible.

ACKNOWLEDGEMENT

Special thanks go to the technical and administrative staff of the forests Conservation of The municipality of Tlemcen for their logistic assistance (exits on the ground) and the documents (maps and booklets of management).

REFERENCES

Belghazi, B., M. Ezzahiri, M. Amhajar and M. Benziane, 2001. Regénération artificielle du chêne liège dans la forêt de la Mâamore (Maroc). Forêt méditerranéenne. Tome, 22 (3): 253-260.

Benabdelli, K., 1983. Mise au point d'une méthodologie d'appréciation de l'action anthropozoogène dans le massif forestier de Telagh. Thèse Doc Es Sciences. Univ Aix Marseille III.

Benabdelli, K., 1996. Mise en évidence de l'importance des formations basse dans la sauvegarde des écosystèmes forestiers: Cas des Monts de Dayas (Algérie occidentale). Ecologia Mediterranea, XXII, 3/4: 101-112.

Benest, M., 1985. Evolution de la plate forme de l'ouest algérien et nord est marocain au cours du jurassique supèrieur et au début du crétacé. Stratigraphique milieux de dépôt et dynamique sédimentaire fasc I et II N°95. document du labaratoir d'écologie de lyon.

Bouazza, M., M. Mahboubi, R. Loisel and N. Benabadji, 2001. Bilan de la flore de la région de Tlemcen. Forêt méditerranéennet, XXII (2): 130-136.

Bouazza, M., N. Benabadji, R. Loisel and G. Metge, 2004. Evolution de la végétation steppique dans le sud-ouest de l'oranie (Algérie). Ecologia Mediterranea, tome 30, fascicule, 2: 219-231.

Brillouin, L., 1962. Science and Information, Academic Press. 2nd Edn. New York.

Correra, A., 2006. Dynamique de l'utilisation des ressources fourragères par les dromadaires des pasteurs nomades du Parc National du Banc d'Arguin (Mauritanie). Thèse Doct. Muséum d'Histoires Naturelles. Paris, pp: 245 + annexes.

Dahmani, M., 1997. Le Chêne vert en Algérie: Syntaxonomie, phyto-écologie et dynamique des peuplements. Th Doc. d'Etat, U.S.T.H.B, Alger, pp: 329 + annexes.

Daget, P. and M. Godron, 1982. Analyse de l'écologie des espèces dans les communautés. Paris, France. Edn Masson.

Godron, M., 1966. Application de la théorie de l'information à l'étude de l'homogénéité et de la structure de la végétation. Oecol. Plant., 2 (2): 187-197.

Godron, M., Ph. Daget, L. Emberger, E. Le Floch, G. Long, J. Poissonnet and Ch. Sauvage, 1968. Code pour le relevé méthodique de la végétation et du milieu. Ed Du CNRS, pp: 292 .

Godron, M., 2005. Ecologie et évolution du monde vivant. Ed. Internet Conseil international de la langue française, Paris, pp: 940.

Hadjadj Aouel, S., 1995. Les peuplements de Thuya de Berberie (*Tetraclinis articulata*) (Vahl Master) en Algérie, Phytoécologie, syntaxonomie, potentialités sylvicoles. Thèse d'état. Fac des Sciences et Techniques de Saint Jérôme, pp: 250 + annexes.

Kadik, L., 2003. la mesure de la biodiversité spatiale. Symbioses, 8: 67-75.

Kadik, L. and M. Godron, 2004. Contribution à l'étude de la «dégradation» de la végétation dans les pineraies à *Pinus halepensis* Mill. D'Algérie et dans les formations dérivées. J. Bot. Soc. Bot. France, 27: 9-19 .

Loudyi, M.C., M. Godron and D. El Khayari, 1995. Profils écologiques et liaisons interspécifiques. Deux approches complémentaires appliquées à l'étude des groupements de mauvaises herbes des cultures de Saîs (Maroc central). European Weed Research Society, 35: 121-131.

Quézel, P. and S. Santa, 1962-1963. Nouvelle flore de l'Algérie et des régions désertiques méridionales. C.N.R.S, Paris, 2: 1170.

West, N.E., 1966. Matrix cluster analysis of mountain forest vegetation of the Oregon cascades. Ecology 47 (6): 975-980.