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Phytosociological analysis of vegetable formations of Djebel Medjounes (Tellian North)

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Abstract

The study is to define the phytosociological units in which the formations of djebel Medjounes, to specify their floristic affinities with the groups that are close to them and their positions in the dynamic series of the region and finally to determine climatic conditions and edaphic in which they develop. The methodology used is called "phytosociological" or "sigmatist". This allowed individualization of thirteen associations and three under associations. These associations are arranged as follows: class of the *Ilicis Quercetea* with an integrated association in the Order of *Quercetalia ilicis* and the Alliance of *Quercion ilicis*, four associations integrated in the Order of *Pistacian-Rhamneta* and the Alliance of *Genisto tricuspidatae- Calicotomion spinosi*; Class of the *Rosmarineta officinalis* with a single association comes to the Order of the *Erinaceetalia anthyllidis* and the Alliance of the Algerian Cast Understanding, two associations related to the Order of *Cisto mauritanici-Thymetalia munbyani* and the Alliance *Genisto atlanticae- Cistion Villosi*; Class of the *Lygeo-Stipetea* with an association belonging to the Order of *Lygeo-stipetalia* and the Alliance *Stipo-launaiaon Acanthocladae*, two associations adhering to the *Noaeo mucronatae-Artemision*, an association being at the Alliance *Artemisia Herba-alba* Asso and *Plantago lagopus*; An association with alliances in *Artemisia herba-alba* Asso and *Poa Bulbos*; Class of *Tubererarierea guttatae* marked by an associations related to the order of *Brachypodietalia (Trachynietalia) Distachyae* and the *Thero-brachypodion*.

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Introduction

Mediterranean forests are characterized by a heterogeneity of unbalanced ecosystems, adapted to dynamic modifications or structure in space and time at various constraints (Barbero et Quézel, 1989).

The pre-forest structures of green oaks, abundant in North Africa, particularly in Morocco and Algeria, either in admixture with other competitive species such as Aleppo pine constitute an important part of the forest heritage (Dahmani, 1984).

The degradation of the green oak caused the substitution of a mesophytic vegetation by a xerophytic vegetation to the most diverse degrees (Quézel & Barbero, 1990).

Some circles such as rock environments (cliffs, rocks, scree) play a major role in the conservation of some plants and populations (Quézel, 1957; Vogel *et al.*, 1999).

The main pres-forest species existing at the djebel Medjounes are: the green oak, the pistachio, the hawthorn forming dense, means and clear matorrals.

Phytosociological studies are very rare in the high plains setifian (Merikhi, R., 1987, 1995 ; Géhu J.M., & *al.*, 1994 ; Kaabeche M., 1994 ; Kaabeche M., & *al.*,

1994 ; Kheloufi-Souici N., 1995 ; Gharzouli & *al.*, 1989, 2007; Boulaacheb & *al.*, 2000,2005, 2009, 2011; Zerroug, K., 2020).

These rare and insufficient works pushed us to study the phytosociological units of djebel Medjourn in order to make a better contribution to their enrichment.

This study will provide a better understanding of the floristic potentialities and the dynamic trend in relation to climatic and anthropogenic conditions in the site in particular and at the level of the high setifian plains in general.

Material and method

Location of the study area

Djebel Medjounes culminates at 1461 m altitude, occupies an area of 6,000 ha and, is a high setifian plains. It is between the geographical coordinates 36° 18'15 "N latitude and 5° 31'17" E longitude in DMS (degrees, minutes, seconds) or 36.30 42° and 5.5214° (in decimal degrees). It is surrounded by a set of massifs, northeast. The djebels Moul el Djediane (1225m) and Tamtarte (1008m), northwest djebel Chenatour (1370m) and djebel Senatour (1076m) ; From east to west djebels Zerib (1317m) and Zkarma (1361m) and south djebels Mnaguer (1416m) and Oulad Gues (1121m) (Fig. 1).

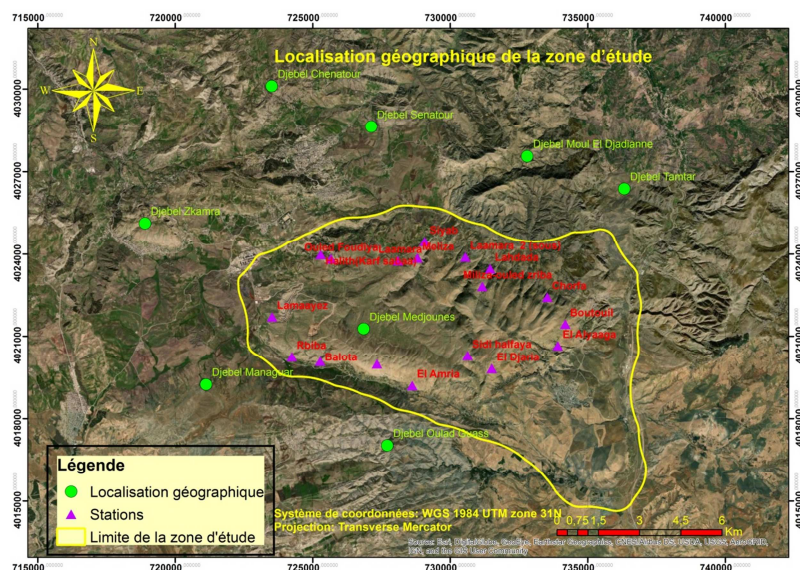


Fig. 1. Geographical location of the study area (carried out by Gourari; 2020).

Djebel Medjounes is dominated by Matorrels. The altitude varies between 900 and 1461m; The slope goes from 2 to 30%. It is subjected to a semi-arid Mediterranean climate has been hot, dry and a cold cold winter with rainfall ranging from 350mm to 600mm, sometimes in the form of snow on more or less steep reliefs.

The massif consists of a mosaic of sedimentary formations of Trias, Cretaceous, Tertiary and Quaternary. The formations of Cretaceous and Tertiary belong to the tablecloth of Djemila. They are formed of an alternation of marls and marinous limestones (Vila, 1977 et 1980). The main types of soils are calcimagnic soils (rendzines, limestone brown soils), raw and low-evolved mineral floors of erosion and intake (M`zoughem & Chenafa, 2006).

The hydrographic network is very low and irregular, the main wads are: Zatine, oued Dahab and oued Dahamcha.

The region is occupied by arboriculture in particular the olive tree and the fig tree. Pedfields are operated by cerealing, and plains by market gardening.

Methodology

To define the plant groups of the djebel Medjounes, we used the so-called sigmatisty phytosociological method (Braun-Blanquet, 1928; Guinochet, 1973), based on the principle that vegetation is the element that best synthesizes the environmental conditions. It attaches to describing plant groups defined by an original and repetitive combination of plant species (Géhu et Rivas-Martínez, 1981).

The sigmatist method used since its advent in the inventory of plant associations has recently proved its evidence in phytodynamics studies (Géhu, 1992, 2010), Spatial planning as well as applications to the conservatory management of seamineral spaces (Géhu, 1993, 2010, 2011). To carry out our surveys we adopted subjective type sampling taking into account the physiognomy and topography (altitude, exhibition and slope).

The minimum area of the meadows and lawns goes from 10 to 50m² that of the matorrels is 50 to 100m², for the steppes it is 50m². The data processing is done by the factor analysis of correspondence (F.A.C), accompanied by a hierarchical ascending classification (H.A.C). The statistical analysis of the data is made by the "PAST" software.

Results and discussions

The data matrix (237 statements and 374 species) subjected to a factor analysis of correspondence (F.A.C) and hierarchical ascending classification (H.A.C) allowed the discrimination of 13 associations falling within 4 phytosociological categories (*Quercetea-ilicis* (Braun-Blanquet 1947) de Foucault & Julve 1991, *Rosmarinetea officinalis* (Braun-Blanquet 1947) em. Rivas- Martínez, Diaz, Prieto, Loidi & Penas 1991, *Lygeo-Stipetea Rivas-Martinez* 1978 em. Kaabèche 1990, *Tuberarietea guttatae* Br-Bl, (1940); Rivas-Martinez, (1977).

The syntaxion scheme of djebel Medjounes brings out the following phytosociological units:

Association in Quercus Pistacio- Quercetum ilicis Brullo, Martino & Marceno 1985

She is affiliated with the class of *Quercetea ilicis* (Braun-Blanquet, 1947) de Foucault & Julve 1991, at the Order of *Quercetalia ilicis* Br.-Bl. ex Molinier 1934 em. Rivas –Martinez 1975 [(*Quercetalia ilicis* Br.-Bl. 1931)] at the alliance *Quercion ilicis* Br.-Bl. ex Molinier 1934 em. Rivas –Martinez 1975 [(*Quercion ilicis* Br.-Bl. 1931)].

This association corresponds to dense medium (80%) medium-based oak and pistachio-based matorrals whose size does not exceed 3 meters. They represent vestiges of green oak forests.

It locates in the northern part of the massif between 1000 and 1200 m altitude, at north and west exhibitions on limestone substrates and slopes of 25%. The woody stratum is dominated by *Quercus ilex subsp. ballota* (Desf.) Samp., *Pistacia terebinthus* L., *Pistacia lentiscus* L., *Crataegus monogyna* Jacq.

with the presence of *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Calicotome spinosa* (L.) Link, *Cistus creticus* L.

The herbaceous stratum includes pasture species, highlighted by the abundance of species:

Atractylis cancellata L., *Atractylis caespitosa* Desf., *Teucrium polium subsp. capitatum* (L.) Arcang., *Fumana thymifolia* (L.) Webb, *Drimia maritima subsp. maura* (Maire) Förther & Podlech et *Asphodelus ramosus* L.

The association is infiltrated by species belonging to the *Rosmarineta officinalis*, *Onopordetea acanthii*, *Tuberarietea guttatae* and *Stellarietea mediae* where the therophytes have 91 species.

Association in Calicotome spinosa -Quercetum rotundifolia (Dahmani, 1997)

Under Association in Ampelodesma mauritanicae (Dahmani, 1997).

She is attached to the class of *Quercetea ilicis* Braun-Blanquet 1947, at the order of *Pistacio-Rhamnetalia alaterni* Rivas Martinez 1975, and the alliance of *Genisto tricuspidatae- Calicotomion spinosi* (Dahmani, 1997).

Among the differential species of the association and the alliance, we find: *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Calicotome spinosa* (L.) Link, *Quercus ilex subsp. ballota* (Desf.) Samp., *Eryngium campestre* L., *Helianthemum cinereum subsp. rotundifolium* (Dunal) Greuter & Burdet...etc

This association has been defined for the first time in Algeria by Dahmani (1997). She was subsequently redefined by Gharzouli (2007); Boulaacheb and al (2005) and Meddour and al (2017). According to Dahmani (1997), there are highly open tree or heliopheile tree pre-forest groups.

At the level of djebel Medjounes, the association corresponds to medium-made materials formed by shrubs (*Calicotome spinosa* (L.) Link, *Ampelodesmos*

mauritanicus (Poir.) T. Durand & Schinz, *Rhamnus lycioides subsp. oleoides* (L.) Jahand. & Maire, *Daphne gnidium* L.), The green oak has a size lower than 1 m. They occupy the cliffs and escarpments between 1050 and 1200 m altitude in north and northeast orientation. The slopes often exceed 15%.

This grouping corresponds to a fairly advanced degradation facies of the *Pistacio- Quercetum ilicis*. Compare the number of therophytes at almost doubled (134 species). The abundance of *Calicotome spinosa* (L.) Link, *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Artemisia herba-alba* Asso et *Retama raetam* (Forssk.) Webb indicates a regressive dynamics of the association towards *Genisto tricuspidata - Calicotometum spinosae*.

Anthropogenic action is also translated by the presence of *Atractylis cancellata* L., *Atractylis caespitosa* Desf., *Anisantha madritensis* (L.) Nevski, *Drimia maritima subsp. maura* (Maire) Förther & Podlech et *Dactylis glomerata* L.

Association in Genisto tricuspidatae- Calicotometum spinosae (Meddour, 2010)

Genisto tricuspidatae- Calicotometum spinosae (Meddour, 2010), is related to the class of *Quercetea ilicis* Braun-Blanquet, 1947, to the Order of *Pistacio-Rhamnetalia alaterni* and the alliance of *Genisto tricuspidatae-Calicotomion spinosi* (Dahmani-Megrerouche & Loisel all. nova hoc loco, 2003). Among the characteristic and differential species of the association we find *Calicotome spinosa* (L.) Link, *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*, *Genista tricuspidata* Desf., *Fumana ericoides subsp. montana* (Pomel) Güemes & Muñoz Garm et *Fumana thymifolia* (L.) Webb.

These are low overall dingers with an overall overcoat of 80%; They are north between 1050-1300 m, on high slopes (20%). They are based on *Genista tricuspidata* Desf., *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Calicotome spinosa* (L.) Link et *Rhamnus lycioides subsp. oleoides* (L.) Jahand. & Maire. They are more degraded than the

Pistacio- Quercetum ilicis Brullo, Martino & Marceno 1985 and *Calicotome spinosa - Quercetum rotundifolia* (Dahmani, 1997). We notice the anthropogenic pressure and the strong xericity, which seems to favor the high therophytizations (124 species) and Chameaphytizations (25 species). The action of overgrazing is marked by the abundance of the *Asphodelus ramosus* and the presence of *Daphne gnidium* (Debazac, 1959; Aimé, 1976).

Association in Calicotome spinosae-Thymeteum ciliatus. nov

On the syntaxonomic level, the affiliation of the association to the class of the *Quercetea ilicis* Braun-Blanquet (1947), at the order of *Pistacio - Rhamnetalia alaterni* Rivas-Martinez (1974) are justified by the presence of species characteristic: *Paronychia arabica* (L.) DC., *Crataegus monogyna* Jacq., *Brachypodium sylvaticum* (Hudson) Beauv., *Bupleurum spinosum* Gouan, *Rhamnus alaternus* L., *Fumana thymifolia* (L.) Webb, *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Daphne gnidium* L., *Rhamnus lycioides subsp. oleoides* (L.) Jahand. & Maire, *Calicotome spinosa* (L.) Link. It ranks in the Alliance of *Calicotomo spinosae-Thymion ciliatus* (Gharzouli, 1989) by the following characteristics: *Helianthemum cinereum subsp. rotundifolium* (Dunal) Greuter & Burdet, *Thymus munbyanus subsp. ciliatus* (Desf.) Greuter & Burdet, *Eryngium campestre* L., *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*, *Convolvulus sabatius subsp. mauritanicus* (Boiss.) Murb.

It corresponds to low-bored matorrals (70% recovery.), Dominated by *Calicotome spinosae* (L.) Link, *Thymus munbyanus subsp. ciliatus* (Desf.) Greuter & Burdet,, *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz. It locates at altitudes ranging from 1050 to 1200m, northwest, on average slopes (10%).

The predominance of *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz indicates a frequently burned environment (Debazac, 1959). The presence of Chamaephytes mainly *Thymus munbyanus*

subsp. ciliatus (Desf.) Greuter & Burdet, et *Globularia alypum* L. and the abundance of *Asphodelus ramosus* L, geophyte indicate the opening of the medium induced by the grazing (Aimé, 1976). Other species present such as: *Linum suffruticosum* L., *Trifolium tomentosum* L., *Plantago coronopus* L., *Linum grandiflorum* Desf., *Poa bulbosa* L., *Anisantha madritensis* (L.) Nevski, indicate nitrification of soil (SekkaL, 2006; Miara, 2012).

Association in Rhamnus alaternus (Boulaacheb et al, 2005).

It is related to the class of *Quercetea ilicis* Braun-Blanquet, 1947, to the order of *Pistacio-Rhamnetalia alaterni* Rivas-Martinez (1974) and the alliance *Calicotomo spinosae- Thymion ciliatus* (Gharzouli, 1989). The species that define it are: *Rhamnus lycioides subsp. oleoides* (L.) Jahand. & Maire, *Thapsia garganica* L., *Rhamnus alaternus* L., *Asparagus acutifolius* L., *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*, *Calicotome spinosa* (L.) Link. It comes with a clear low geatter with a cover of 40 to 50%. It appears between 1000 and 1100 m altitude on limestone substrates in the north-east of djebel Medjounes. The slopes often exceeding 16%. Species *Asphodelus ramosus* L., *Plantago lagopus* L, *Trifolium stellatum* L., *Trifolium glomeratum* L, *Trifolium resupinatum* L., *Anisantha rubens* (L.) Nevski, are a sign of extensive grazing. The five types of matorrals are confined on the North side and they are absent on the southern flank.

Human action is very marked on the southern flank than on the North side. Populations practice vegetable crops, the planting of fruit trees and pastoralism (cattle, sheep, goats and equidae). These courses have regressed leaving the place to the *Rosmarinetea officinalis*.

Association in Centaureo acaulis - Genistetum tricuspidata Under Association in Stipetosum tenacissimae

This new association and under association are attached to the *Rosmarinetea officinalis* (Braun-Blanquet, 1947) em. Rivas- Martinez, Diaz, Prieto,

Loidi & Penas 1991, to the order of *Cisto mauritanici-Thymetalia mynbyanus* (Quezel, Barbero, Benabid, Loisel and Rivas-Martinez, 1992), at the alliance *Genisto atlanticae-cistion villosi* (Dahmani, 1984).

Differential species are *Genista tricuspidata* Desf., *Centaurea acaulis* L., *Artemisia herba-alba* Asso, *Minuartia montana* L., *Centaurea pullata* L., *Macrochloa tenacissima* (L.) Kunth.

They are dense recovery scrubbus (80%), they are located on medium sloped grounds (10%), between 1120 and 1150 m altitude, at a North, Northeast exhibition. The sparse places are occupied by Xerophytic lawns of *Echinario capitatae* - *Euphorbietum falcatae* appartenant belonging to the *Tuberarietea guttatae* Br-Bl, (1940).

The *Stellarietea Mediae* (R.Tüxen, Lohmeyer et Preisling in R. Tüxen, 1950) are quite well represented.

Steppic influence is indicated by the presence of *Macrochloa tenacissima* (L.) Kunth, *Artemisia herba-alba* Asso, *Retama raetam* (Forssk.) Webb, *Plantago lagopus* L., *Launaea lanifera* Pau arid grazing species.

According to Dahmani (1997), these formations particularly characterize the opening of green oakia.

Association in Helianthemo cinereum subsp. rotundifolium - Genistetum tricuspidata

It is attached to the class of *Rosmarinetea officinalis* (Braun-Blanquet 1947) em. Rivas-Martinez, Diaz, Prieto, Loidi & Penas 1991, at the order of *Cisto mauritanici-Thymetalia mynbyanus* (Quezel, Barbero, Benabid, Loisel et Rivas-Martinez, 1992), and at the alliance of *Genisto atlanticae-cistion villosi* (Dahmani, 1984). It is characterized by the following taxa: *Genista tricuspidata* Desf., *Helianthemum ruficomum* (Viv.) Spreng., *Helianthemum cinereum subsp. rotundifolium* (Dunal) Greuter & Burdet, *Argyrolobium zanonii* (Turra) P. W. Ball, *Festuca coerulescens* Desf., *Thymbra capitata* (L.) Cav., *Fumana ericoides subsp. montana* (Pomel) Güemes & Muñoz Garm.

It represents a garrigue gathered 70% global overlap. It occupies the largest north-eastern part of djebel Medjounes between 900 and 1050 m above sea level, on rocky substrates. The shrub stratum is composed of *Calicotome spinosa* (L.) Link, *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Daphne gnidium* L., *Rhamnus lycioides subsp. Oleoides* (L.) Jahand. & Maire., etc. The herbaceous carpet is important, it is essentially species of the class *Stellarietea mediae* that dominate.

The significant presence of *Lygeo-stipetea* species and *Onopordetea* seems to indicate a regressive dynamics of scrublands to skinned lawns.

Association in Bupleuro spinosi- Astragaletum armatus (Quézel, 1975).

It belongs to the class of *Rosmarinetea officinalis* (Braun-Blanquet 1947) em. Rivas-Martinez, Diaz, Prieto, Loidi & Penas 1991, at the order of *Erinacetalia anthyllidis* (Quezel, 1952) and at the alliance *Festucion algeriensis* Quezel, (1957). It is defined by *Astragalus armatus* Willd. subsp. *armatus*, *Atractylis cancellata* L. and *Bupleurum spinosum* Gouan.

These are skinned lawns with spiny xerophytes in pad with a total cover of 60%. They are located south of djebel Medjounes between 1300 and 1400 m, on high slopes (20%).

The shrub stratum is dominated by *Calicotome spinosa* (L.) Link, *Crataegus monogyna* Jacq., *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Rhamnus alaternus* L.,...etc. La The herbaceous stratum consists of *Plantago lagopus* L., *Calendula arvensis* (Vaill.) L., *Briza minor* L., *Sinapis arvensis* L. *Plantago coronopus* L and *Guenthera amplexicaulis* (Desf.) Gómez-Campo. etc.

These associations seem to be the result of a regressive dynamic of matorrals. The remains of *Quercetea ilicis* (*Crataegus monogyna* et *azorolus*) bear witness to this. They are more preserved on the northern flank than on the southern flank where the

association with *Bupleuro spinosi- Astragaletum armatus* (Quézel, 1975) represents the ultimate stage of *Rosmarinetea officinalis*.

Association in Plantago coronopus L. et Helianthemum apenninum (L.) Mill.

She is subservient to the class of *Lygeo-Stipetea* (Rivas-Martinez 1978 em. Kaabèche 1990), at the order of *Lygeo-Stipetalia* (Braun-Blanquet et DE Bolos, 1954), and at the alliance *Stipo-Launaeion acanthocladae* (Kaabèche, 1990).

The characteristic species of the association are *Helianthemum apenninum* (L.) Mill., *Plantago coronopus* L., *Artemisia herba-alba* Asso.

They are stony lawns with medium cover (50%), they are found in the east between 900 and 1000 m above sea level, on medium-sloped terrain (15%). The herbaceous stratum is composed of therophytes: *Helianthemum ruficomum* (Viv.) Spreng., *Poa annua* L., *Astragalus echinatus* Murray, *Echium boissieri* Steud., *Micropus supinus* L.

Association in Plantago lagopus L. et Pseudopodospermum undulatum (Vahl) Zaika, Sukhor. & Kilian, Nouv

From a synsystetic point of view the association with *Plantago lagopus* L. and *Pseudopodospermum undulatum* (Vahl) Zaika, Sukhor. & Kilian, Nouv, joins the class of *Lygeo-Stipetea* Rivas-Martinez 1978 em. Kaabèche 1990 and the order of *Lygeo-Stipetalia* (Braun-Blanquet et De Bolos, 1954) and the alliance with *Artemisia herba-alba* Asso et *Plantago albicans* L. Djebaïli 1978.

It is a steppe formation, more or less dense (60%), characterized by *Artemisia herba-alba* Asso, *Plantago lagopus* L., *Plantago albicans* L., *Pseudopodospermum undulatum* (Vahl) Zaika, Sukhor. & Kilian, *Ajuga chamaepitys* (L.) Schreb., *Salvia verbenaca* L., *Plantago serraria* L. It is found on marl-limestone soils with a low slope (8%), at an altitude of 1050 m and south of djebel Medjounes.

The shrub layer consists of *Daphne gnidium* L. and *Calicotome spinosa* (L.) Link. La The herbaceous stratum is dominated by chamaephytes (*Thymus munbyanus* subsp. *ciliatus* (Desf.) Greuter & Burdet, *Artemisia herba-alba* Asso, *Capparis spinosa* L., etc), hemichryptophytes (*Carlina gummifera* (L.) Less., *Hyoseris radiata* subsp. *radiata* L., *Ajuga iva* (L.) Schreb., *Paronychia argentea* Lam., *Plantago lagopus* L. etc) and therophytes (*Erodium moschatum* (L.) L'Hér., *Sedum caeruleum* L., *Guenthera amplexicaulis* (Desf.) Gómez-Campo...etc).

Association in Artemisetum herba-albae (Maire, 1926)

It belongs to the *Lygeo-Stipetea* Rivas-Martinez 1978 em. Kaabèche 1990, *Lygeo-Stipetalia* (Braun-Blanquet et De Bolos, 1954) and *Noaeo mucronatae-Artemision herba-albae* (Aidoud- Lounis, 1984). It is characterized by *Artemisia herba alba* Asso, *Hertia cheirifolia* (L.) Kuntze, *Astragalus armatus* Willd. subsp. *armatus*, *Astragalus echinatus* Murray.

These are stepping courses with recovery between 40 and 60%, they are south and southwest between 1300 to 1400m altitude, on medium slopes (12%).

The characteristic floristic composition corresponds to a chamaephytic vegetation (*Artemisia herba-alba* Asso, *Astragalus echinatus* Murray, *Hertia cheirifolia* (L.) Kuntze, *Astragalus armatus* Willd. subsp. *armatus*, *Helianthemum cinereum* (Cav.) Pers., *Launaea lanifera* Pau,..etc) Accompanied by hemicyptophytes and by therophytes (*Astragalus echinatus* Murray, *Poa bulbosa* L., *Plantago afra* L., *Micropus supinus* L...etc).

Association in Artemisia herba-alba Asso and Launaea lanifera Pau nouv

It is attached to the class of *Lygeo-Stipetea* (Rivas-Martinez 1978 em. Kaabèche 1990), at the Order of *Lygeo-Stipetalia* (Braun-Blanquet et De Bolos, 1954), and the Alliance of *Artemisia herba-albae* and *Poa bulbosa* (Le Houérou, 1969). It is characterized by the following floristic procession *Artemisia haerba-alba* Asso, *Poa bulbosa* L., *Launaea lanifera* Pau.

The association, dominated by the chamaephytes of *Artemisia herba-alba* Asso, *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*, *Thapsia garganica* L., *Drimia maritima* subsp. *maura* (Maire) Förther & Podlech, corresponds to clear steppes with a cover of 40%. It appears at 1400m altitude on rocky terrains and slabs in the south and south-west of Jebel Medjourn.

Herbaceous stratum is dominated by hemicyptophytes (*Thapsia garganica* L., *Carduncellus pinnatus* (Desf.) DC., *Plantago lagopus* L., *Lobularia canariensis* subsp. *rosula-venti* (Svent.) L. Borgen, *Hyoseris radiata* subsp. *radiata* L.).

Many ruderal species: *Sedum sediforme* (Jacq.) Pau, *Sedum caeruleum* L., *Alyssum atlanticum* Desf., *Erodium malacoides* (L.) L'Hér., *Asperula hirsuta* Desf., *Sedum album* L. form the floristic procession of these steppes .

The weak presence of the *Quercetea ilicis* (*Calicotome spinosa* (L.) Link, *Ampelodesmos mauritanicus* (Poir.) T. Durand & Schinz, *Daphne gnidium* L., *Rhamnus alaternus* L.) is a sign of a very advanced degradation of forest formations. Note that these associations are completely absent on the northern flank.

Association in Filago pyramidatae-Plantaginatum lagopi Dahmani (1997)

Under association Thymetosum –munbyanus Dahmani (1997)

This association and under association have an affinity with the class of *Tuberarietea guttatae* Br-Bl, (1940) Rivas-Martinez, (1977), at the order of *Brachypodietalia (Trachynietalia) distachyae* (Rivas-Martinez, 1977) and at the alliance of *Thero-Brachypodion (Trachynion distachyae)* (Braun-Blanquet, 1925, Rivas-Martinez, 1977). They are characterized by *Filago pygmaea* L., *Plantago lagopus* L., *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*.

These are the threeophytic lawns with average overlap (50%). They meet on low-slope marn-limestone floors (6%), at 1400m altitude and south of djebel Medjounes.

The shrub stratum consists of *Thymus munbyanus* Boiss. & Reut. subsp. *munbyanus*, *Bupleurum spinosum* Gouan, *Astragalus armatus* Willd. subsp. *armatus*. The herbaceous stratum is formed of the *Plantago lagopus* L., *Carduncellus pinnatus* (Desf.) DC., *Tragopogon pratensis* L., *Campanula erinus* L.

The presence of *Stellarietea mediae* (R.Tüxen, Lohmeyer et Preisling in R. Tüxen, 1950) testifies to anthropozoic intensity.

Conclusion

The phytosociological study allowed us to define 13 associations and three under associations belonging to 10 alliances, 06 orders and 04 classes.

Of the thirteen syntaxonomic units, five relate to *Quercetea ilicis* including a new association (association with *Calicotome spinosae-Thymuteum ciliatus*); Three at the *Rosmarinetea officinalis* avec with two new associations (Association at *Centaureo acaulis - Genistetum tricuspidata* et Association à *Helianthemo cinereum* subsp. *rotundifolium - Genistetum tricuspidata*); Four at the *Lygeo-Stipetea* contenant trois nouvelles associations (Association at *Plantago coronopus* and *Helianthemum apenninum*, Association at *Plantago lagopus* L. and *Pseudopodospermum undulatum*, Association at *Artemisia herba-alba* Asso and *Launaea lanifera*) and an association affiliated with the *Tuberarietea guttatae*.

The different units correspond on the physiognomic level to matorrals, scrublands, steppes and lawns.

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