Factorial analysis of correspondences Application to phytoecological Study in the Tazekka National Park (Morocco)

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Abstract ; Our work concerned a protected area, formerly created. It was concerned the study of the vegetation in the National park of Tazekka, situated in the Eastern Middle Atlas. Concerning this park spread on an area of 13737 hectares, knowledge of the vegetation remained quite incomplete. Therefore, the target is, the knowledge of the current state of the vegetation on the one hand, and highlighted its potential state on the other hand. About sixty made floral statements are handled by the Factorial Analysis of Correspondence. The interpretation of the results enabled to identify four forest vegetal groupings (one of which contains two sub-groupings) according to the influence of altitude, soil profundity, and bioclimatic terracing; and a pre-forest vegetal grouping. The mapping of these vegetal groupings in cartographic layers is also approached.

Keywords: National Park, Tazekka, mapping, forest groupings, pre-forest groupings, Eastern Middle Atlas.

I. INTRODUCTION

To the Morocco, nicknamed 'complex of trees and bushes' forest (Boudy, 1950) covers with the Alfa tablecloths around 9 million hectares (HCEFLCD, 2012). This space is the continuous drought, human action, and grazing pressure. Indeed, the Moroccan forest develops overall in weather conditions precarious and remains vulnerable to resultant degradation of the different attacks of the man and his herds. The regression of our forests for the benefit of the phenomenon of desertification on areas more and more extended, leading to an irreversible loss of land, on the one hand, and to protect representative ecosystems of the biodiversity of the country on the other hand, led Morocco to an orientation towards the conservation of its natural heritage. Among the strategic action plans in this direction, the creation of a network of protected areas (Lorent, 2011). Among these areas, national parks are the most well-known form of the public. IUCN (World Conservation Alliance) made the second category which group areas of special interest for its protected areas national parks commission The Park National de Tazekka (PTNZ), created in 1950 680ha to preserve the cedar forest of Tazekka, today is by its extension to 13 737 ha in order to follow the natural evolution of this ecosystem, include other natural resources, and meet the international standards for the creation of national parks. In such site, conservation is undoubtedly the top priority. This "rational conservation of resources of the Earth is nothing else than the marriage of the former two principles: the need to prepare the management of resources on the basis of accurate inventories and the need to take measures to prevent exhaustion of resources" (IUCN, 1990).

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As part of these principles that between our study in the PNZ. In fact, the area underwent some studies more or less oriented in the direction of our work such as Zidane (1986) and Belahyan (1990). However, given the very particular interest currently granted to the parks, a study of the fullest possible vegetation, which is the originality of the PTNZ, remains valuable, in order to address the lack of accurate and up-to-date about these plant groups and their conditions of development knowledge (natural regeneration, environmental conditions, State of health, dynamic vegetation,...). It's as well as managers and scientists will be able to develop a model of development for these plant association. It is in this sense, that this study is interested in the characterization and typology of the different environments through the analysis of vegetation taking into account stationnels settings, in a protected area called to appeal of ecological interest and development that might acquire a dimension international, something that will add originality still has our research work.

II. MATERIELS ET METHODES

1. Study site

The PNTZ is the former 2nd National Park in Morocco after the National Park of Toubkal. It currently spans three key areas: a central core, an area of Oaks (Bab-Azhar) and a tourist area including forest Chiker (green Grove), the Dayat Chiker, the abyss of Friouato, the site of Bab-Boudir, the site of Ras-El-Maa, and the site of Sidi-Mejbar (DEFCS/BCEOM-SECA, 1994).

The study area is located in the northern part of the Middle Atlas where stands three geological parts: primary Tazekka massif, the average causse tabular Atlasique from the secondary era, and the Middle Atlas pleated from the secondary era (DEFCS/BCEOM-SECA, 1994).

The climate of the PNTZ is particular; its relief is a barrier to the moist westerly winds, allowing him to receive the bulk of the moisture they carry. In comparison with the neighbouring rainfall regimes, it is characterized by annual average rainfall ranging from 900 mm/year at Bab Azhar 1500 mm/year at the Summit Tazekka and a relative humidity of the atmosphere significantly greater (Mtewet, 2009). Seasonal rainfall is of type HPAE. The bioclimate is semi-arid superior to Perhumide atmosphere. Thermal variations change according to altitudes between temperate and cold Variant (Fougrach, 1990). In terms of land, four classes are identified with the dominance of the first two (AEFCS / BCEOM - SECA, 1994) :

- Iron channel soils: they are the best represented, they occupy in particular the eastern portion of the Park, and on dolomitic basalts dolomitic calcareous trays or other volcanic rocks;
- Little advanced soil: cover large areas on schistose land, on land marno-limestone slopes and terraces West of main wadis;
- Calcimagnetiques soils: are vulnerable to erosion, and occupy the eastern part ;
- Brown soils: they watch on more or less extended spikes in the Northwest of the Summit of the Tazekka.

2. Collection of informations

Map of stand types based on pre-determined by us - even, and following the counting of the documents available on the study area (topographic map data geomorphological, geological, climate,...), we opted for a guided random sampling. Indeed, to view the diversity of ecological descriptors in the box (gradient altitudinal, exhibition, geological substrate, slope, soil,...), We thought it reasonable to conduct surveys, whenever we have seen a change at the plant level, or a significant ecological descriptor (Amini and al., 2008 ; Belghazi, 1990 ;Bellaghmouch, 2008; Ezzahiri, 1989). This while striving to choose the locations of surveys in full individual association to avoid areas of overlap between groups (Gillet, 2000 ; Gillet, 1991 ; Gallandat, 1995). Each statement has been a qualitative floristic inventory (flora of all species list) and quantitative (abundance-dominance) at the level of the minimum air (Guinochet, 1973). Eleven other descriptors judged interesting were selected for each statement. The recovery of each species is noted by the method of BRAUN-BLOQUET (1952, 1964), by assigning to each species abundance-dominance and sociability factor according to fix scales.

3. Data analysis

The method of data analysis used is said to be quantitative. It is more suitable for the treatment of ecological information (Richard, 1969; Guinochet, 1973). This technique ((AFC) correspondence factorial analysis) allows to define vegetation and environmental groups (groups of species to sociological affinities (Duvigneaud *in* Belghazi, 1990)) individualized within the plant formations.

All of the floristic data collected is submitted to statistical treatment (by the AFC) matrix records (individual) / case (variable) (Benzekri, 1973). This treatment takes account of the Presence-Absence index (which takes the value 1 in the presence of the species in the succession, and the value 0 in the event of his absence), that is the most used for the identification of plant associations, because of its simplicity (Aafi, 2007) compared to the index of abundance-dominance, which brings no significant additional information and even tends to obscure the interpretation (Lacoste and Roux, 1972 ; Lonchamp, 1977 ; Bonin et Tatoni, 1990).

At the end of the calculation made by the program used we got more or less scattered point clouds. Depending on the case, these points represent statements or species, or both on the same cloud. In this last case, each statement is surrounded by its species and each species occupies a position in connection with his presence in each statement. We have synthetic image relations and studied all data. In this sense, and differentiation and individualization of the vegetation are to be perfectly objective, he had to consider the various information provided by listings of computer for each AFC, namely:

- Table of eigenvalues;
- Tables of factors on species and surveys: each point-statement or point-species is usually represented by its coordinates on different axes and its absolute (CTA) Contribution and Contribution (CTR) Relative. These have a key role in interpreting because they designate specific points of an axis. In this way, we were able to interpret key factors, particularly by the game of species, and we have individual sets of points-statements with the neighboring CTR on the same poles of axes;
- Factorial designs (or cards factorial): detect relationships between the axes of the first scatterplot and the second, due to the symmetry between the clouds of species and surveys.

After having bounded on factorial designs distributed sets of points-records spatially homogeneous manner, thanks to a certain floristic affinity, we have established sets of points-species, following the same procedure of spatial reconstruction.

However, the characterization of each group of points-floristic point of view remains delicate. Raising in particular the problem of where the limit of species to take into account for a group given survey.

Obviously, to be a species characteristic of the group to which it belongs, it is important that its general frequency (in reporting AFC) is equal to its frequency in the group, itself equal the number of statements forming this set (October, 1982). We have translated this by this report:

Index of characterization =2 f(x)/ F(x) + N

Where:

f(x) : frequency of the species in the Groupment
F(x) : General frequency of the species, in the AFC
N : Number of statements of the Group

More this report tends to 1, more species x is characteristic of the considered grouping. A last step, the importance of which may vary from a to another, phytoecological characterization detailed study of stations eventually vegetation mapping, using a geographic information system (GIS) software. The polygons are digitized on maps of pre-established land, from the contours drawn on paper prints. These data are structured in layers.

III. RESULTS AND DISCUSSIONS

1. Inventory of flora

The inventory of the flora of the PNTZ, established in the present work, has 92 taxa. Most species have a low extension in the site. The most common species (present in 21 to 45 surveys) are thirteen: *Balansaea glaberrima* (45 surveys), *Quercus rotundifolia* (36 surveys), *Galium ellipticum* (32 surveys), *Quercus canariensis* (31 surveys), *Anarrhinum pedatum* (30 surveys), *Cistus salviifolius* (29 surveys), *Quercus suber* (28 surveys), *Asphodelus cerasiferus* (25 surveys), et *Arbutus unedo*, *Arisarum vulgare*, *Bellis sylvestris*, *Cytisus triflorus*, *Juniperus oxycedrus* (21 surveys). The specific richness of records varies between 6 and 24 species. The richest Habitat (16 to 24 species) are those of the cedar forest, including those located in the North of Tazekka Mountain slope.

Analysis of surveys

The analysis looked at overall records and species of the PNTZ, 57 records, and 92 species. The processing of our data by the FTA helped firstly know the share of information expressed by each axis calculating participation relative to the total inertia of the cloud, explained by the 5 axes. On the other hand, this treatment also helped to highlight the main local factors influencing the distribution of natural vegetation. The results obtained are summarized in table1.

Table 1: Percentage of absorbed by the axes inertia

Axes	1	2	3	4	5
Eigenvalues	**0,62**	0,50	0,45	0,38	0,26
Inertia (%)	15,61	11,84	9,52	6,11	2,70
Cumulation %	15,61	27,45	37,01	45,02	50,92

This table shows a significant own value on the axis F1 reflecting heterogeneity in records (Vedrenne,1982). This phenomen is found to a lesser degree on the F2 axis. Symmetry in the structure of the cloud in the F1 - F2 (Figures 1 and 2) plan shows a complementarity in the provision of information between the axes F1 and F2.

In this analysis, the F1 - F2 plan expresses 27.45% of the information. This indicates the axes F1 and F2 summarize the major features of spatial organization of flora and surveys. The axes of F3, F4 and F5 are redundant information with the previous ones. However, examination of factorial designs shows available to groups defined by the analysis of the information is essentially ordered axes F1 - F2 and F1 - F3 plans that we interpret below.

The analysis allowed the identification of three groups of statements. However, the highlight of the characteristic species of each group of records, appeals to the CTR

of the species on the same poles of axes used to individualize this group (we have considered that the CTR higher than the average CTR on each axis), as well as the calculation of the IC.

The F1 axis organizes most of the groupings. He opposes:

- On the positive side: (G2) surveys carried out on stands of Cedrus atlantica with a few clumps of *Quercus canariensis* and *Quercus rotundifolia* herbal depending on the altitude and exposure.

- On the negative side: the (G1) surveys on stands of *Quercus rotundifolia*, in the presence of other species *as Juniperus oxycedrus, Balansaea glaberrima, Genista jahandiezii*, and *Digitalis purpurea*. This vegetation has the largest surface area of the North East of the PNZ portion. The axis F2 does not distinguish clearly the various groupings. However it seems to bring into conflict.
- On the positive side: the basis of *Cedrus atlantica* (G2) stands that are already mentioned axis F1.
- On the negative side: surveys where there is an over-representation of the Quercus suber and Arbutus unedo (G3), in the presence of a few species such *as Cistus salviifolius, Balansaea glaberrima, Pteridium aqualinum, Erica arborea, Quercus canariensis* and *Anarrhinum pedatum* on substrate siliceous between 1000 and 1300 m altitude.

However, the core G'1 + G'2 remains close to zero. But it is possible to distinguish in this cloud of breaks that can allow the isolation of new groupings. Statements distinguishing these two groupings are dominated by *Quercus canariensis* and other species that appear in statements depending on the altitude and exposure (Figures 1 and 2). Furthermore, this analysis identified that axis F1 (15.61% of total inertia) denotes a soil depth gradient. He opposed side *negative surveys illicaie populated by Quercus rotundifolia, Juniperus oxycedrus, Balansaea glaberrima*, and *Digitalis purpurea* where the depth of soil is low, the rest of statements, representatives the habitats of the Oaks, cedar forest, and of zeen oak growing on deep soil.

The F2 (11.84% of total inertia) axis can be interpreted as a clear opposition between a cedar forest that grows at high altitudes, and a look at average altitude. This axis has a gradient of altitude. The axes F1 and F2 floristics dispositif point of view very different vegetation. Available to groups in V reminds the effect of GUTTMAN (Benzekri, 1975 in Vedrenne, 1982) which expresses a certain complementarity between the two environmental gradients that influence the distribution of vegetation in the study area.

Axis F3, despite its low contribution information (9.52%), he opposed the negative side to the surveys where there is an over-representation of species such as: *Cedrus atlantica, Quercus canariensis, Geranium malviflorum, Arbutus unedo,* Crataegus *laciniata, Tamus communis, Gernaium malviflorum*, and *Quercus suber*. Essentially, these species thrive in a floor of Supramediterraneen vegetation, which barely touches the floor of the Mountaineer Mediterranean (Summit Tazekka), under mean wet to Perhumide, cold to very cold. On the positive side, is rich in records *Quercus rotundifolia, Chamaerops humilis, Juniperus oxycedrus, Cytisus triflorus,* and *Phillyrea latifolia ;* forming Mesomediterra- neenne pure forest training, under subhumid bioclimate to damp costs. In conclusion, the F3 axis can be considered as an axis that indicates the bioclimate and the staging of vegetation.

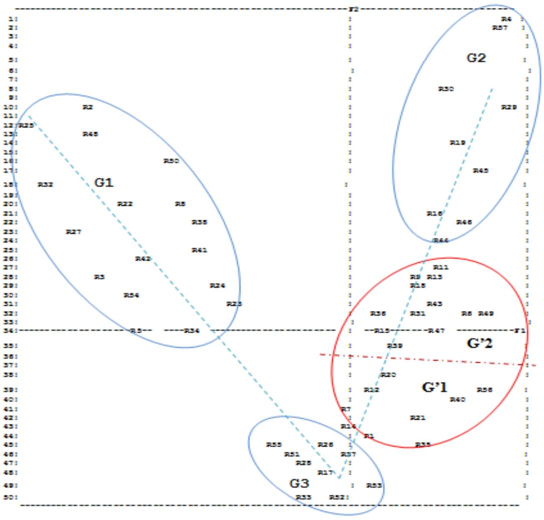

Figure 1: Factorial analysis of the floristic data F1 - F2

2. Typology of vegetation in the PNTZ

The phytoecological study and phytoso-ciological training forest and preforestieres of the Morocco undertaken by the team shorts, Quézel and Rivas-Martinez in 1981 described national most of the vegetation on the scale. Our work can be seen, in large part, as a confirmation of these groups, particularly in the PNZ.

2.1. Forestiers Groupements

The survey and species groupings are (Figure 3):

*** G1 (Group to *Quercus rotundifolia*)**:

It is a frankly forestry training. It corresponds to the Mesomediterraneenne and Supramediterraneenne, Green Oaks growing on substrata various (limestone, dolomite, partly shale and locally sandstone) and generally shallow soils to superficial.

It occupies the largest surface at the level of the eastern portion of the PNZ with slopes of 20-40% on various exhibitions. On the slope east of the Tazekka found on steeper slopes up to 80% on schist substrate with low training which gives way down (1000 to 1150 m), to a matorral of green oak, very anthropise.

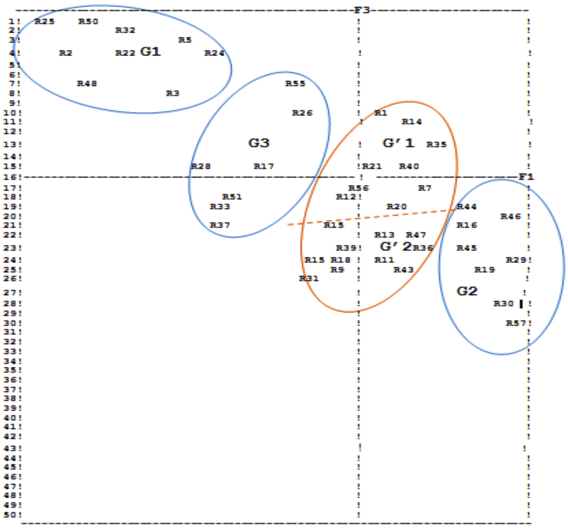

Figure 1 : F1 - F3 of the overall data analysis floristic factorial

These groups, even though they occupy the largest scope at the level of the PNZ, are fairly homogeneous. In terms of flora, we don't decelons no large differences between the various sites of these groupings. However, we can note a few items that appear in the Supramediterranen Green Oaks because of more favorable moisture conditions (*Genista jahandiezii*). These groups do not always offer ongoing massive but lie on large areas, infiltrated matorral training generally dense.

These formations can be seen quite frequently on the reverse is and northeast of the Jbel Bou Messoud with floristic cortege consisting, in addition to *Quercus rotundifolia*, Chamaerops humilis and *Phillyrea latifolia*.

Phytosociological perspective, this group-ing relates to the alliance *Balansaeo glaberrimae - Quercion retundifoliae Barbero*, (Quézel and Rivas-Martinez, 1981), which is characterized by these frankly forestry training involving species of the order of the *Querceralia ilicis* Braun-Blanquet, 1947; *Quercetea ilicis* class. In terms of flora, this group can be characterized by the first two species appear in table 2, by the fact that they possess a characterization index greater than or equal to 0.6.

Table 2: Indices of characterization of the species of the grouping to *Quercus rotundifolia*

Species	Index of characterization (IC)
Quercus rotundifolia	**0,64**
Digitalis purpurea	**0,64**
Balansaea glaberrima	**0,48**
Genista jahandiezii	**0,40**
Origanum elongatum	**0,24**

***G2 (grouping to *Cedrus atlantica*) :**

This group corresponds to the original forest unit of the PNZ; the rate of endemism is highest. It develops on a shale and deep, fresh soil substrate and humiferes. This cedar forest occupies mainly the Supramediterraneen and barely touches the floor of the Mediterranean Mountain, under mean wet and Perhumide, cold and very cold.

Altitudinalement, this grouping goes from 1600 m, on the South side, at 1400 m on the north side. He knows his limit at the top of the Tazekka (1980 m) on gentle slopes on the South becoming more steep on the hillsides East and North side.

Phytosociologically, this grouping encarte in Violo mumbyane - *Cedrion atlanticae* corresponding to the cedar forest, RIF silicole, which is part of the order *Querco-Cedretalia atlanticae*, class pubescentis Quercetea which includes the forest associations stories Suprameditерraneen and mountain Mediterranean (Bennett and all., 1994).

This alliance brings together three sous-alliances and our group relates to the *Violo-Cedrenion atlanticae* Quézel, Barbero and Rivas-Martinez, 1981.

The use of characterization index enabled us to confirm the results obtained by the shorts, Quézel and Rivas-Martinez team in 1981, who says that this group is characterized by taxa *Luzula forsteri, Teucrium oxylepis*, and *Leucanthempsis pallida.* In fact, five records have allowed us to regain some of the characteristics of the alliance.

It is of *Luzula forsteri* and *Viola munbyana*. About the characteristics of the upper units (order and class), we were able to find *Calamintha baborensis, Geranium malviflorum*, ans *Bunium alpinum var. atlantica* (Table 3).

Table 3: Indices of characterization for the grouping species of *Cedrus atlantica*

Species	Index of characterization (IC)
Cedrus atlantica	**0,94**
Luzula forsteri	**0,82**
Viola munbyana	**0,71**
Calamintha baborensis	**0,63**
Geranium malviflorum	**0,48**

***G3 (Group to *Quercus suber* and *Arbutus unedo*)**:

Corresponds to the Oaks in the western part of the PNTZ. It represents training usually closed with a fairly developed undergrowth binding development of the herbaceous stratum that is, therefore, very poor. Indeed, species diversity under the shrub stratum is quite modest (table 4).This group occupies essentially the ceiling of the Thermomediterraneen and Mesome-diterraneen under the mean subhumid and humid temperate and cool. At the level of the PNZ, he confined between 1000 and 1300 m approximately. From the geological point of view, it grows on siliceous substrate (shale, sandstone and clay locally), on soils generally deep and humiferes. The montado colonizes essen-tially Western exhibitions and is. However, we can meet her quite frequently on slope North or Southeast, on slopes ranging from 30 to 50%. The attachment of the oak Cork and *Arbutus unedo* in a phytosociological specific unit groups seems quite difficult. However, join them the association *Quercus suber* and *Arbutus unedo* (Sauvage, 1961).

Table 4: Indices of characterization of the species of the grouping to *Arbutus unedo* and *Quercus suber*

Species	Index of characterization (IC)
Arbutus unedo	**0,60**
Quercus suber	**0,49**
Anarrhinum pedatum	**0,21**
Quercus canariensis	**0,20**
Balansaea glaberrima	**0,11**

***G'1+G'2(Grouping of *Quercus canariensis*)**: It represents all the zenaie between altitudinalement the Oaks and located on the slope East of Jbel Tazekka. There are two sub-groups:

G'1: the Subgrouping to Arbutus unedo: corresponds to the Mesomediterraneenne zenaie which replaces the Oaks at altitudes of between 1300 m, but which infiltrates, repeatedly, at the level of the wet gullies. Its upper limit is reached around 1400 m to 1500 m. It grows mainly in the wet cold on soils usually very deep and cool. The zeen oak understory is poor often closed stratum tree cover and a very abundant litter (thick) formed by the accumulation of the senescent leaves. This platoon that characterized by *Origanum elongatum* and *Festuca triflora* (Table 5).

G'2: the Subgrouping to *Geranium malviflorum* : represents the zenaie successor to the previous and amount up to enter mixed with the Cedar on the Southwest and East of the Tazekka sides. It appears in the Supramediterraneen with altitudes ranging from 1500 m to 1700 m approximately. This zenaie is less vigorous than the previous, but more dense. It grows on deep, fresh, soils on slopes of the order of 40%. Bioclimatic point of view, it appears in the wet, cool and cold. From the point of view floristic characterization, this platoon is distinguished by *Lamium flexuosum* and *Geranium malviflorum* (Table 6). In the ' 2 G, and relatively ' 1 G, we notice the appearance of a procession of more intensive moisture, transgressive pubescentis Quercetea species. It is especially Crataegus laciniata and Tamus communis. It is characterized by Lamium flexuosum and Gernaium malviflorum well represented at these levels. We find it on the South. On the slope East of the Tazekka, It follows the green oak and go high enough altitude (1700 m approximately). However, it is found also on exhibitions Northeast and Northwest. Finally, we note that this grouping (grouping to *Quercus canariensis*) who is encarte Association *Balansaeo glaberrimae Quercetum canariensis* develops with its two subunits on schist substrate.

Table 5: Index of characterization of the species in the *Quercus canariensis*

(sub-Association to *Arbutus unedo*) grouping.

Species	Index of characterization (IC)
Origanum elongatum	**0,71**
Festuca triflora	**0,71**
Arbutus unedo	**0,53**
Quercus canariensis	**0,45**
Balansaea glaberrima	**0,33**

Table 6: Index of characterization of the species of the grouping to *Quercus canariensis* (sub-Association to *Geranium malviflorum*)

Species	Index of characterization (IC)
Lamium flexuosum	**0,75**
Geranium malviflorum	**0,64**
Quercus canariensis	**0,56**
Balansaea glaberrima	**0,39**
Anarrhinum pedatum	**0,10**

2.2. Preforestiers groups

At the level of the PNTZ, a single pre-forestier group has been identified. It is made up of statements that have been made on stands of oak scale, in the North East of the Park part. These surveys have not done AFC, to lighten the cloud of points and allow the individualization of major floristic units which formed the basis for mapping and the study of the forest of the PNTZ (Amini, 2008) communities.

This group has been identified by Barbero, Benabid Quézel and Rivaz-Martinez in 1992, it's *Cytiso arborei - Quercetum cocciferae*. It includes three sub-Association at the level of the Eastern Morocco including *Pistacia lentiscus*, *Quercus coccifera* and *Cytisus arboreus* ssp. (Barbero and al, 1992).

The group described at the level of the PNTZ, corresponds to the Sub-Association *Tetraclinetosum* (Barbéro, Benabid, Quézel,and Rivaz-Martinez at 1992). In fact, four species are used this sub-Association differential: *Tetraclinis articulata, Olea europea var. sylvestris,* *Ampelodesma* mauritanica and *Ceratonia siliqua* (Table7).This grouping is described in the peripheral portion in the extreme north east of the PNZ under Ras El Ma. It occupies a very small area in the Park, at altitudes between 800 and 900 m. It grows on limestone, locally marno-limestone substrate and shallow soils in the subhumid atmosphere tempered the upper horizon of the Thermo-mediterraneen.

This preforestiere unit comes on the hillsides East and Southeast, with low training without frankly individualized feet. By against, on the northern slopes and Northwest, Oak scale can form high enough feet (4 to 5 m), always mixed with green oak. It occupies very strong slopes up to 90%. Layers of Doum follow this grouping. They extend over large areas and are generally based on limestone lapiese (lapies).

The phytosociological point of view, this group relates to the order of the *Pistacio-Rhamnetelia alaterni arboreae Ericion* and the *Quercetea ilicis* class.

Table 7: Indices of characterization of the species of the Group Preforestier

(*Cytiso arborei-Quercetum cocciferae*)

Species	Index of characterization (IC)
Quercus coccifera	**0,77**
Ceratonia siliqua	**0,67**
Tetraclinis articulata	**0,62**
Olea europea var. sylvestris	**0,62**
Cytisus arboreus	**0,53**

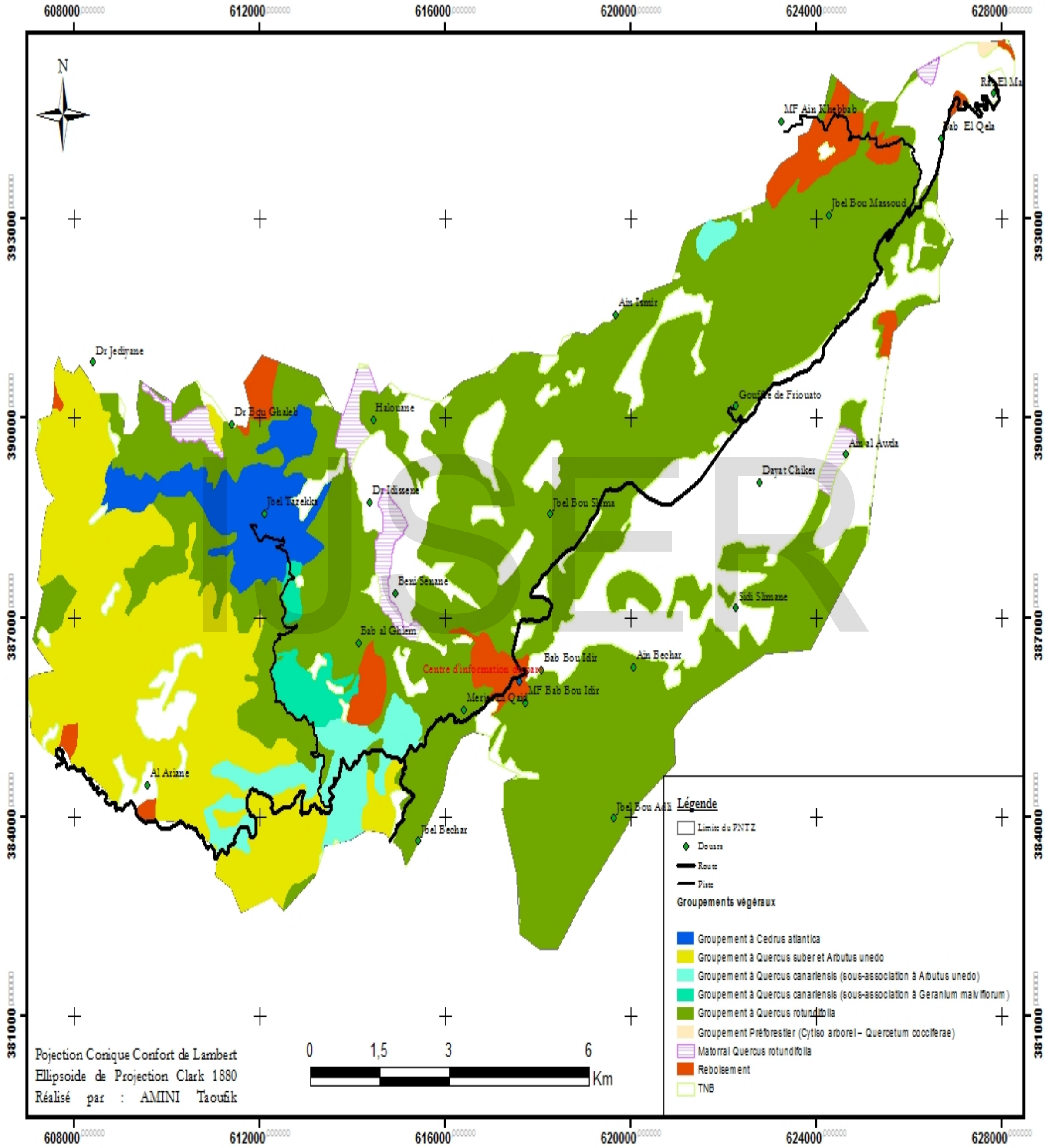

Figure 3: Map of the vegetation of the PNZ.

IV. CONCLUSION

The phytoecologique forest and pre-forestiers of the PNZ groups study shows their belonging to two classes: *Quercetea,*

illicis, and *Quercetea pubescentis*. Analysis of vegetation through the numerical method shows that it is constituted essentially mesophilic and sciaphiles elements. The famous umbellifera, *Balansaea glaberrima*, is an important phytoecologique. The holm oak form a grouping climax at the level of the Mesomediterraneen and the Supramediterraneen. The zeen oak, is two climax subgroups in the Mesomediterraneen and the Supramediterraneen: the first to *Arbutus unedo* and *Quercus canariensis* and the second in *Quercus canariensis* and *Geranium* malviflorum.
The Cork oak form a single climax group occupying the Mesomediterraneen and the Supramediterraneen floor: *Quercus suber* and*Arbutus unedo* (Sauvage, 1961).
The Cedar is the most original group in the Supramediterraneen and the floor of the Mediterranean mountain: *Luzulo forsteri – Cedretum altantica* (Barbéro and al, 1981).
Oak kermes organized an association more or less degraded in the Thermomediterraneen : *Cytiso arborei – Quercetum cocciferae* (Barbéro and al, 1992).
The central part of the Park, containing most of the endemic taxa of the Tazekka, has the greatest diversity of groups. The side portions being phytoecologiquement homogeneous. This result can be attributed to degradation particularly focused on these side portions action that leads to a commoditization of their training and the complication in their midst of phytoecological investigation.
The formations of the PNTZ are essentially forest with groups often climax. Preforestieres courses are very limited and very localized groups of degradation. This shows that, generally speaking, of the good condition of the training. However, a more important degradation becoming action would undermine the good condition of these formations, if measures would not intervene to limit.
What we can say about this is that the resilience of the ecosystems of the PNZ is still pretty good with reservations relating to the possibility of deterioration if degradation, sometimes relatively less important action, remains without limitations.
We find also that the Park area is, with its forestry groups, an intermediate situation between the *illicis Quercetea* and the *Quercetea pubescentis*. This explains that transgressions of each themselves in others.
The results presented as a result of our own observations, and those of the Group DEFCS/BCEOM-SECA (1994) relating to the series of vegetation, show that the PNTZ has significant diversity. We note the striking plasticity of the green oak compared to other species.

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