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Importance of spontaneous plants of steppe arid regions ouled djellel biskra (Algeria)

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Abstract
Algerian steppes are now experiencing a sharp decline resulting in an ecological imbalance and decreased pastoral performance. Based on surveys conducted in the study region in 2015, an inventory of spontaneous plant species was carried out, using the linear method, the pastoral local inventoried taxa in three selected sites revealed a richness of 45 flora species belonging to 41 genera and 26 families. Among the most represented families, Chenopodiaceae with 5 species (11.11%), Fabaceae and Brassicaceae with 4 species for each (8.88%), followed by Asteraceae, Lamiateaeand Zygophyllaceae with 3 species for each (6.66%). The 10 other Families are represented by only one species (2.22%). 31 of the 45 sampled species are perennial and 14 Acheb (annual). The abundance of flora is deferent for the same species from one site to another. The bio-morphological forms are noted, the chamaephytes are more dominant with 21 species (46%).

Keywords: steppe, Ouled Djellel, spontaneous flora, importance, inventory

1. Introduction

Representing more than 2/3 of the Algerian territory, the arid and semi-arid lands contain natural resources (water, soil, vegetation, etc.) which have suffered a severe degradation due to the combined effects of a human pressure and increasing animal and a drought aggravating circumstance. The preservation of those ecosystems (phyto-genetic resources) passes through the improvement of knowledge (Identification and characterization) and the conservation of biological diversity represented particularly by the spontaneous plants that have developed over thousands of years of qualifications and adaptations that harmonize perfectly with the conditions already extremes of these environments. The Algerian Steppe knows today a strong degradation that translates into an ecological imbalance and a decline in the pastoral performance [1, 2] consider, in effect, that desertification is the main phenomenon that threatens the maintenance of the diversity of plants in addition to the decrease in rainfall that directly affects the primary production of ecosystems and on the floristic diversity. The pastoral vegetation is subject also to a more and more pressure by population leading to an excessive overgrazing and the regression of resources [3]. The present work has for objective, the floristic characterization and ecological environment of the steppe vegetation (Ouled Djellel) as well as their dynamic and their relationship with the modes of use.

2. Material and Methods

2.1. Study region

Located at the East of Algeria, Biskra (4°15' et le 6°45' E et 35°15' et le 33°30'N) extends on an area of 21 671,24 km2 [4]. It is limited to the north by the wilaya of Batna, to the northwest by the wilaya of M'sila, in the northeast by the wilaya of Khenchela, to the south by the wilaya of El Oued and Ouargla and in the South West by the wilaya of Djelfa (Figure 1). The region of the Ziban is characterized by very low precipitation. Not more than 200 mm per year. These rains fall in an irregular manner and can be heavy.

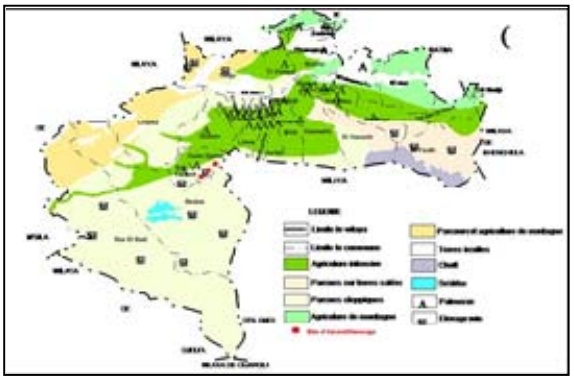

Fig 1: Location of sampling sites [5].

2.2. Choice of transect and sampling structure

Our study, conducted in 2015 in Ouled Djellel region, focus on an investigations with farmers and producers and survey by sampling spontaneous plants using linear method and quadrats technique. We place, between two pickets, a ribbon of graduated 10 to 20 m tense above the vegetation; a reading is done all 10 cm [6]. For each species we assigned a coefficient of dominance abundance [7, 8]. The floristic data have been identified, corrected and organized by an update nomenclature of species based on the references [9, 10, 11]. In addition we calculated for each species its Dominance-Abundance (number of times has been reported) and its bio-morphological types.

2.3. Statistical analyses

2.3.1. Hierarchical Cluster Analysis with R.

Cluster analysis includes a techniques designed to find similar groups within a data set [12]. Partitioning methods divide data into a number of groups predestinated by user. This method is characterized by a minimum gain of intra class inertia and loss interclass inertia at each aggregation [13, 12].

Hierarchical cluster methods produce a hierarchy of clusters from small clusters of very similar items to large clusters that include more dissimilar items. It usually produces a graphical

output known as a dendrogram or tree that shows this hierarchical clustering structure [14, 12].

3. Results and Discussion

3.1. Floristic diversity

The identification and characterization of species inventoried at 3 selected sites, highlights a floristic richness of 45 spontaneous species belonging to 41 genus grouped in 26 different botanical familiesAsteraceae, Brassicaceae, Fabaceae, Caryophyllaceae, Chenopodiaceae (Amaranthaceae), Cucurbitaceae, Poaceae, Polygonaceae, Zygophyllaceae were the most represented families (Table 1).

Table 1: Systematic and biological spectrum of spontaneous species inventoried at Ouled Djellel region.

Famillies	Species	Appreciation	Frensh name	Bio-morphological
Aizoaceae	*Aizoon canariense* L.	+		Chamaephytes
Apiaceae	*Ferula communis* L.	-	Férule	Theophytes
Asclepiadaceae	*Pergularia tomentosa* L.	-	Tanin	Chamaephytes
Asteraceae	*Launaea nudicaulis* (L.) Hook.	+	Launée à tiges nues	Theophytes
	Pallenis spinosa Cossini.	-	L'Astérolide épineux	Theophytes
	Silybium marianum (L.) Gaertn.	++	Chardon-marie	Geophytes
Chenopodiaceae	*Agathophora alopicuroides* Del.	+++		Chamaephytes
	Anabasis articulata Forssk.	+++		Chamaephytes
	Atriplex halimus L.	+++	Atriplex	Chamaephytes
	Salsola titragona Del.	++	Salsola	Chamaephytes
	Salsola vermiculata Aggr.	++		Chamaephytes
Borraginaceae	*Echium trygorrhizum* Pomel.	+	Vipérine	Theophytes
Brassicaceae	*Lonchophora capiomontana* Dur.	-	Lonchophore	Chamaephytes
	Matthiola livida DC.	-	Giroflée	Chamaephytes
	Moricandia arvensis L.	+	Moricandie des champs	Chamaephytes
	Vella annua L.	+++		Theophytes
Caryophyllaceae	*Gymnocarpos decander* Forsk.	+++		Chamaephytes
	Pteranthus dichotomus Forsk.	+		Theophytes
Cistaceae	*Helianthemum kahiricum* Del.	++	Hélianthème	Chamaephytes
Cucurbitaceae	*Coloquinthis vulgaris* (L.) Schrad.	-	Coloquinthe	Theophytes
Cyperaceae	*Scirpus holoschoenus* L.	+		Geophytes
Fabaceae	*Astragalus armatus* Willd.	+++	Astragale	Chamaephytes
	Astragalus cruciatus Link	+++	Astragale	Chamaephytes
	Genista saharea Coss. Et Dur.	++	Genêt	Nano -phanerophytes
	Retama retam (Forssk.)Webb.	+++	Retam	Nano -phanerophytes
Getraniaceae	*Erodium glaucophyllum* L'Her.	+++	Erodium	Geophytes
Juncaceae	*Juncus capitatus* Weig.	+	Jonccapité	Geophytes
Lamiaceae	*Lavandula anteneae* Maire et Qué.	+		Chamaephytes
	Salvia aegyptiaca L.	+	Salvia	Chamaephytes
	Salvia clandestine L.	+	Saugesauvage	Chamaephytes
Liliaceae	*Asphodelus tenuifolius* Cav.	+	Asphodèle	Geophytes
Plantaginaceae	*Plantago notate* Lag.	+	Plantain	Geophytes
	Plantago psyllium L.	+	Herbe aux puces	Geophytes
Plumbaginaceae	*Limonium thorini*(Maire) Sauv. et Vindt.	++	Statice	Chamaephytes
Poaceae	*Aristida pungens* Desf.	++	Drinn	Chamaephytes
Polygonaceae	*Rumex cyprius* Murb.	++	Patience	Theophytes
Ranunculaceae	*Adonis dentate* Del.	+++	Adonis denté	Theophytes
	Delphinium pubescens D.C.	++	Pied d'alouette	Theophytes
Rhamnaceae	*Zizyphus lotus (*L.) Desf.	+	Jujubier	Nano -phanerophytes
Scrophulariaceae	*Antirrhium ramosissimum* Coss. et Dur.	+++	Gueule de loup	Chamaephytes
Rosaceae	*Neurada procumbens* L.	+++		Theophytes
Solanaceae	*Lycium afrum* Manby. Et Batt.	+	Lyciet	Nano -phanerophytes
Zygophyllaceae	*Fagonia glutinosa* Del.	+++		Theophytes
	Peganum harmala L.	+	Rue sauvage	Theophytes
	Zygophyllum cornutum Coss.	-	Zygophylle	Chamaephytes

App = Appreciation: +, - : not appreciated

Among the families the most represented were Chenopodiaceae with 5 species (11.11%), followed by Brassicaceae and Fabaceae with 4 species (8.88%), Asteraceae, Lamiaceae and Zygophyllaceae with 3 species (6.66%) of the total number of species**.** Sixteen (16) families were represented by only a single species (2.22%) of the total spontaneous flora.

3.2. Biological types

The bio-morphological types were also mentioned (Table 2), Chamaephytes (46.66%) and Theophytes (28.80%) were the most represented in our study region in comparison to the others. often Chamaephytes vegetation represent stages of degradation of grassland steppes [2] Their great presence can be explain by the fact that Chamaephytes are of bushes which resist well to drought conditions by their foliage systems and adapted root to arid conditions. Whereas ephemeral Theophytes were herbaceous species that typically appear just after a rain and when the moisture of the soil was superficial. Those were species that had difficulty to survive in a period of drought and remain in seeds form [15, 16]. In third position nano-phanerophytes (8, 88%) that are shrubs and trees developed root systems feeding water from aquifers [17].

Table 2: Biological spectrum of spontaneous species inventoried at Ouled Djellel region.

Parametres	
Systematic	
Families	26
Genus	41
Species	45
Bio-morphological groupes	
Theophytes	28 ,80%
Geophytes	15.55%
Chamaephytes	46,66%
Nano-phanerophytes	8,88%
Biological spectrum	
Ch> Th> Ge > Ph	
Biological types	
Acheb (annual)	14
perennial species	31

Among the 45 sampled species, 14 species were Acheb (annual) and 31 perennial species (Table 2). The great importance of perennial in our study region can be explained by the arid conditions of steppe region characterized by scarcity of rain and sandy soil [2, 18].

The abundance of collected species from 3 sites varies for the same species from site to another. This variation can be explained by the ability of species to adapt to edaphic and climatic conditions of study region. Our region of study was characterized by large presence of *Aristida pungens* and *Astragalus armatus* (35%) that are gypsum-related species [19, 20]. Less abundant species were collected in this study region which were *Moricandia arvenisis* (24%) that is an annual specie its germination depend on rain during spring and autumn period. In third position *Lonchophora capiomontana, Asphodelus tenuifolius* and *Zygophyllum cornutum* (20%).

In comparison of our results, a previous work was done at oasis of Ziban [21, 22] have mentioned a floristic richness of 137 species including 40 spontaneous species belonging to 27 botanical families. In the region of M'sila 63 species have been identified belong to 16 families [23]. Similarly [24], identified 21 families and 66 species in a study carried out at Laghouat steppes. In region of Ouargla and Ghardaia [25], has inventoried 112 spontaneous species divided into 88 ephemeral and 24 perennial.

3.3. Importance of species

During our study, conversations (surveys) have been taking with cattlemens in the study area from what we were able to list the importance of some spontaneous species that are important food for camels and other livestock like sheeps that are the most important race “Ouled Djellel” in Algeria [23] By reading Table 1, species belonging to Chenopodiaceae (Amaranthaceae) family were the most appreciated by camel and other livestock animals. *Agathophora alopicuroides* Del. locally known as "Dhimrane", *Anabasis articulate* Forssk, referred locally as "Adjrem" and *Atriplex halimus* L. locally called "G'tef" [20]. The family of the Fabaceae represented especially by *Astragalus armatus* Willd. Referred locally as "K’ded, *Astragalus cruciatus* Link, locally knowns as" Ain Chems" and *Retamaretam* (Forssk.) Webb also called "R'tem. The Poaceae are represented by only one species but which is a good fodder *Aristida pungens* referred locally as "Drinn". As reported [26], this was also well represented in Ouargla desert and it was good fodder for camels. Whereas [2], indicate that presence of *peganum harmala*, *salsola vermiculata* sign an important degradation of vegetation cover by overgrazing and impact of human activities [26]. In addition, [20] repoted that psammophyte vegetation giving an important pastoral production for sheep on year.

3.4. Interpretation analyses

Dendrogram obtained by cluster analysis (Figure 2) and classification of group structure show formation of four groups considering the set of four magnetic susceptibility components: the first grouped samples or species with low abundance less than 2% (*Retama retam, Ferula communis,…*), and second group contained samples that had medium abundance that did not exceed 12% (*Atriplex halimus, Salsola vermiculata,* …). Third group illustrate species that had height abundance less than 35% (*Moricandia arvensis,…*) the last one contain most abundant species (*Astragalus armatus, aristida pungens,* …).

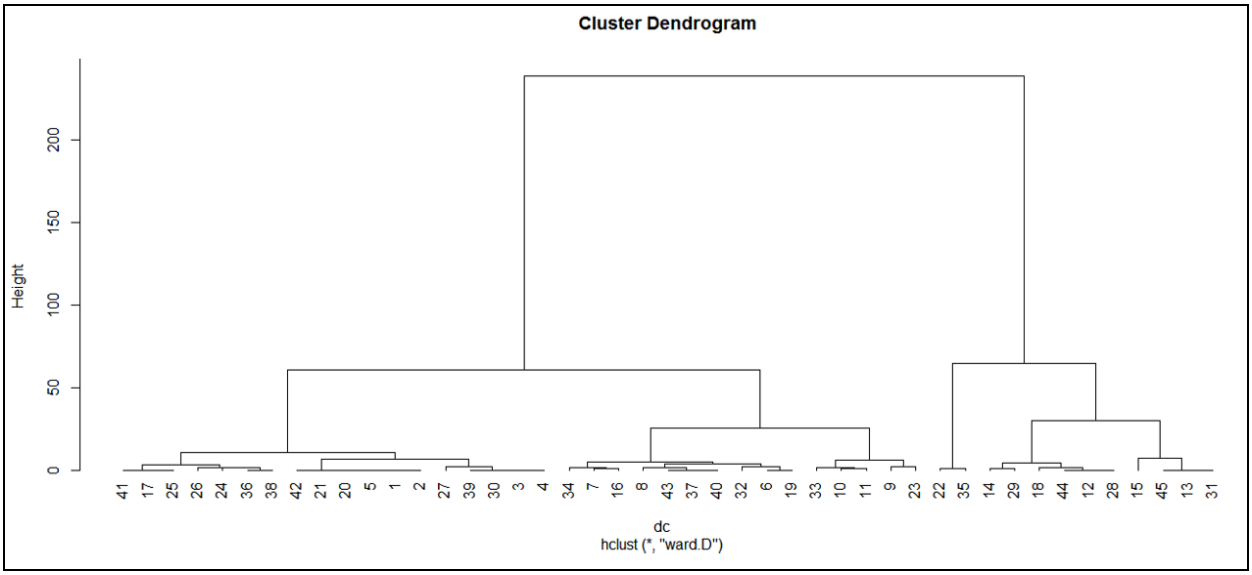

Fig 2: Dendrogram obtained by a cluster analysis of plants species

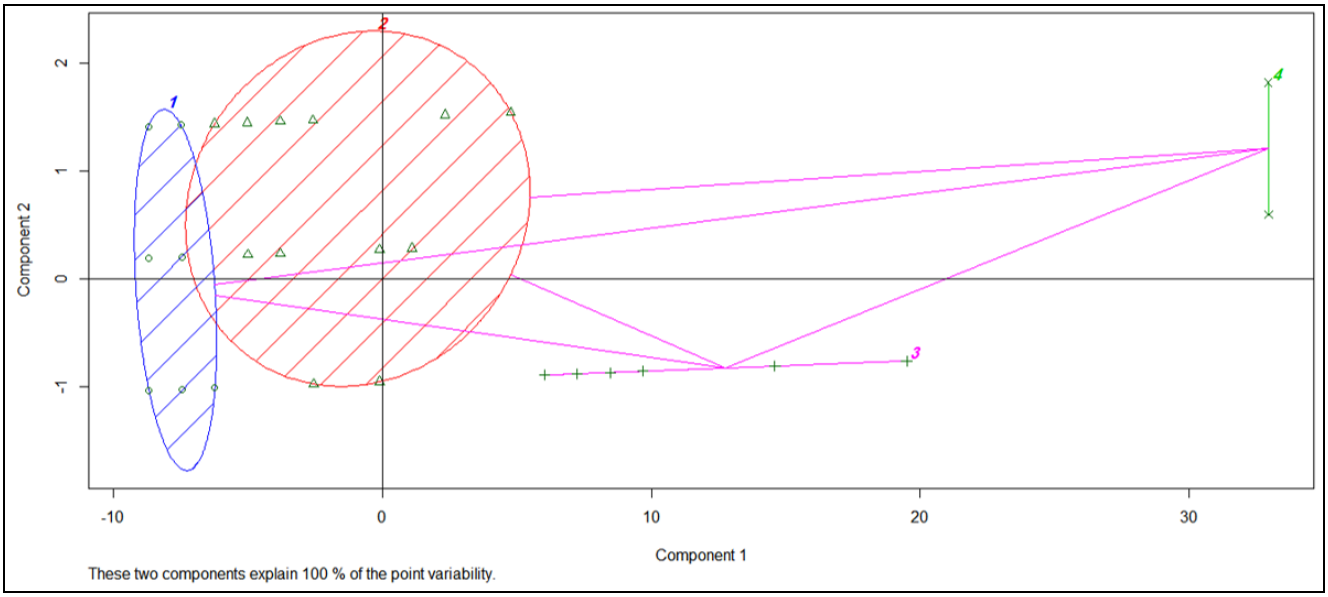

Fig 3: classification of group structure of plants species

4. Conclusion

The pastoral species premises in Biskra (Ouled Djellel), which survived in spite of anthropogenic pressures multifaceted, constitute a not negligible component in the pastoral improvement. From the collected information and the settings removed from this study, it is important to note the usefulness to know the chemical composition and the cultivation requirements of this spontaneous vegetation, rate of high appraisals by livestock, with the aim to develop and to study the possibility of introducing in the farming system. The majority of them are threatened by genetic erosion. This erosion requires the establishment of periodic assessments of the flora and the best approaches for the management of pastoral space as a function of the changing socio-economic conditions of local populations. A good number of them have become rare and threatened with extinction. The analysis of the genetic diversity and the establishment of strategies for the conservation of the most threatened species and management ecological more of the pastoral vegetation is urgent necessity.

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