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Article

Vegetation Classification and Plant Community Structure of Mediterranean Woodlands in the Surif Area, Hebron Governorate, Palestine

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Abstract: The Surif area, located in the northwestern part of the Hebron Governorate, is a significant component of the Mediterranean vegetation in southern Palestine, owing to its diverse topography, climatic conditions, and geological formations, as well as its long history of human land use. Furthermore, its location situated in a transitional zone between the Mediterranean, Irano-Turanian, and Saharo-Arabian biogeographic regions contributes to substantial plant diversity and the coexistence of species with distinct ecological and geographical affinities. **Materials and Methods:** A vegetation survey was conducted in seven representative areas of Surif, southern Palestine, using the Braun-Blanquet method. A total of 266 tree and shrub species were analyzed using cluster analysis, Euclidean distance, and Detrended Correspondence Analysis (DCA) to assess floristic relationships. Taxonomic classification was verified against international botanical databases. **Results and Discussion:** One major plant community was identified the Pinus halepensis–Cupressus sempervirens association characterized by Mediterranean pines and broad-leaved tree species. Phanerophytes were the dominant life form (36.09%), followed by chamaephytes (28.19%). Thirteen endemic or regionally restricted species (4.88%) highlighted the area's conservation significance. The vegetation composition reflected climatic, edaphic, topographic, and anthropogenic influences. **Conclusion:** Surif is characterized by rich Mediterranean forest vegetation. Habitat protection, maintaining connectivity, regulating grazing, and monitoring endemic species are essential for biodiversity conservation and sustainable ecosystem management.

Keywords: Palestine; Hebron; Phytosociology; Plant Classification; Taxonomy

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1. Introduction

Palestine lies in one of the most geographically and ecologically diverse regions of the Eastern Mediterranean and Western Asia, with exceptionally rich vegetation. Its location at the crossroads of three continents, combined with marked variations in topography, climate, geology, and soil characteristics, has created a complex mosaic of habitats supporting plant species with diverse biogeographical affinities [1]. Southern Palestine, particularly the Hebron Governorate, serves as a crucial ecological transition zone separating Mediterranean environments from more arid ones; the area encompasses mountains, highlands, valleys, plains, and agricultural landscapes, resulting in significant diversity in environmental conditions and vegetation patterns. Its geographical location further enhances its ecological significance, as the Dead Sea borders it to the east; the Sinai and Negev deserts and the Red Sea to the south; and the Palestinian coastal plain, the Mediterranean Sea, and the north to the west [1-3].

Environmental diversity in southern Palestine has given rise to varied vegetation, comprising elements from the Mediterranean, Irano-Turanian, and Saharo-Arabian phytogeographical regions, among others. Palestine boasts over 2,780 plant species

spanning approximately 872 genera and 144 families including numerous endemic or regionally restricted varieties [4-14]. This botanical richness underscores the importance of studying not only species diversity but also the organization, composition, and ecological relationships of plant communities.

Phytosociology provides a crucial framework for understanding vegetation structure and the relationships between plant species within specific habitats. By identifying and classifying plant communities based on their floristic composition and species abundance, studies in this field yield valuable insights into vegetation dynamics, habitat differentiation, environmental gradients, and plant-environment interactions. Such information is particularly significant in areas where natural vegetation is increasingly impacted by factors such as agricultural expansion, grazing, urbanization, habitat fragmentation, and other forms of human-induced disturbance. Consequently, providing detailed data on plant communities can serve as a fundamental ecological reference for assessing biodiversity, planning conservation programs, and sustainably managing natural vegetation [1,3]. Several studies have contributed to the understanding of plant diversity and plant communities in southern Palestine and the Hebron Governorate. Research conducted in areas such as Idhna, Beit Jibrin, Al-Dawayima, Wadi Al-Quff, and other parts of the Hebron region has documented significant plant diversity and revealed distinct plant communities associated with variations in topography, climate, soil, and land-use patterns [15-19]. These studies provide an important regional framework for interpreting vegetation patterns in the town of Surif, while also demonstrating that relatively small geographical areas within the Hebron Governorate can harbor markedly different botanical and phytosociological characteristics.

However, numerous studies have been conducted in the Mediterranean region regarding plant vascular and phytosociology [18, 20-27]. Surif, located in the northwestern part of the Hebron Governorate, is an ideal site for detailed vegetation research due to its diverse topography and varied environmental conditions. Situated at an elevation of approximately 600 meters above sea level, the area encompasses mountainous terrain, woodlands, open lands, pastures, and agricultural habitats. Its temperate Mediterranean climate is characterized by hot, dry summers and cold, rainy winters. The average annual temperature is approximately 18°C, while annual precipitation averages around 560 mm; most rainfall occurs between October and April, with the highest levels typically recorded in January and February [28,29]. Together, these factors climatic variability, topographical differences, diverse soil characteristics, and land-use patterns create favorable conditions for the emergence and development of diverse plant communities.

Despite these studies, the vegetation in southern Palestine still lacks sufficient documentation at the local level. Variations in elevation, slope, soil characteristics, moisture availability, land use, and climatic conditions can lead to significant differences in plant community composition over relatively short geographical distances. Consequently, findings from specific sites cannot necessarily be generalized to other areas within the Hebron region; hence, there is a need for detailed local-level studies to identify plant communities, characterize their floristic composition, and elucidate their relationships with environmental conditions.

Accordingly, the present study aims to investigate the phytosociological characteristics of plant communities in the Surif area.

2. Materials and methods

2.1. Study area

Surif is a Palestinian town located in the northwestern part of the Hebron Governorate, approximately 20 km northwest of the city of Hebron and 32 km south of Jerusalem. Surif has held a strategic location since the Roman era, situated on a mountain ridge rising about 600 meters above sea level. The area was first inhabited during the

Roman period and saw the minting of Roman coins, highlighting its historical economic importance [30]. The town's total land area is approximately 31,600 dunums, comprising 13,500 dunums of agricultural land, 400 dunums of woodland, and 9,700 dunums of open land and pasture [28]. Its geographical coordinates are 31.6495695° N and 35.0734668° E [31]. Surif is bordered to the north by the village of Al-Jaba' (Bethlehem Governorate); to the south by the villages of Kharas and Halhul; to the east by the town of Beit Ummar; and to the west by the villages of Beit Nattif and Beit Shemesh [30], as shown in Figures 1 and 2.



Figure 1. Surif location in Palestine as seen by satellite.

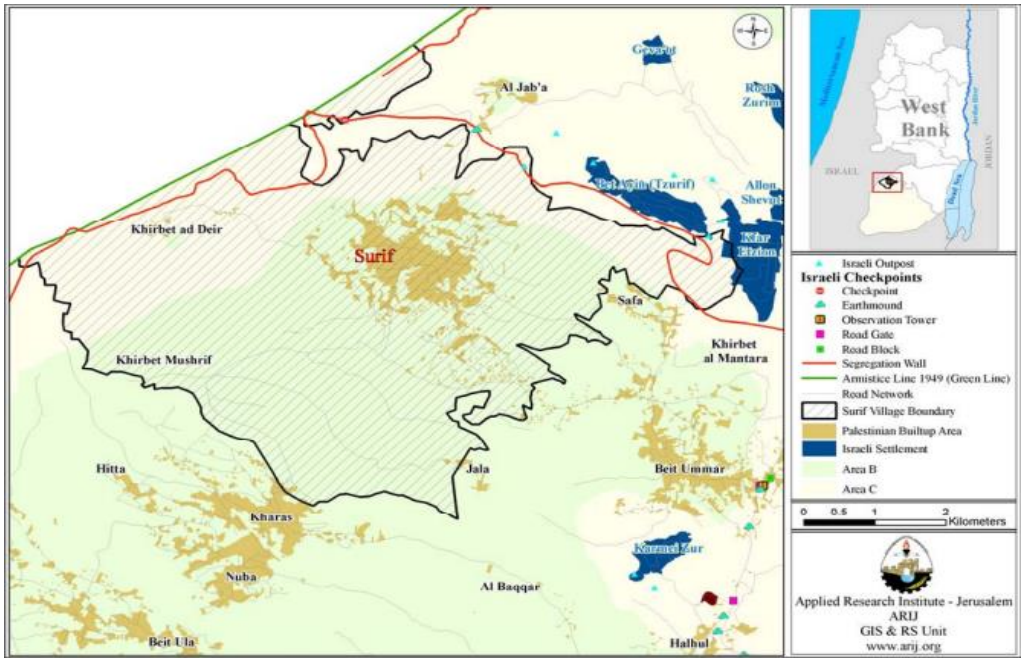


Figure 2. Surif location and its borders in Hebron Governorate, Palestine (ARIJ, 2006-2009).

2.2. *Vegetation and data collection*

Approximately 270 plant samples were selected from the study area, and data were collected on 266 woody plant species found in the forests, hills, and mountains surrounding the town of Surif. The sampling and study sites included the villages of Al-Deir and Jabla; Khirbet Jamrin (home to the shrine of the Companion Abu Ubaidah Amir ibn al-Jarrah and numerous historical houses estimated to be over 350 years old); Khirbet Mushrif; Khirbet Deir Musa; Khallat Ali Ghunaim; Khirbet Abu Shuk; Khirbet 'Alin; Karabin; and other neighboring areas, as illustrated in Figure 3.



Figure 3. The research area, from which some samples were collected, is located in the Surif region and includes Al-Dair Village, Jabla Village, Khirbet Jamreen, Khirbet Mishrif, Khirbet Dair Musa, Ali Ghunaim's Khalet, and Khirbet Abu Shouk, as identified by satellite imagery.

In addition, several shrub-covered areas were selected for biological sampling, including plant species representing both traditional and thermophilous vegetation types (Table 1). Vegetation data were collected using the Braun-Blanquet method [32], and cover-abundance values were converted according to the scale proposed by Van der Maarel (1979) [33]. The study area was divided into three plots (A–C), as shown in Table 1.

To convert the Braun-Blanquet phytosociological cover-abundance values to the Van der Maarel ordinal scale, a 266 × 3 data matrix was constructed. The conversion was performed as follows: Braun-Blanquet values (+, 1, 2, 3, 4, and 5) were converted to Van der Maarel values (2, 3, 5, 5, 6, and 7), respectively. The Braun-Blanquet cover-abundance categories are defined as follows:

5: Species covering more than three-quarters (>75%) of the sample area.
4: Species covering between one-half and three-quarters (50–75%) of the sample area.
3: Species covering between one-quarter and one-half (25–50%) of the sample area.
2: Species covering at least 5% of the sample area.
1: Species abundant in number but with low cover value.
+: Species with very low abundance and minimal cover.

In addition to applying the International Code of Phytosociological Nomenclature to characterize newly defined syntaxa, Euclidean distance measures, cluster analysis, and Detrended Correspondence Analysis (DCA) were employed to examine patterns in plant community composition and address potential gaps in the overall vegetation analysis [34-38]. Statistical analyses were performed using XLSTAT integrated with Microsoft Excel.

Furthermore, the results of plant species identification and taxonomic verification were cross-referenced with data from several internationally recognized botanical databases and online resources, including JSTOR Global Plants, the Kew World Checklist of Selected Plant Families (WCSP), Plants of the World Online (POWO), World Flora Online (WFO), The Plant List (TPL), Lebanon Flora, and Flora of Israel Online.

Table 1. Sampling data.

Inventories	Coordinates	Site	Altitude	Biogeographic unit
Inv. A	31° 35' 02"	Al-Dair Village	570	Mediterranean basin territories
Inv. B	31° 35' 06"	Khirbet Dari Musa	600	Mediterranean basin territories
Inv. C	31° 35' 10"	Ali Ghoneim's Khalet	587	Mediterranean basin territories

The study of vegetation in the Hebron region encompassed plant species found in Palestine, Syria, Lebanon, Jordan, the Negev Desert, the Sinai Desert, and the Mediterranean coastal region [15-18, 39-41]. Various approaches were employed to analyze the vegetation, drawing upon the works of Scientifics botanicals [32,33,36-38,42-46].

2.3. Statistical Analyses

The data were organized into an Excel spreadsheet comprising 266 rows (representing plant species) and 3 columns (representing vegetation survey samples or "relevés") to calculate similarity and distance metrics using a correlation-based approach. Based on this dataset, a Euclidean distance matrix was generated and used as input for Detrended Correspondence Analysis (DCA). Following the construction of correlation and covariance matrices, ordination analysis via DCA was performed to analyze patterns in plant community composition; statistical software facilitated this process by providing a clear classification and ordering of the plant communities.

The analyses identified a single plant association, designated as "Association 1" (ASL1). This association comprises forest vegetation samples from groups A, B, and C, which were grouped together based on the results of cluster analysis and Detrended Correspondence Analysis (DCA).

3. Results

3.1. Steppe vegetation, maquis, and macchie forests

3.1.1. Pino halepensis-Cupression sempervirenti

The majority of the listed species in the inventories (A, B, and C) belonged to *Pinus halepensis* (L.) Miller (commonly known as Jerusalem pine or Aleppo pine), *Cupressus sempervirens* L., *Cupressus arizonica* Greene, *Pinus pinea* L., *Pinus brutia* Tenore, *Juniperus deltoides* R.P. Adams (synonymous with *Juniperus oxycedrus* L.), and *Juniperus turbinata* Guss. (also known as *Juniperus phoenicea* L.). *Retama raetam* (Forssk.) Webb. & Berthel., *Spartium junceum* L., *Thuja occidentalis* L., *Glycyrrhiza glabra* L., *Ceratonia siliqua* L., *Cersis siliquastrum* L., *Acacia dealbata* Link., *Acacia salicina* Lindl., *Acacia cyanophylla* Lindl., *Calicotome villosa* (Poir.) Link., *Genista monspessulana* (L.) O. Bolós & Vigo., *Acacia radiana* Savi., *Ficus cariaca* L., *Retama rhodorhizoides* (Webb. & Berthel.), Scop., *Ficus microcarpa* L. F.,

Prosopis farcta (Banks et Sol.), *Morus nigara* L., *Olea europaea* L., *Anonis natrix* (L.), *Morus alba* L., *Olea europaea* var. sylvestris, *Quercus calliprinos* Webb. or *Quercus palaestina* Kotschy or *Quercus coccifera* L., *Quercus rotundifolia* Lam., *Quercus boissieri* Reut. or *Quercus infectoria* Olivier, *Quercus inthaburensis* Decne., *Pistacia saportae* Burnat., *Rhus tripartita* (Ucria) Grande *Pistacia khinjuk* Stocks, *Rhus coriaria* L., *Schinus molle* L., *Schinus terebinthifolius* Raddi, *Rhamnus alaternus* L., *Sageretia thea* (Osbeck) M. C. Johnst., *Rhamnus disperma* Ehrenb. ex. Boiss., *Ziziphus jujuba* Miller, *Searsia tripartita* (Ucria) Moffett, *Zizyphus Lotus* (L.) Lam., *Paliurus spina-christi* Miller, *Zizyphus Spina-christi* (L.) Desf., *Populus alba* L., *Populus euphratica* Oliv., *Salix alba* L., *Atraphaxis spinosa* L., *Sarcopoterium spinosum* (L.) Spach, *Crataegus oriana* (L.) DC., *Amygdalus ramonensis* Danin, *Prunus arabica* (Olivier) Meikle., *Crataegus monogyna* Jacq., *Prunus dulcis* (Miller) D. A. Webb., *Mespilus germanica* L., *Crataegus azarolus* L., *Lycium shawii* Roem., *Malus communis* Desf., *Prunus korshinskyi* Hand. Mazz., *Prunus ursina* Kotschy, *Solanum incanum* L., *Salvia officinalis* L., *Lycium europaeum* L., Schult., *Ballota undulata* (Sieber ex. Fresen.) Bentham, *Bassia arabica* (Boiss.) Maire & Weiller, *Lycium depressum* Stocks, *Phlomis brachyodon* (Boiss.) Zohary, *Phlomis pungens* Willd., *Phlomis chrysophylla* Boiss., *Phlomis platystegia* Post., *Ballota philistaea* Bornm., *Lycium schweinfurthii* Dammer, *Phlomis viscosa* Poiret., *Teucrium capitatum* L., *Lycium barbarum* L., *Salvia fruticosa* Miller, *Satureja thymbrifolia* Hedge & Feinbrun, *Stachys palaestina* L., *Thymbra spicata* L., *Capparis aegyptia* Lam., *Satureja thymbra* L., *Salvia aegyptiaca* L., *Teucrium creticum* L., *Salvia palaestina* Benth., *Thymbra capitata* (L.) Cav., *Haloxylon salicornicum* (Moq.) Bunge ex Boiss., *Sarcocornia fruticosa* (L.) A. J. Scott., *Suaeda palaestina* Eig. & Zohary, *Salsola cyclophylla* Baker, *Atriplex halimus* L., *Haloxylon persicum* Bunge, *Hyoscyamus aureus* L., *Iphiona maris-mortui* Feinbrun, *Echinops philistaeus* Feinbrun & Zohary, *Cota tinctoria* (L.) J. Gay, *Crepis reuteriana* Boiss., *Alkanna tinctoria* (L.) Tausch, *Doellia bovei* (DC.) Anderb., *Crepis hierosolymitana* Boiss., *Achillea aleppica* DC., *Alkanna strigosa* Boiss. & Hohen., *Artemisia monosperma* Delile, *Artemisia sieberi* Besser, *Alkanna galilaea* Boiss., *Periploca aphylla* Decne., *Artemisia arborescens* L., *Euphorbia hirta* L., *Heliotropium arbainense* Fresen., *Alkanna orientalis* (L.) Boiss., *Euphorbia hierosolymitana* Boiss., *Echium glomeratum* Poir., *Heliotropium bacciferum* Forssk., *Echium angustifolium* Miller, *Podonosma orientalis* (L.) Feinbrun, *Euphorbia hirsuta* L., *Echiochilon fruticosum* Desf., *Heliotropium rotundifolium* Lehm., *Erysimum crassipes* Fisch. & C. A. Mey., *Festuca arundinacea* Schreb., *Fibigia clypeata* (L.) Medik, *Glaucium flavum* Crantz., *Hordeum bulbosum* L., *Iris vartanii* Foster, *Verbascum sinaiticum* Benth., *Gladiolus italicus* Mill., *Juncus subulatus* Forssk., *Iris palaestina* (Bak.) Boiss., *Kickxia aegyptiaca* (L.) Nabelek, *Capparis sicula* Duh., *Iris atropurpurea* Baker, *Juncus acutus* L., *Clematis cirrhosa* L., *Capparis spinosa* L., *Convolvulus dorycnium* L., *Clematis flammula* L., *Ipomoea cairica* (L.) Sweet, *Fagonia orientalis* C. Presl., *Ferula biverticillata* J. Thieb., *Convolvulus lanatus* Vahl., *Fagonia bruguieri* DC., *Ipomoea imperati* (Vahl.) Griseb., *Foeniculum vulgare* Miller, *Fagonia arabica* L., *Ferula tingitana* L., *Balanites aegyptiaca* (L.) Delile, *Fagonia mollis* Delile, *Ferula orientalis* L., *Ferula communis* L., *Conium maculatum* L., *Ferulago syriaca* Boiss., *Glaucium grandiflorum* Boiss. & A. Huet, *Glaucium arabicum* Fresen., *Cistus creticus* L., *Fumana thymifolia* (L.) Webb., *Tamarix nilotica* (Ehrenb.) Bunge, *Asparagus palaestinus* Baker, *Parkinsonia aculeata* L., *Ochradenus baccatus* Delile, *Styrex officinalis* L., *Azolla filiculoides* Lam., *Paeonia mascula* (L.) Miller, *Melia azedarach* L., *Ephedra aphylla* Forskal, *Thymelaea hirsuta* (L.) Endl., *Erodium arborescens* (Desf.) Willd., *Rubia tinctorum* L., *Jacaranda mimosaefolia* D. Don., *Erodium acaule* (L.) Becherer & Thell., *Verbascum fruticulosum* Post., *Erodium crassifolium* L'Her., *Arbutus andrachne* L., *Juglans regia* L., *Globularia arabica* Jaub. & Spach, *Vitex agnus-castus* L., *Hibiscus micranthus* L., *Brachychiton populneus* (Schott & Endl.) R.Br., *Verbena officinalis* L., *Arundo micrantha* Lam., *Arundo donax* L., *Arundo micrantha* Lam. (*Arundo mediterranea* Danin), *Heptaptera anisoptera* (DC.) Tutin, *Cynodon dactylon* (L.) Pers., and *Dittrichia viscosa* (L.) Greuter, accompanied by *Pistacia lentiscus* L., *Rhamnus palaestinus* Boiss. (*Rhamnus lycioides* L.), *Pistacia palaestina* Boiss., *Pistacia atlantica* Desf., *Crataegus monogyna* Jacq., *Rhamnus disperma* Ehrenb. ex Boiss., Quercus species, and numerous herbaceous plant species.

Additionally, a rich herbaceous layer was recorded, comprising species belonging to the Asteraceae, Lamiaceae, Fabaceae, Brassicaceae, Boraginaceae, and Poaceae families, alongside other taxonomic groups characteristic of the Eastern Mediterranean vegetation.

The plant communities were distributed across Mediterranean bioclimatic belts (meso-Mediterranean and thermo-Mediterranean) under bioclimatic conditions ranging from dry to sub-humid and humid. The vegetation was characterized by Mediterranean forest formations, shrublands, and remnant "maquis" formations, growing on limestone-derived soils, including brown Rendzina and Terra Rossa soils, with pH values approaching neutrality [3,25].

This plant community (association) occurred at a mean elevation of approximately 586 meters above sea level. Vegetation height ranged from 5 to 20 meters, with an average of about 10 meters. The sites were situated on slopes ranging from 5% to 30%, and the average vegetation cover density was approximately 75%. Based on floristic composition, physiognomy, ecological characteristics, and the results of phytosociological analyses, the vegetation was classified within the *Pino halepensis-Cupressetum sempervirentis* association. This association belongs to the Eastern Mediterranean region of Southwest Asia and is characteristic of the inframediterranean, thermomediterranean, and mesomediterranean bioclimatic belts (Figures 4-6; Table 2, ASL1, Lists A-C, Typus Group 1). Accordingly, the newly proposed association has been named *Pino halepensis-Cupressetum sempervirentis*.

Table 2. Association 1. Pino halepensis-Cupression semperviren.

Releve of inventories	**A**	**B**	**C**	**P**	**Status**	**Life form**	**Family**
Surface in m2 1 = 10	750	600	450	R			
Cover rate %	70	75	80	E			
Altitude in m.	570	600	587	S			
Average height of vegetation (m.)	9	11	20	N			
Slope %	5	18	30	C			
Orientation	E	N	S	I			
Order number	1	3	4	A			
Characteristics of association and higher units							
Cupressus sempervirens L.	4	4	4	V	N	Tree	Cupressaceae
Pinus halepensis (L.) Miller	5	4	4	V	N	Tree	Pinaceae
Pinus Pinea L.	3	3	3	IV	N	Tree	Pinaceae
Pinus brutia Tenore	2	1		III	N	Tree	Pinaceae
Cupressus arizonica Greene			1	I	N	Tree	Cupressaceae
Companions							
Pistacia lentiscus L.	4	4	2	V	N	Tree	Anacardiaceae
Pistacia terebinthus L.			2	IV	N	Tree	Anacardiaceae
Quercus calliprinos Webb. (*Quercus palaestina* K., *Quercus coccifera* L.)	4	2	1	V	N	Tree	Fagaceae
Rhamnus palaestinus Boiss. or *Rhamnus lycioides* L.	2	2	2	IV	Sub-e	Phan.	Rhamnaceae
Rhamnus alaternus L.		2	2	IV	N	Tree	Rhamnaceae
Pistacia saportae Burnat.	2		2	III	N	Tree	Anacardiaceae
Rhamnus disperma Ehrenb.ex. Boiss.		2		III	N	Phan.	Rhamnaceae

Pistacia palaestina Boiss.			2	III	Sub-e	Tree	Anacardiaceae
Ceratonia siliqua L	1	1	1	III	N	Tree	Fabaceae
Ficus cariaca L.	1	1	1	III	N	Tree	Moraceae
Pistacia atlantica Desf.		1	2	III	N	Tree	Anacardiaceae
Quercus boissieri Reut. (*Quercus infectoria* Olivier var. veneris (C.K. Schneider) Meikle)			1	I	N	Tree	Fagaceae
Quercus inthaburensis Decne.	2		2	III	N	Tree	Fagaceae
Juniperus deltoides R.P. Adams			1	I	N	Tree	Cupressaceae
Juniperus turbinata Guss. (*Juniperus phoenicea* L.)			1	I	N	Tree	Cupressaceae
Rhus tripartita (Ucria) Grande				I	N	Phan. shrubs	Anacardiaceae
Sageretia thea (Osbeck) M.C. Johnst.	1			II	N	Phan.	Rhamnaceae
Schinus molle L.		1		II	N	Tree	Anacardiaceae
Paliurus spina-christi Miller				II	N	Tree	Rhamnaceae
Rhus coriaria L.	1			I	N	Tree	Anacardiaceae
Zizyphus Spina-christi (L.) Desf.		1	1	II	N	Tree	Rhamnaceae
Schinus terebinthifolius Raddi		1	1	II	N	Tree	Anacardiaceae
Searsia tripartita (Ucria) Moffett		1	1	II	N	Phan.	Rhamnaceae
Crataegus azarolus L.			1	I	N	Tree	Rosaceae
Zizyphus Lotus (L.) Lam.			1	II	N	Shrubs	Rhamnaceae
Crataegus monogyna Jacq.			2	III	N	Tree	Rosaceae
Prunus amygdalus (*Prunus dulcis* (Mill.) D. A. Webb.)	2		1	III	N	Tree	Rosaceae
Malus communis Desf.		1		I	N	Shrubs	Rosaceae
Amygdalus ramonensis Danin		1		I	E	Tree	Rosaceae
Mespilus germanica L.				I	N	Shrubs	Rosaceae
Prunus arabica (Olivier) Meikle.		1	1	II	N	Phan. shrubs	Rosaceae
Crataegus oriana (L.) DC		1	2	II	N	Cham.	Rosaceae
Prunus korshinskyi Hand.Mazz.	1			I	N	Tree	Rosaceae
Prunus ursina Kotschy			1	II	N	Tree	Rosaceae
Sarcopoterium spinosum (L.) Spach			1	III	N	Cham	Rosaceae
Spartium junceum L.		1		I	N	Phan. shrub	Fabaceae
Acacia salicina Lindl.		1		I	N	Tree	Fabaceae
Prosopis farcta (Banks et Sol.)	1			I	N	Cham. sem-shrubs	Mimosaceae
Calicotome villosa (Poir.) Link			1	I	N	Phan.	Fabaceae
Cersis siliquastrum L.			1	I	N	Tree	Fabaceae
Retama raetam (Forssk.) Webb. & Berthel.	1			I	N	Phan. shrub	Fabaceae
Morus nigara L.	1			I	N	Tree	Moraceae

Acacia saligna (Labill.) Wendl.F.			1	I	N	Tree	Fabaceae
Retama rhodorhizoides (Webb. & Berthel.)	1			I	N	Tree	Fabaceae
Acacia cyanophylla Lindl.				I	N	Tree	Fabaceae
Glycyrrhiza glabra L.	1			I	N	Phan. shrub	Fabaceae
Morus alba L.		1		I	N	Tree	Moraceae
Genista monspessulana (L.) O.Bolós & Vigo	1			I	N	Tree	Fabaceae
Olea europaea L.			1	III	N	Tree	Oleaceae
Anonis natrix (L.) Scop.		1		I	N	Cham.	Fabaceae
Olea europaea var. sylvestris		1		I	N	Tree	Oleaceae
Lycium shawii Roem. & Schult.	1			I	N	Shrubs	Solanaceae
Phlomis chrysophylla Boiss.		1		I	N	Cham. semi-shrubs	Lamiaceae
Helichrysum sanguineum (L.) Kostel.		1		I	N	Hem.	Asteraceae
Salvia officinalis L.			1	II	N	Cham.	Lamiaceae
Salvia fruticosa Miller	1			II	N	Cham.	Lamiaceae
Cota tinctoria (L.) J.Gay ex Guss			1	I	N	Hem.	Asteraceae
Salvia aegyptiaca L.	1			I	N	Cham.	Lamiaceae
Salvia palaestina Benth.		1		I	Sub-e	Cham.	Lamiaceae
Crepis hierosolymitana Boiss.		1		I	N	Hem.	Asteraceae
Phlomis platystegia Post.		1		I	E	Cham. semi-shrubs	Lamiaceae
Artemisia monosperma Delile	1		1	II	N	Cham.	Asteraceae
Artemisia sieberi Besser	1		1	II	N	Cham.	Asteraceae
Phlomis viscosa Poiret.				I	N	Cham. semi-shrubs	Lamiaceae
Achillea aleppica DC.			1	II	N	Cham.	Asteraceae
Artemisia arborescens L.	1		1	II	N	Cham.	Asteraceae
Crepis reuteriana Boiss.				I	N	Hem.	Asteraceae
Teucrium capitatum L.	1		1	II	N	Cham.	Lamiaceae
Doellia bovei (DC.) Anderb.				I	N	Cham.	Asteraceae
Teucrium creticum L.	1		1	II	N	Cham.	Lamiaceae
Thymbra capitata (L.) Cav.	1		1	II	N	Cham.	Lamiaceae
Lycium barbarum L.		1		I	N	Shrubs	Solanaceae
Bassia arabica (Boiss.) Maire & Weiller		1		I	N	shrubs	Lamiaceae
Solanum incanum L.		1		I	N	Cham. semi-shrubs	Solanaceae
Lycium europaeum L.		1		I	N	Shrubs	Solanaceae
Satureja thymbra L.		1		I	N	Cham. semi-shrubs	Lamiaceae
Lycium depressum Stocks			1	I	N	Phan. shrubs	Solanaceae
Lycium schweinfurthii Dammer				I	N	Phan. shrubs	Solanaceae
Satureja thymbrifolia Hedge & Feinbrun	1			I	E	Cham. semi-shrubs	Lamiaceae
Phlomis brachyodon (Boiss.) Zohary	1			I	N	Cham. semi-shrubs	Lamiaceae
Stachys palaestina L.		1		I	E	Cham. semi-shrubs	Lamiaceae
Ballota undulata (Sieber ex. Fresen.) Bentham	1			I	N	shrubs	Lamiaceae
Phlomis pungens Willd.		1		I	N	Cham. semi-shrubs	Lamiaceae
Hyoscyamus aureus L.	1			I	N	Cham.	Solanaceae
Gundelia tournefortii L.			1	I	N	Hem.	Asteraceae
Heliotropium arbainense Fresen.		1		I	N	Cham. Semi-shrubs	Boraginaceae

Haloxylon persicum Bunge		2		I	N	Phan. Shrubs	Amaranthaceae
Suaeda palaestina Eig. & Zohary		1		I	E	Cham.	Amaranthaceae
Heliotropium bacciferum Forssk.		1		I	N	Cham. Semi-shrubs	Boraginaceae
Haloxylon salicornicum (Moq.) Bunge ex Boiss.	1	1		II	N	Cham.	Amaranthaceae
Salsola cyclophylla Baker	1		1	II	N	Shrubs	Amaranthaceae
Echium angustifolium Mill.	1			I	N	Cham.	Boraginaceae
Heliotropium rotundifolium Lehm.	1			I	N	Cham.	Boraginaceae
Echiochilon fruticosum Desf.	1			I	N	Cham.	Boraginaceae
Sarcocornia fruticosa (L.) A.J.Scott	1	1		II	N	Cham.	Amaranthaceae
Echium glomeratum Poir.	1			I	N	Hem.	Boraginaceae
Podonosma orientalis (L.) Feinbrun	1			I	N	Cham.	Boraginaceae
Fagonia arabica L.		1		I	N	Shrubs	Zygophyllaceae
Atriplex halimus L.		1		I	N	Shrubs	Amaranthaceae
Fagonia orientalis C. Presl.	1			I	N	Shrubs	Zygophyllaceae
Alkanna orientalis (L.) Boiss	1		1	II	N	Cham.	Boraginaceae
Alkanna strigosa Boiss & Hohen.	1	1		II	N	Cham.	Boraginaceae
Alkanna tinctoria (L.) Tausch	1		1	II	N	Cham.	Boraginaceae
Ferula communis L.		1		I	N	Hem.	Apiaceae
*Fagonia bruguier*i DC.	1			I	N	Shrubs	Zygophyllaceae
Ferula biverticillata J. Thieb	1	1		I	E	Hem.	Apiaceae
Fagonia mollis Delile		1		I	N	Shrubs	Zygophyllaceae
Ferulago syriaca Boiss.				I	N	Hem.	Apiaceae
Ferula orientalis L.		1		I	N	Hem.	Apiaceae
Capparis spinosa L.		1	1	II	N	Shrubs	Capparaceae
Foeniculum vulgare Miller			1	I	N	Hem.	Apiaceae
Ferula tingitana L.		1		I	N	Hem.	Apiaceae
Capparis aegyptia Lam.	1	1		II	N	Shrubs	Capparaceae
Conium maculatum L.		1		I	N	Hem.	Apiaceae
Capparis sicula Duh.		1	1	II	N	Shrubs	Capparaceae
Ipomoea imperati (Vahl.) Griseb.	1			I	N	Hem.	Convolvulaceae
Clematis cirrhosa L.	1			I	N	Phan. vine	Ranunculaceae
Atraphaxis spinosa L.	1			I	N	Cham.	Polygonaceae
Convolvulus dorycnium L.	1			I	N	Hem.	Convolvulaceae
Tamarix nilotica (Ehrenb.) Bunge	1			I	N	Tree	Tamaricaceae
Clematis flammula L.	1			I	N	Phan. vine	Ranunculaceae

Convolvulus lanatus Vahl.	1			I	N	Cham.	Convolvulaceae
Ipomoea cairica (L.) Sweet	1			I	N	Hem.	Convolvulaceae
Kickxia aegyptiaca (L.) Nabelek	1		1	II	N	Cham.	Plantaginaceae
Verbascum sinaiticum Benth.		1	1	II	N	Hem.	Scrophulariaceae
Euphorbia hierosolymitana Boiss.		1		I	N	Shrubs	Euphorbiaceae
Periploca aphylla Decne.		1		I	N	Phan. shrubs	Apocynaceae
Euphorbia hirta L.		1		I	N	Shrubs	Euphorbiaceae
Iris vartanii Foster		1		I	E	Geophyte	Iridaceae
Iris palaestina (Bak.) Boiss.		1		I	E	Geophyte	Iridaceae
Euphorbia hirsuta L.		1	1	I	N	Hem.	Euphorbiaceae
Tamarix aphylla (L.) Karsten	1			I	N	Tree	Tamaricaceae
Glaucium arabicum Fresen.	1			I	N	Hem.	Papaveraceae
Glaucium flavum Crantz			1	I	N	Hem.	Papaveraceae
Glaucium grandiflorum Boiss. & A.Huet		1		I	N	Hem.	Papaveraceae
Thymelaea hirsuta (L.) Endl		1		I	N	Phan. dwarf -shrub	Scrophulariaceae
Ephedra foeminea Forssk				I	N	Phan. shrubs vine	Ephedraceae
Verbascum fruticulosum Post.		1		I	N	Phan. dwarf -shrub	Scrophulariaceae
Ephedra aphylla Forskal			1	I	N	Phan. shrubs vine	Ephedraceae
Juncus subulatus Forssk.			1	I	N	Hem.	Juncaceae
Hordeum bulbosum L.			1	I	N	Hem.	Poaceae
Erysimum crassipes Fisch. &C.A.Mey.		1		I	N	Hem.	Brassicaceae
Juncus acutus L.		1		I	N	Hem.	Juncaceae
Fibigia clypeata (L.) Medik		1		I	N	Hem.	Brassicaceae
Festuca arundinacea Schreb.		1		I	N	Hem.	Poaceae
Erodium crassifolium L'Her.		1		I	N	Hem.	Geraniaceae
Asparagus palaestinus Baker	1			I	Sub-e	Geophyte vine	Liliaceae
Erodium arborescens (Desf.) Willd.		1	1	I	N	Hem.	Geraniaceae
Cistus creticus L.		1		I	N	Cham. semi-shrubs	Cistaceae
Erodium acaule (L.) Becherer &Thell.		1		I	N	Hem.	Geraniaceae
Asparagus horridus L.		1	1	II	N	Geophyte	Liliaceae
Parkinsonia aculeata L.		1		I	N	Phan. shrubs	Caesalpiniaceae
Fumana thymifolia (L.) Webb.		1		I	N	Cham. semi-shrubs	Cistaceae
Ochradenus baccatus Delile		1		I	N	Phan. shrubs	Resedaceae
Azolla filiculoides Lam.		1		I	N	Helophyte	Azollaceae
Melia azedarach L.		1		I	N	Tree	Meliaceae
Paeonia mascula (L.) Mill.		1		I	N	Geophyte	Paeoniaceae
Styrex officinalis L.		1		I	N	Phan. shrubs	Styracaceae
Vitex agnus-castus L.		1	1	I	N	Cham. semi-shrubs	Verbenaceae

Juglans regia L.		1	1	I	N	Tree	Juglandaceae
*Globularia arabic*a Jaub. & Spach		1		I	N	Cham. semi-shrubs	Plantaginacea e
Verbena officinalis L.			1	I	N	Hem.	Verbenaceae
Hibiscus micranthus L.			1	I	N	Cham. semi-shrubs	Malvaceae
Tamarix palaestina Bertol.		1		I	E	Tree	Tamaricaceae
Achillea arabica Kotschy			1	I	N	Hem.	Asteraceae
Achillea fragrantissima (Forssk.) Sch.Bip.		1		I	N	Hem.	Asteraceae
Achillea falcata L.			1	I	N	Shrubs	Asteraceae
Achillea wilhelmsii K. Koch	1			I	N	Hem.	Asteraceae
Cotoneaster nummularius Fisch. & C.A.Mey.	1			I	N	Phan. Shrubs	Rosaceae
Astragalus aleppicus Boiss.	1			I	N	Hem.	Fabaceae
Salsola gaetula (Maire) Botsch.	1			I	N	Cham.	Amaranthace ae
Salsola imbricata Forssk.	1			I	N	Phan. Shrubs	Amaranthace ae
Salsola incanescens C.A.Mey.	1			I	N	Cham.	Amaranthace ae
Salsola oppositifolia Desf.	1			I	N	Cham.	Amaranthace ae
Acanthus syriacus Boiss.	1			I	N	Hem.	Acanthaceae
Atriplex glauca L.	1			I	N	Cham.	Amaranthace ae
Haloxylon scoparium Pomel	1			I	N	Cham.	Amaranthace ae
Kickxia acerbiana (Boiss.) Taeckh. & Boulos	1			I	N	Hem.	Plantaginacea e
Kickxia floribunda (Boiss.) Taeckh. & Boulos	1			I	N	Cham.	Plantaginacea e
Kickxia macilenta (Decne.) Danin	1			I	N	Cham.	Plantaginacea e
Kickxia spartioides (Brouss. ex Buch) Janch.	1			I	N	Cham.	Plantaginacea e
Salvia ceratophylla L.		1		I	N	Hem.	Lamiaceae
Salvia lanigera Poir.		1		I	N	Cham.	Lamiaceae
Salvia samuelssonii Rech.F.		1		I	N	Hem.	Lamiaceae
Salvia spinosa L.		1		I	N	Hem.	Lamiaceae
Salvia verbenaca L.		1		I	N	Hem.	Lamiaceae
Cistus salviifolius L.		1		I	N	Cham.	Cistaceae
Solanum elaeagnifolium Cav.		1		I	N	Hem.	Solanaceae
Solanum nigrum L.		1		I	N	Hem.	Solanaceae
Solanum villosum (L.) Mill.		1		I	N	Hem.	Solanaceae
Teucrium decaisnei C.Presl		1		I	N	Cham.	Lamiaceae
Tamarix tetragyna Ehrenb.		1		I	N	Tree	Tamaricaceae
Thymbra spicata L.		1		I	N	Cham.	Lamiaceae
Stachys viticina Boiss.		1		I	N	Hem.	Lamiaceae
Stachys aegyptiaca Pers.	1			I	N	Cham.	Lamiaceae
Cyperus alopecuroides Rottb.	1			I	N	Hem.	Cyperaceae
Arundo micrantha Lam.		2		I	N	Phan. Shrub, Geo.	Poaceae

Arundo donax L.	1			I	N	Phan. Shrub, Geo.	Poaceae
Heptaptera anisoptera (DC.) Tutin	1			I	N	Hem.	Apiaceae
Cynodon dactylon (L.) Pers.	1		1	II	N	Hem. Geo.	Poaceae
Dittrichia viscosa (L.) Greuter	1	1		II	N	Cham	Asteraceae
Astragalus bethlehemiticus Boiss.	1		1	I	N	Cham	Fabaceae
Origanum syriacum L.		1		I	N	Cham	Lamiaceae
Verbascum agrimoniifolium (K.Koch) Hub.-Mor.	1			I	N	Hem.	Scrophulariaceae
Cynanchum acutum L.	1			I	N	Phan. Vine	Apocynaceae
Asparagus aphyllus L.	1			I	N	Geophyte	Asparagaceae
Ankyropetalum gypsophiloides Fenzl.	1			I	N	Cham.	Caryophyllaceae
Arundo plinii Turra	1			I	N	Phan., Ge	Poaceae
Astragalus caprinus L.	1			I	N	Hem.	Fabaceae
Astragalus sanctus Boiss.	1			I	N	Cham.	Fabaceae
Atractylis serratuloides (Cass.) DC.	1			I	N	Cham.	Asteraceae
Capparis zoharyi Inocencio, Rivera et Alcaraz	1			I	N	Shrubs	Capparaceae
Chiliadenus iphionoides (Boiss. & Blanche) Brullo.	1			I	N	Cham.	Asteraceae
Coridothymus capitatus (L.) Rchb.f.	1			I	N	Cham.	Lamiaceae
Deverra tortuosa (Desf.) DC.	1			I	N	Cham.	Apiaceae
Cynoglossum creticum Miller	1			I	N	Hem.	Boraginaceae
Echinops adenocaulos Boiss.	1			I	N	Cham.	Asteraceae
Echinops polyceras Boiss.	1			I	N	Hem.	Asteraceae
Echium angustifolium Miller	1			I	N	Cham.	Boraginaceae
Eryngium creticum Lam.	1			I	N	Hem.	Apiaceae
Eryngium glomeratum Lam.	1			I	N	Hem.	Apiaceae
Lotus peregrinus L.			1	I	N	Hem.	Fabaceae
Noaea mucronata (Forssk.) Asch. & Schweinf.	1			I	N	Cham.	Amaranthaceae
Malva sylvestris L.		1		I	N	Hem.	Malvaceae
Marrubium vulgare L.		1		I	N	Cham.	Lamiaceae
Opuntia ficus indica (L.) Miller	1			I	N	Non-Native: Naturalized	Cactaceae
Paronychia capitata (L.) Lam.	1			I	N	Hem.	Caryophyllaceae
Paronychia sinaica Fresen.	1			I	N	Hem.	Caryophyllaceae
Phoenix dactylifera L.		1		I	N	Tree	Palmae
Rubus sanctus Schreb.		1		I	N	Phan.	Rosaceae
Salvia dominica L.		1		I	N	Cham.	Lamiaceae
Teucrium divaricatum Sieber ex. Heldr.	1			I	N	Cham.	Lamiaceae
Teucrium parviflorum Schreb.	1			I	N	Hem.	Lamiaceae
Teucrium scordium L.	1			I	N	Hem.	Lamiaceae
Herniaria hemistemon J. Gay	1			I	N	Hem.	Caryophyllaceae
Hyoscyamus aureus L.	1			I	N	Cham.	Solanaceae
Juncus rigidus Desf.	1			I	N	Hem.	Juncaceae

Verbascum sinuatum L.		1		I	N	Hem.	Scrophulariaceae
Scaligeria napiformis Grande		1		I	N	Hem.	Lamiaceae
Phagnalon rupestre (L.) DC.			1	I	N	subshrub	Asteraceae
Ballota saxatilis Sieber ex C. Presl.			1	I	N	subshrub	Lamiaceae
Arbutus andrachne L.			1	I	N	Tree	Ericaceae
Calotropis procera (Aiton) Aiton F.			1	I	N	Tree	Asclepiadaceae
Washingtonia robusta H. A. Wendl.			1	I	N	Tree	Palmae
Crataegus azarolus L.			1	I	N	Tree	Rosaceae
Pyrus syriaca Boiss.			1	I	N	Tree	Rosaceae
Phillyrea latifolia L.	1			I	N	Tree	Oleaceae
Olea europaea L. ssp. *europaea*	1			I	N	Tree	Oleaceae
Fraxinus angustifolia Vahl.	1			I	N	Tree	Oleaceae
Ailanthus altissima (Mill.) Swingle		1		I	N	Tree	Simaroubaceae
Salix acmophylla Boiss.			1	I	N	Tree	Salicaceae
Laurus nobilis L.		1		I	N	Tree	Lauraceae
Faidherbia albida (Delile) A.Chev.	1			I	N	Tree	Fabaceae
Ficus sycomorus L.	1			I	N	Tree	Moraceae
Tetraclinis articulata (Vahl.) Mast.		1		I	N	Tree	Cupressaceae
Dalbergia sissoo Roxb.		1		I	N	Tree	Fabaceae
Nicotiana glauca Graham		1		I	N	Tree	Solanaceae
Eucalyptus camaldulensis Dehn.		1		I	N	Tree	Myrtaceae
Moringa peregrina (Forssk.) Fiori.				I	N	Tree	Moringaceae
Celtis australis L.	1			I	N	Tree	Ulmaceae
Olea europaea var. *sylvestris* (Mill.) Lehr	1			I	N	Tree	Oleaceae

Abbreviations: T.: tree; Phan: phanerophyte, Phan. Shrubs: phanerophyte shrubs, Phan. shrubs vine: phanerophyte shrubs vine; Phan. vine: phanerophyte vine; Phan. dwarf shrubs: phanerophyte dwarf shrubs; Cham.: chamaephyte; Cham. semi-shrubs: chamaephyte semi-shrubs; Cham., chamaephyte; Cham. Shrubs: chamaephyte shrubs; Hem.: hemicryptophyte; Geo.: geophyte, Geo. vine: geophyte vine; H.: Helophyte. Percentage of plant species present in the sample studies and communities: V = 100%, IV = 60.1-80%, III = 40.1-60%, II = 20.1-40% and I = 0.1-20%. N: native, E: endemic, ASL: Association, and ASL1: association 1.

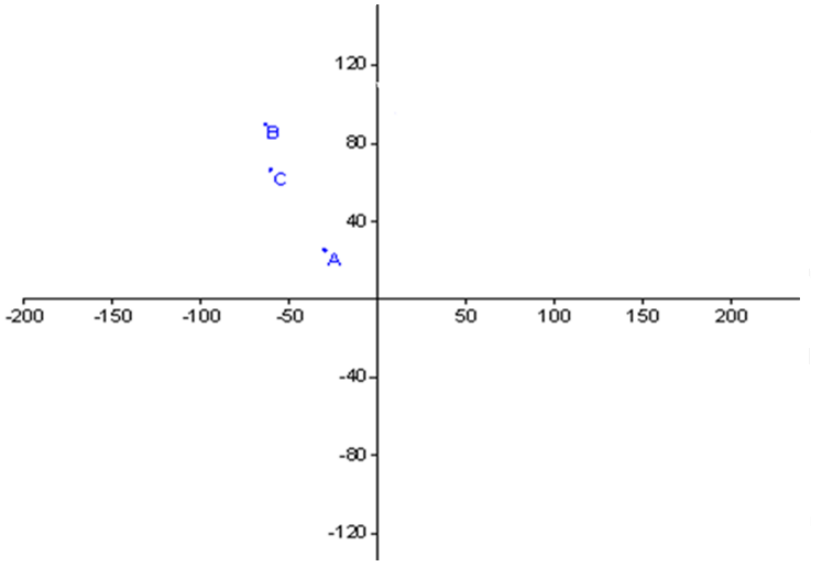


Figure 4. Detrended correspondence analysis.

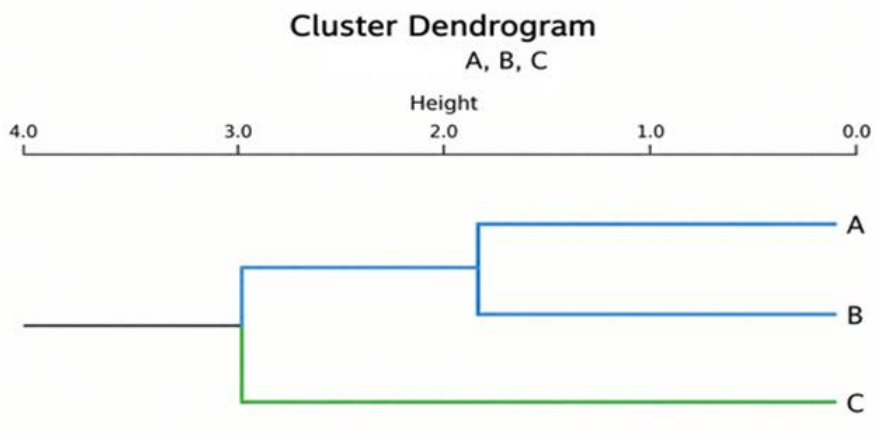


Figure 5. Cluster dendrogram analysis.

Furthermore, a total of 266 plant species were identified within this plant community. Phanerophytes predominated, accounting for 36.09% of the total; this category included 66 tree species (24.81%), 14 phanerophytic shrub species (5.26%), 3 geophytic phanerophyte species, 3 phanerophytic climber species, 2 shrubby phanerophytic climber species (0.74%), and 2 dwarf phanerophytic shrub species (0.74%). Shrubs constituted 23 species (8.64%).

The Chamaephyte category comprised 75 species (28.19%), including 17 species of chamaephytic shrubs or sub-shrubs (6.39%). Hemicryptophytes were represented by 64 species (24.06%), including two geophytic hemicryptophyte species (0.74%), while Geophytes accounted for 6 species (2.25%), comprising five geophyte species and one geophytic climber species (0.37%). Finally, Helophytes were represented by a single species (0.37%). Figure 6 illustrates the distribution of these life-form categories.

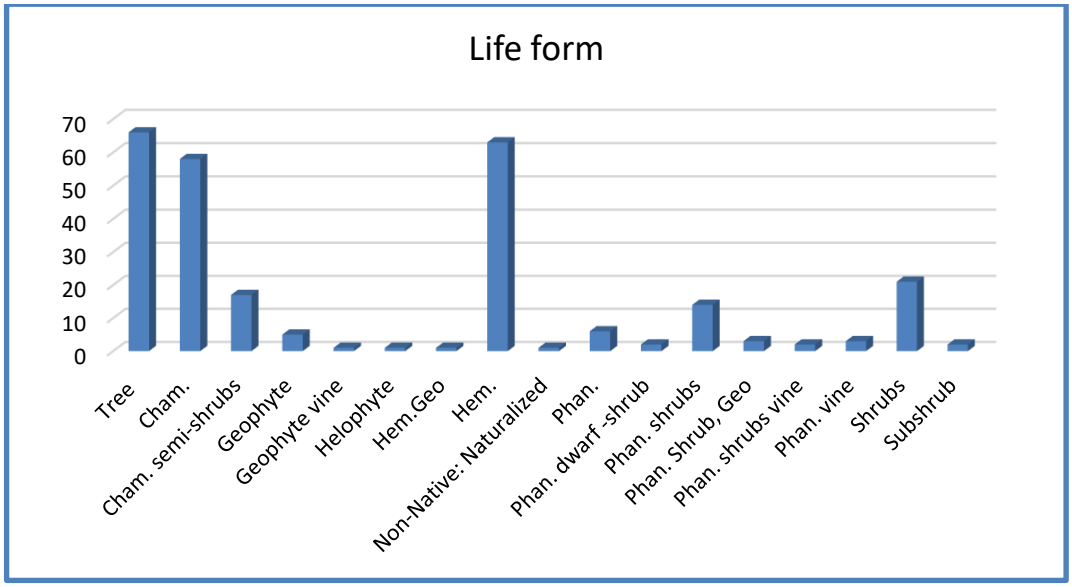


Figure 6. Plant association's life forms.

A total of more than 58 plant families were recorded within this plant assemblage. The families with the highest species richness were: Lamiaceae (35 species, 13.15%), Asteraceae (20 species, 7.51%), Fabaceae (19 species, 7.14%), Rosaceae (15 species, 5.63%), Amaranthaceae (13 species, 4.88%), Boraginaceae (12 species, 4.51%), Solanaceae (12 species, 4.51%), Apiaceae (11 species, 4.13%), Anacardiaceae (9 species, 3.38%), and Rhamnaceae (8 species, 3%), among others. The percentages for the remaining families are shown in Figure 7.

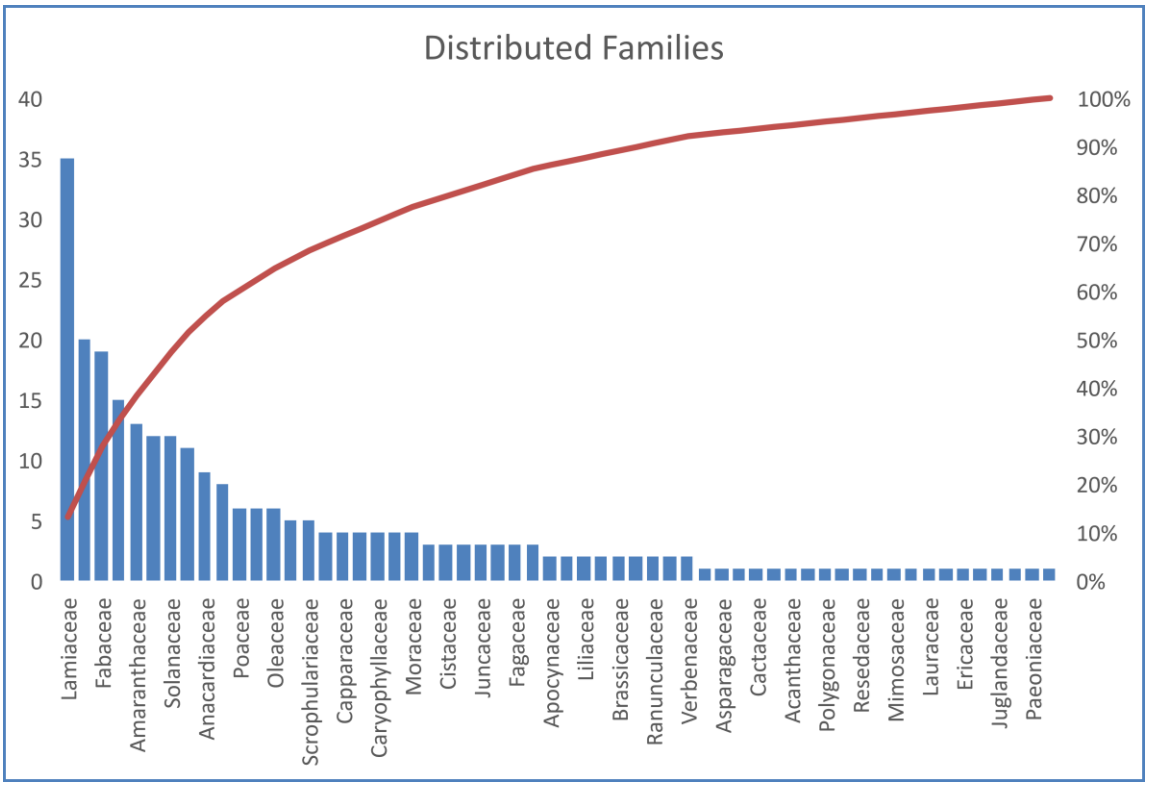


Figure 7. Distribution of plant species among the recorded families in the study area.

Among the approximately 600 plant species recorded in the Surif area, 266 were woody species. Of these woody varieties, 13 species (4.88%) were endemic, including four sub-endemic species. Herbaceous species were excluded from this study because the research focused specifically on woody plants and shrubs.

Analysis of the *Pino halepensis–Cupressetum sempervirentis* association revealed strong floristic similarities with a comparable plant community previously described from the western Hebron region, particularly the Beit Jibrin area [18]. The principal species shared between the two communities include *Pinus halepensis*, *Pinus pinea*, *Pinus brutia*, *Cupressus sempervirens*, *Cupressus arizonica*, *Juniperus deltoids*, and among other characteristic Mediterranean species.

The study area supports several species of Pinus, including *P. halepensis*, *P. pinea*, and *P. brutia*, together with *Cupressus sempervirens* L., *Juniperus deltoides*, and *Juniperus turbinata*. These species are characteristic of dry, subhumid, and humid Mediterranean bioclimatic zones and are associated with the order *Pinetalia halepensis Biondi* et al. (2014) [47] and the class *Junipero phoeniceae–Pinetea acutisquamae* A.V. Pérez & Cabezudo (1988), as revised by Rivas-Martínez et al. [43]. From a syntaxonomic perspective, this plant community is associated with the classes *Quercetea calliprini* or (*Quercetea palaestini*) and Quercetea ilicis Br.-Bl. (e.g., A. & O. Bolòs, 1958) [36]. It belongs to the order Pinetalia halepensis [47] and falls within the Pino *halepensis-Cupression sempervirentis* alliance [18].

The syntaxonomic interpretation of these associations is presented as follows:

Maquis and forest vegetation:

Class: *Quercetea ilicis* Br.-Bl. ex. A.& O. Bolòs 1950
Class: *Quercetea calliprini* or *palaestini [18]*
Order: *Pinetalia halepensis* [47]
Alliance: *Pino halepensis-Cupressus sempervirentis [18]*
Association: *Pino halepensis-Cupressetum sempervirentis*

The Surif area, home to more than 266 species of plants and forest shrubs examined in this study is distinguished by a unique pattern of forest vegetation and biodiversity compared to other Palestinian regions. Situated at a favorable elevation above sea level, the area encompasses steppe landscapes, oak forests, shrublands, and a variety of other plant species. It is characterized by arid climatic conditions, with thermal properties spanning the Inframediterranean, Thermomediterranean, and Mesomediterranean zones, and an annual rainfall ranging from 350 to 600 mm.

4. Discussion

This study provides a comprehensive characterization of the phytosociological attributes of the woody vegetation in the Surif area, located in the north-western part of the Hebron Governorate, Palestine. The results reveal a distinct Mediterranean forest plant community dominated by *Pinus halepensis* L. and *Cupressus sempervirens* L., accompanied by a diverse array of woody and herbaceous species. The identification of this plant community classified as Pino *halepensis-Cupressetum sempervirentis* highlights the ecological significance of the Surif area as a representative site for Mediterranean vegetation in southern Palestine.

The floristic composition of this plant community reflects Palestine's transitional biogeographical location among four phytogeographical regions: Mediterranean, Irano-Turanian, Saharo-Arabian, and Sudanian. This unique geographical position has long been considered a key factor contributing to the remarkable plant diversity found in Palestine [4,5,13,18,19]. The coexistence of Mediterranean species such as *Pinus halepensis* M., *Cupressus sempervirens* L., *Pistacia lentiscus* L., *Quercus calli*prinos W., and Arbutus andrachne L. with species characteristic of the more arid Saharo-Arabian environments such as *Retama raetam* L., *Ziziphus spina-christi* L., and *Haloxylon salicornicum* highlights the distinctive nature of the study area and its high level of ecological heterogeneity.

The dominance of phanerophyte trees (36.09%) within the life-form spectrum indicates the arboreal or forest-like character of this plant community. According to Raunkiaer's life-form theory, phanerophytes typically predominate in regions characterized by relatively stable climatic conditions and sufficient moisture to support the growth of perennial woody vegetation [48]. Furthermore, the high proportions of chamaeophytes (28.19%) and hemicryptophytes (24.06%) reflect adaptation to Mediterranean climatic conditions, particularly seasonal drought and grazing pressure. Similar life-form patterns have been recorded in other ecosystems within the Mediterranean region of Palestine and neighboring countries [15-19].

The dominance of plant families such as Lamiaceae, Asteraceae, Fabaceae, Rosaceae, Boraginaceae, and Amaranthaceae aligns with patterns documented across the Eastern Mediterranean basin. These families are key contributors to Mediterranean biodiversity, owing to their ecological resilience, drought tolerance, and adaptive strategies for survival under fluctuating environmental conditions [13,49]. The high species diversity observed within the Lamiaceae family in this study is particularly noteworthy, as species from this family constitute a major and distinctive component of the shrubland vegetation and "maquis" communities across the Mediterranean region.

Furthermore, the presence of approximately 13 endemic and sub-endemic woody species underscores the biological value of the Surif area for biodiversity conservation; endemic species are a vital component of Mediterranean biodiversity and often serve as indicators of long-term ecological stability and historical biogeographical processes [49]. The presence of endemic plant taxa within the study area supports earlier findings indicating that Palestine serves as a significant center of plant diversity and endemism in the Eastern Mediterranean region [3,5-9,12,13,50,51].

Phytosociological analyses including cluster analysis and Detrended Correspondence Analysis (DCA) identified a single major plant association encompassing the survey sites (A-C). This result indicates a relatively homogeneous vegetation structure across the studied sites, despite local environmental variation. The clustering of vegetation survey samples (relevés) further suggests that dominant environmental factors, including climate, geology, soil characteristics, and land-use history, exert similar influences throughout the study area. Similar vegetation patterns have been documented in neighboring areas within the Hebron Governorate, such as Wadi Al-Quff, Idhna, Beit Jibrin, and Al-Dawayima [17-19]. The environmental characteristics of this plant association closely align with those described for Mediterranean pine and cypress forests across the Levant. The dominance of Aleppo pine (*Pinus halepensis* M.) and evergreen cypress (*Cupressus sempervirens* L.) reflects an adaptation to dry summer conditions, moderate annual rainfall, and calcareous soils. These species are known for their high tolerance to seasonal drought, high temperatures, and relatively poor soils, enabling them to survive and thrive under Mediterranean climatic conditions [51,52]. Furthermore, the presence of associated species such as *Pistacia palaestina* B., *Pistacia lentiscus* L., Quercus calliprinos W., and *Crataegus Aronia* L. reinforces the classification of this vegetation within the ecological complex of Mediterranean forests and "maquis" shrublands.

A comparison with the vegetation described in the Beit Jibrin area [18] revealed strong floristic similarities, particularly regarding the dominance of species such as Aleppo pine (*Pinus halepensis* M.), Mediterranean cypress (*Cupressus sempervirens* L.), and *Juniperus deltoides*, alongside other woody Mediterranean species. These similarities suggest that the *Pino halepensis-Cupressetum sempervirentis* association may represent a broader vegetation unit distributed across several areas of the Hebron Governorate. These findings support the syntaxonomic placement of this association within *the Pinetalia halepensis* order and underscore the importance of Mediterranean pine forests as a key vegetation type in southern Palestine.

From a conservation perspective, however, the study area serves as a vital refuge for native woody Mediterranean vegetation; increasing urbanization, agricultural

intensification, overgrazing, frequent fires, and climate change pose significant threats to Mediterranean ecosystems throughout the Levant [49,53]. Furthermore, the relatively high species diversity and the presence of endemic taxa recorded in the Surif area highlight the need for long-term conservation and sustainable management strategies aimed at protecting these valuable plant communities. Overall, the results confirm that the Surif area harbours a distinctive Mediterranean forest association characterized by high plant diversity, significant ecological stability, and notable phytogeographical importance. The proposed association (*Pino halepensis-Cupressetum sempervirentis*) contributes to enhancing the understanding of plant diversity in Palestine and provides a vital foundation for future studies in phytosociology, ecology, and conservation efforts within the Eastern Mediterranean region.

5. Conclusion

Overall, the study demonstrates that the Surif area harbors Mediterranean forests and woodlands of high botanical and ecological value, characterized primarily by a community of Aleppo pine and evergreen cypress. The documentation of 266 plant species including 13 that are endemic or have a restricted regional distribution highlights significant botanical richness and underscores the area's critical importance for conservation. This plant assemblage reflects the interplay of Mediterranean climate, calcareous soil, topography, moisture availability, and historical land use; furthermore, its floristic resemblance to plant communities in Beit Jibrin suggests a broader botanical diversity across the Hebron region. These findings provide a vital foundation for vegetation classification, biodiversity assessment, and conservation planning in southern Palestine. To maintain the ecological integrity of the Surif area, the study recommends protecting forest patches, preserving habitat connectivity, practicing sustainable grazing, preventing unnecessary vegetation removal, and monitoring endemic species. Future research should expand the scope of surveys and incorporate quantitative measurements of soil characteristics, elevation, slope, aspect, precipitation, grazing intensity, disturbances, and land-use history to better understand the relationships between plant communities and environmental gradients. Ongoing botanical surveys and long-term monitoring will be essential for preserving the native Mediterranean vegetation and biological heritage of Surif and the Hebron governorate at large. Overall, Surif's study underscores the significant botanical and ecological importance of Mediterranean forest vegetation in the Hebron Governorate.

Taxonomical scheme:
Class: *Quercetea ilicis* Br.-Bl. ex A. Bolòs et O. de Bolòs in A. Bolòs y Vayreda 1950 [54]
Class: *Quercetea calliprini* or *palaestini* nova. (Ighbareyeh et al., 2022) [18]
Order: *Quercetalia calliprini* Zohary 1960 [55]
Order: *Quercetalia ilicis* Br.-Bl. ex Molinier 1934 [56]
Order: *Pinetalia halepensis* Biondi et al. (2014) [47]
Alliance: *Pino halepensis-Cupressus sempervirentis [18]* (Ighbareyeh et al., 2022),
Alliance: *Querco - Pistacion lentisci* all. nova [18] (Ighbareyeh et al., 2022)
Association: *Pino halepensis-Cupression sempervirenti* *
Class: *Quercetea ilicis* Br.-Bl. ex A. Bolòs et O. de Bolòs in A. Bolòs y Vayreda 1950 [54]
Order: *Quercetalia calliprini* Zohary 1960 [54]
Alliance: *Ceratonio-Pistacion lentisci* Zohary ex Zohary et Orshan 1959 [57]
Alliance: *Querco - Pistacion lentisci* all. nova [18] (Ighbareyeh et al., 2022)
Ceratonio siliquae - Quercion calliprinae [17] (Jehad et al., 2021)
Pino halepensis-Cupression sempervirenti [17] (Jehad et al., 2021)
Associations:
Ceratonio siliquae-Quercetum callipinii. [17] (Jehad et al., 2021)
Pino halepensis-Cupressetum sempervirentis [17] (Jehad et al., 2021); [58] Ighbareyeh, 2026)

* Associations in which olive cultivation is possible.

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Author Contributions

This research was conducted solely by the author.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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Data Availability

Datasets were generated or analysed during the current study.

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