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A Phytosociological of Plant Communities and Biodiversity in the East-South of Idna Village-Hebron of Palestine

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Abstract

This paper presents a floristic and vegetation study of the territories of the Idna-Hebron of Palestine, corresponding to one area with three different names as Abu Salman Forest Reserve, Khallet Osman mountains, and Hamra Aslimi. These sites are very important at a local level of the flora with a high endemic rate. The floristic analysis revealed the existence of 48 species, of which 10 (20.83%) are endemic endemic. Seventeen plots of vegetation distributed in one area dominated and have been analyzed in this study. Methodology, the phytosociological approach is based on the Braun-Blanquet method. The results revealed three different kinds of forests, one dominated by the endemic *Pino halepensis-Quercetum lookii*, which is peculiar to the inframediterranean dry-thermomediterranean environments, with the terra rossa and brown rendzinas territory. The second type of forest is dominated by the *Pistacio palaestinae-Ceratonietum silique,* which is growing in the dry-subhumid ombrotype and the terra rossa and brown rendzinas territory. The third group of the forest of Khallet Osman and Hamra Aslimi dominated by *Quercus lookii-Tamaricetum palestineae*. Finally, in this study there are three associations and tow alliances are proposed as new Syntaxa based on statistical and phytosociological analyses in the study area.

Keywords

Palestine, Phytosociology, Idna , Abu Salman Forest Reserve, Vegetation, Biodiversity, Flora

1. Introduction

Palestine has a wide range of agro-ecological concerns, particular geographic

location, with a series of environmental, a unique biodiversity and a large variety of plants [1] [2] [3], it has a Mediterranean climate, characterized by mild rainy winters and hot dry summers, with a tropical-subtropical tendency in the far south, and rainfall decreases from north to south, while the temperature increases [2]. Climate and bioclimate were played an important role in influence on plant communities, plant production, and biological resources [1]-[20].

In Palestine, about 2780 plant taxa were recorded as native, which of 159 [19], 162 taxa were recorded as endemics [20] [21]. Moreover, it is found that about 2750 species of plants including 138 families were estimated for Palestinian *flora* [22], [23], while in the other study the flora of Palestine includes 149 endemic species [24], (6% of the total flora), which of 43% are found to be common, 27.5% are rare and 25.6% are very rare. The recent study there recorded more than 1881 species of plant, which of 53 are endemic rare species in the fourth areas of Palestine as Hebron, Ramallah, Jericho and Jenin [19], and we described eight new plant associations, of which two have a dry-sub-humid ombrotype (*Pistacio palaestinae-Quercetum lokii*; *Cerasus microcarpae-Quercetum ithaburensis*) in the area of Idna, Hebron of Palestine [3].

The aim of this paper is to provide a botanical study of the flora and vegetation growing in the Idna-Hebron of Palestine.

2. Materials and Methods

In our study and survey consists of up to 17 vegetation grids distributed over one area with three different names as (Abu Salman Forest Reserve, Khallet Osman and Aslimi) (**Figure 1**). The sampling area ranged from 400 to 430 dunums, according to the vegetation unit concerned, forest and very little scrubland (trees only). Nevertheless, for each one, we provide the records of altitude, slope, area, cover rate, orientation and number of species. In our phytosociological

Figure 1. Represent the study area in Idna village by satellite.

approach is fundamentally based on the Braun-Blanquet (1979) [25] method, we have taken into account the advances in the method pointed out by Pott (2011) [26] and Biondi (2011) [27].

However, we made a comprehensive floristic study of these 17 grids, singled out the respective endemic species and identified the floristic differences in the territories involved. The phytosociological indexes are converted to the Van der Maarel (1979) [28] scale for a proper statistical analysis, these data were used to create an Excel table with 48 rows (plants) and 17 columns (grids). Moreover, from this table we generated a Euclidean Distance Matrix to measure the distance, with the relevant data on community plant physiognomy, average height of dominant species and abundance dominance index, we created a table with the dominant species of each of the 17 grids. We took values over 6 m as the average forest height, dominant species with average height values ranging from 3.5 to 7 m could be described to forest as well as to scrubland environments as *Cerasus microcarpa Boiss , Rhamnus palaestinus Boiss.* The bioclimatic analysis was carried out based on climatic data provided by Palestine Meteorological Department and according to the Rivas-Martinez bioclimatic system (Rivas-Martınez *et al.* 2011) [29], which main aim was to study the relationship between the climate and the living species and their communities on the land in the world.

Study Area

Idna (Idhna) is Palestinian village located to the north-west of the city of Hebron (13 kilometers west of Hebron) and in the southern West Bank, one of the territories occupied in 1967 and is located on the Green Line, an area now estimated at 17,000 hectares after it was 37,000 hectares in 1948, elevated about 450 - 500 m above sea level, between longitudes 34˚06' east and latitudes 31˚33' north. In the fact, we took one area is located at the east-south of Idna village that's have three different names as Abu Salman Forest Reserve (elevation 450 - 545 m), Khallet Osman (elevation 440 - 540 m) and Hamra Aslimi (elevation 420 - 445 m) (**Figure 1** and **Figure 2**).

3. Results and Discussion

In our study, the clustering analysis (Euclidean distance) applied to our data matrix of 48 rows (plants) and 17 columns yielded three clearly separated groups at the level of the truncation of (0.93). Group I (P1, P2, P5, P9, P11, P12, P14 and P16), Group II (P3, P4, P7, P8, P13 and P15) show the relives collected in Abu Salman Forest Reserve. Group III (P6, P10 and P17) gathers the relives corresponding to the forests of the Khallet Osman and Hamra Aslimi mountains (**Figure 3**). Both groups include plots located in the east-south of the Idna village and near of Suba.

However, when we applied of a principal component analysis (PCA) and covariance matrix obtained positive results, thereby confirming the existence of the

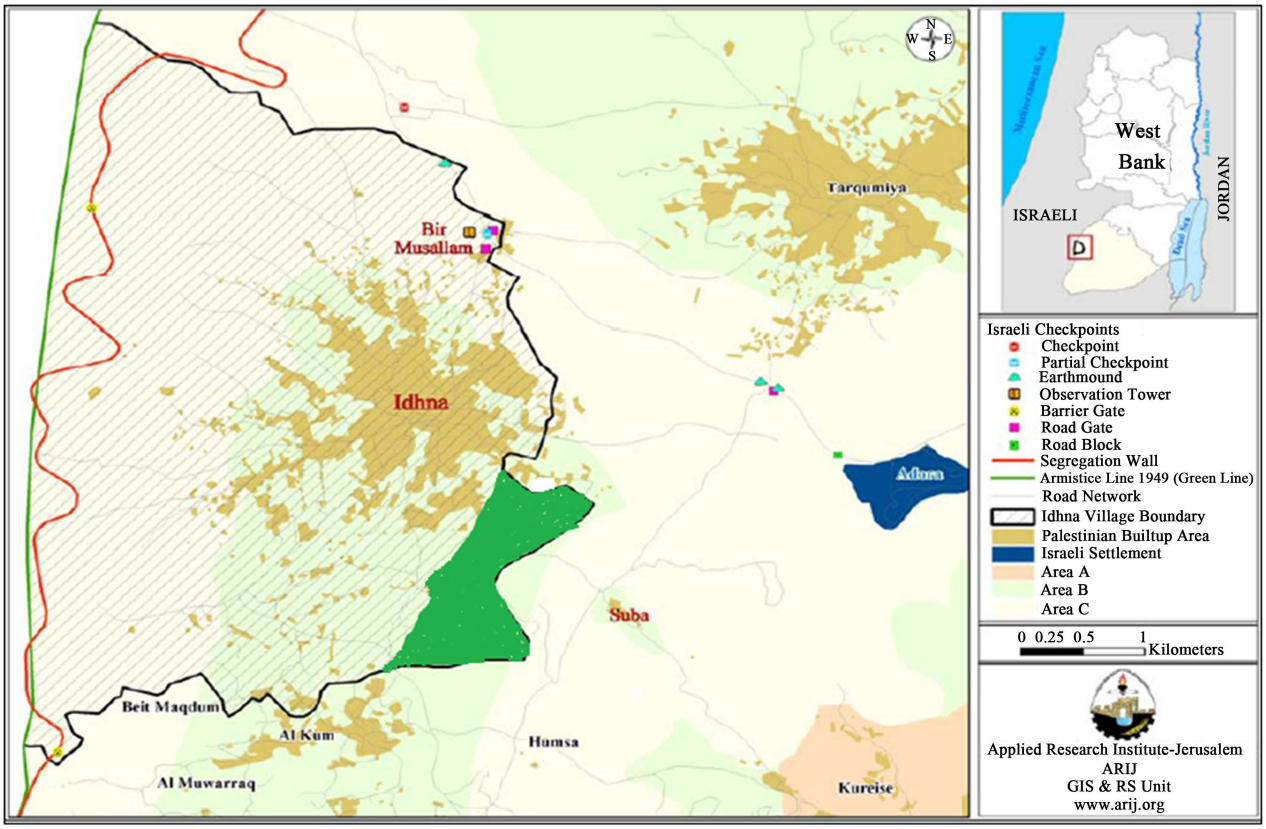

Figure 2. Idna location and green color represent a study area in the map.

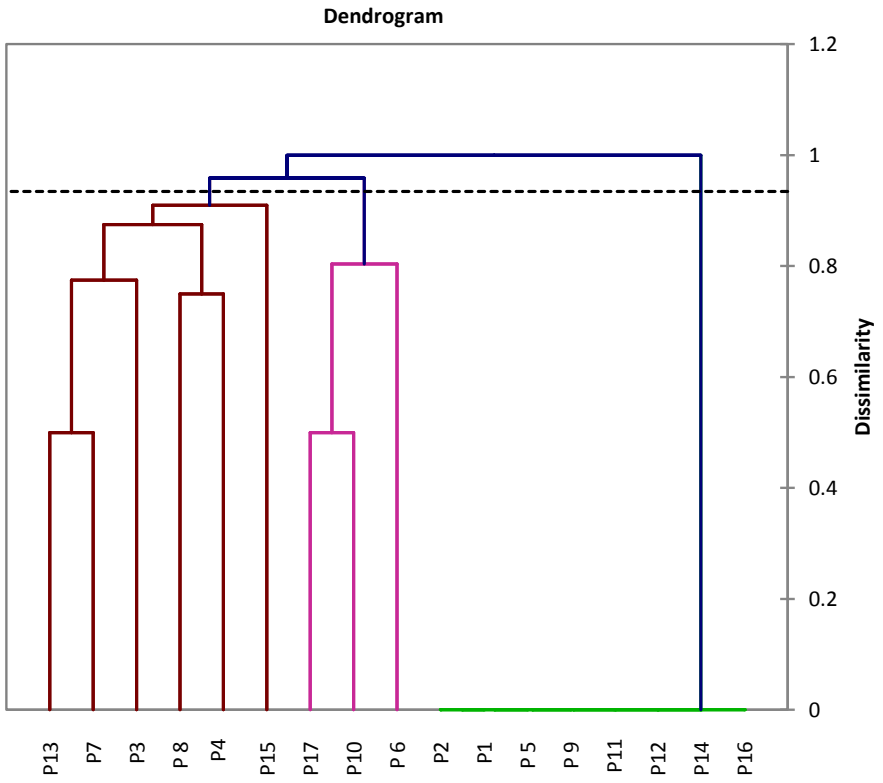

Figure 3. Clustering agglomerative complete linkage.

three groups produced by the clustering analysis (Group I, Group II and Group III) (Figure 4).

Furthermore, the phytosociological analysis of the groups obtained with the previous multivariate analysis has allowed us to point out that the relives of Abu Salman Forest Reserve plots (P1, P2, P5, P9, P11, P12, P14, P16, P3, P4, P7, P8, P13 and P15) belong to the forest dominated by *Pinus halepinsis Mill.* recently described by Ighbareyeh J. M. H. *et al.* (2014) [19], this is a pine-tree forest characterized at the Idna village flora elements such as: *Quercus libani* G. *Olivier, Quercus caliprinos* Webb., *Ceratonia siliqua* L., Alain together with the endemic species *Quercus look Kotschy, Tamarix palaestina Bertol* and *Tamarix jordanis* L. this forest develops in the infra-thermomediterranean dry bioclimatic belt and it is growing in Mediterranean maquis and forest [2] [3], with the terra rose and brown rendzinas territory, we proposed pine-tree forest (Abu Salman Forest Reserve), group I or association ASL 1: 1 - 16 *Pino halepinsis-Quercetum lookii* (Table 1).

Groups II include species collected in Abu Salman Forest Reserve, a relives 3 to 15 represents the infra-thermotropical forest, and dry-subhumid ombrotype (Annual ombrothermic index = 1.5 - 2.8 [2] [3], which is 3.5 - 6 m high, with a 45% - 90% cover rate. This forest is characterized by the endemic trees *Pyrus syriaca Boiss.* Alain *Pistacia palaestina Boiss.*, and growing in Mediterranean maquis and forest, therefore we proposed the association ASL 2 or Group II: 3 - 15 *Pistacio paletinae-Ceratonietum siliquae* (Table 2).

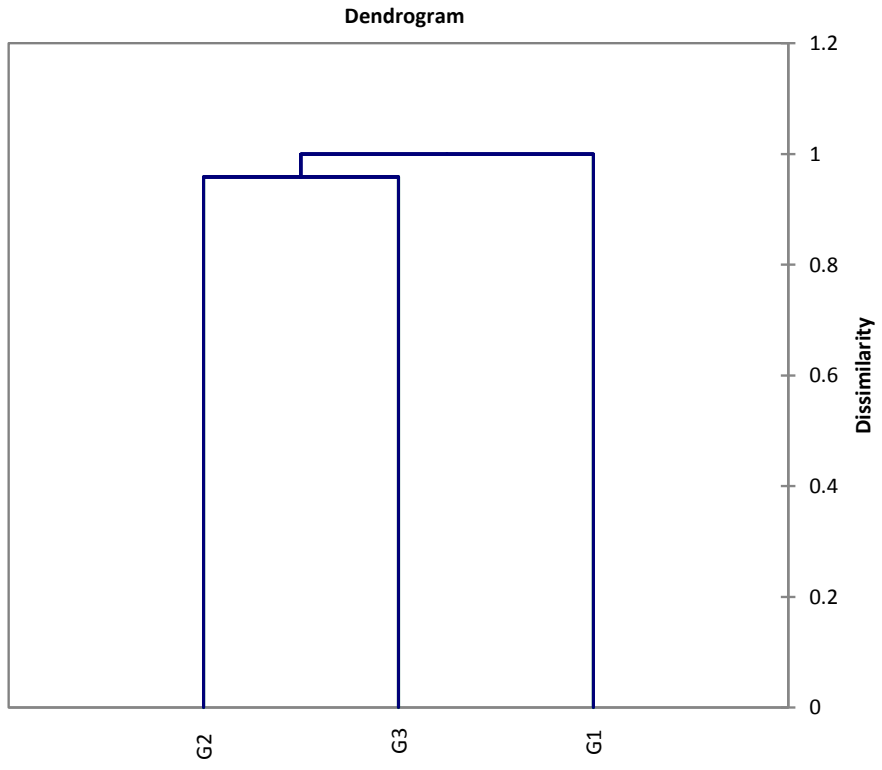

Figure 4. Cluster analysis for dry forest communities in the east south Idna-Hebron of Palestine.

Table 1. *Pino halepinsis-Quercetum lookii*.

Species	P									
Altitude in meter	**533**	**497**	**522**	**540**	**611**	**488**	**555**	**470**	**R**	**S**
Surface in m²	**100**	**120**	**285**	**280**	**250**	**300**	**270**	**280**	**E**	**T**
Cover rate %	**70**	**35**	**45**	**60**	**90**	**85**	**60**	**45**	**S**	**A**
Average height of veg. (m)	**4**	**4.5**	**3.5**	**5**	**5.5**	**4**	**4**	**3.5**	**N**	**T**
Slope %	**10**	**5**	**15**	**5**	**5**	**10**	**5**	**5**	**C**	**U**
Orientation	**W**	**W**	**W**	**N**	**E**	**E**	**N**	**E**	**I**	**S**
Number field relive	**1**	**2**	**3**	**4**	**21**	**22**	**23**	**25**	**A**	
Grid number	**P1**	**P2**	**P5**	**P9**	**P11**	**P12**	**P14**	**P16**	**S**	
Order number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Characteristic of the association and upper units										
Quercus look Kotschy	4	2	2	3	3	2	2	2	V	E
Quercus libani G. Olivier	3	2	1	1	2	2			IV	N
Pinus halepensis Mill	2		2		1		2	1	III	N
Quercus caliprinos Webb.	2		1		2	2		1	III	N
Ceratonia siliqua L.			1			2			II	N
Companions										
Rubus idaeus L.	1	2	1	1	2	2			V	N
Rubus fruticosus L.	2		1	2	1		2	1	V	N
Rhus tripartita Lobadium Raf.			1	1	2	1		2		III
Rhus coriaria L.				1	1			1	I	N
Tamarix palaestina Bertol				2			2		I	E
Tamarix parviflora DC	1			2			2		I	N
Tamarix tetragyna Ehrenb	1				1		2	1	II	N
Tamarix jordanis L.					1			1	I	E
Pistacia palaestina Boiss.		1	2			2			II	E
Pistacia saportae Burnat					1				I	N
Pistacia lentiscus L.				2					I	N
Pistacia atlantica Desf.	2			2	1				II	N
Pyrus syriaca Boiss.				1	1				I	E
Quercus ithaburensi Kotschy	2		2		1			1	II	N
Echinops philistaeus Feinbrun & Zohary	1			1	1				I	E
Cupressus sempervirens L.				1					I	N
Morus nigra L.					1		2	1	I	N
Ficus carica L.		1		1				1	I	N
Populus euphratica L.				1	1				I	N
Abies cilicica (*Antoine & Koschy*)						1				I
Salix acmophylla Boiss				2				1	I	N
Fagus crenata Blume				1	1		2		I	E
Cercis siliquastrum L.				2	1		2		I	N
Cercis siliquastrum L.				2			2		I	N
Cerasus microcarpa Boiss					1		2		I	N
Rhamnus punctata Boiss	2							1	I	N
Rhamnus lycioides Brot	2			2	1			1	II	N

Continued

Rhamnus Palestaestina Boiss	3			2	1			2	II	E
Arbutus andrachne L.				2				1	I	E
Olea europaea L.			1				2		I	N
Pinus canariensis L.	1					1		1	I	N
Pinus brutia L.	1			1				1	I	N
Pinus pinea L.	1					1		1	I	N
Cupressus sempervirens Var horizontalis	1	1						1	I	N
Cupressus arizonica L.			1						I	N
Cupressus macrocarpaa L.						1		1	I	N
Crataegus aronia L.	1			1					I	N
Crataegus azarolus L.								1	I	N
Styrax officinalis L.	1					1			I	N
Lycium barbatum L.				1				1	I	N
Acer syriscum L.		1				1			I	E
Acacia cyanophylla L.	1			1					I	N
Eucalyptus camaldulensis L.				1						I
Melia azedarach L.	1			1		1			I	N

Table 2. *Pistacio palestinae-Ceratonietum siliquae.*

Species	**P**							
Altitude in meter	**450**	**466**	**490**	**545**	**460**	**488**	**R**	**S**
Surface in m²	**270**	**120**	**270**	**300**	**250**	**300**	**E**	**T**
Cover rate %	**90**	**35**	**75**	**60**	**90**	**85**	**S**	**A**
Average height of veg. (m)	**3.5**	**4**	**3.5**	**5**	**6**	**4**	**N**	**T**
Slope %	**5**	**5**	**15**	**10**	**5**	**10**	**C**	**U**
Orientation	**E**	**E**	**E**	**N**	**E**	**E**	**I**	**S**
Number field relive	**27**	**28**	**29**	**30**	**32**	**33**	**A**	
Grid number	**P3**	**P4**	**P7**	**P8**	**P13**	**P15**	**S**	
Order number	**1**	**2**	**3**	**4**	**5**	**6**		
Characteristic of the association and upper units								
Ceratonia siliqua L.	4	2	1	2	2	2	V	N
Pistacia lentiscus L.	1		1	2	3		III	N
Pistacia palaestina Boiss.	2	2	2	2	1	2	IV	E
Pinus halepensis Mill.		2	2	2	1		II	N
Rubus fruticosus L.	2		1	2	1		II	N
Rhus tripartita Lobadium Raf.					2	1		I
Rhus coriaria L.				1	1		I	N
Quercus look Kotschy		2	2	1		2	II	E
Quercus libani G. Olivier	3		1	1		2	II	N
Quercus caliprinos Webb.	2		1		2		I	N
Pinus halepensis Mill.	1	2		1	2		I	N

Continued

Companions								
Rubus idaeus L.	+	2			2		I	N
Tamarix palaestina Bertol	2		2	2			II	E
Tamarix parviflora DC	1			2			I	N
Tamarix tetragyna Ehrenb	1				1		I	N
Tamarix jordanis L.			1		1		I	E
Pistacia saportae Burnat					1		I	N
Pistacia lentiscus L.				2			I	N
Pistacia atlantica Desf.	2				1		I	N
Pyrus syriaca Boiss.				1	1		I	E
Quercus ithaburensi Kotschy	2			1			I	N
Echinops philistaeus Feinbrum & Zohary	1			1	1		I	E
Cupressus sempervirens L.				1			I	N
Morus nigra L.					1		I	N
Ficus carica L.				1			I	N
Populus euphratica L.					1		I	N
Abies cilicica (*Antoine & Koschy*)						1		I
Salix acmophylla Boiss				2			I	N
Fagus crenata Blume					1		I	E
Cercis siliquastrum L.				1	1		I	N
Cerasus microcarpa Boiss					1		I	N
Quercus ithaburensi Kotschy	2			2	1		I	N
Rhamnus punctata Boiss							I	N
Rhamnus lycioides Brot				2	1		I	N
Rhamnus Palestaestina Boiss.	3			1	1		II	E
Arbutus andrachne L.				1			I	E
Olea europaea L.	1						I	N
Pinus canariensis L.			1		1	1	I	N
Pinus brutia L.				1			I	N
Pinus pinea L.			1		1	1	I	N
Cupressus sempervirens Var horizontalis	1	1					I	N
Cupressus arizonica L.			1				I	N
Cupressus macrocarpaa L.						1	I	N
Crataegus aronia L.	1			1			I	N
Crataegus azarolus L.							I	N
Styrax officinalis L.	1					1	I	N
Lycium barbatum L.				1			I	N
Acer syriscum L.			1			1	I	E
Acacia cyanophylla L.				1	1		I	N
Eucalyptus camaldulensis L.				1				I
Melia azedarach L.				1		1	I	N

Moreover, relives 6 to 17 including the Group III correspond to the forest of *Pinus halepinus Mill.- Tamaricetum Palestineae*. It is a tangled, plant forest 3.5 - 6 m high, with a 40% - 80% cover rate. This plants are characterized by *Rubus idaeus* L., *Pinus halepensis Mill., Rhamnus punctata Boiss, Rhamnus lycioides Brot. & Rhamnus Palestaestina Boiss.* and the local endemic plant *Rhamnus Palestaestina Boiss*. *Echinops philistaeus Feinbrun & Zohary* and Alain, we proposed Group III or association ASL3: 6 - 17 *Quercus libanii-Tamaricetum Palestineae* (**Table 3**).

In the other side, we include the forests growing in dry, sub-humid environments, it is probably necessary to create a new alliance to include all forests, and differences between the different associations proposed can be seen in the synthetic **Table 4**.

Finally, it is possible to say that Abu Salman Forest Reserve will be reduced to some plants or will be removed in the future due to the acceleration of construction (building houses and human activities), it is lies within the area classified B, this means that people can build houses and do their various activities, because it is located under Palestinian control, while the area C and D are located under Israeli control, don't it permits to construct of building houses and any activities.

Climate change [2] [3], the growth of the population, the increase in the population density, and the occupation of the Palestinian territories occupied in 1967, including Abu Salman Forest Reserve and other Palestinian areas, will give us a serious indication of the loss of many endemic, semi-endemic and native plants in Palestine, thus eliminating a large part of the vegetation, flora and biodiversity in the future of Palestine.

4. Conclusions

Our study reveal that the 17 grids analyzed are clearly divided into three different groups, all of these groups represent the potential natural vegetation and with a very little substitution scrublands. The floristic analysis revealed that 20.83 % of these species are endemic especial in Abu Salman Forest Reserve. However, we indicated that the forests of Hebron as Idna village belong to different forests groups: Pine-tree forest as *Pinus halepinus Mill., Arbutus andrachne* L. *and Cupressus arizonica* L., Mediterranean maquis and forest as *Quercus look Kotschy, Pistacia palestina* L., *Carob-lentisk* maquis as *Ceratonia siliqua* L. and *Pistacia lentiscus* L., Everegreen oak maquis as Quercus caliprinos Webb, *Rhamnus Palestaestina Boiss*. and Rhamnus punctata Boiss., Deciduous oak forests as *Pistacia palestina Boiss*. and *Pistacia saportae Burnat*., and Reprian forests as *Tamarix palaestina Bertoland Tamarix Jordani*.

Associations described as new:

*Pino halepinsis- Quercetum lookii**.

*Pistacio paletinae- Ceratonietum siliquae**.

*Quercus libanii- Tamaricetum palestineae**.

In the near area of Idna Village, associations described by Ighbareyeh J. M. H. *et al*., 2014 [3] were followed:

Table 3. *Quercus libanii- Tamaricetum palestineae.*

Species	P							
Altitude in meter	**460**	**480**	**522**	**540**	**600**	**450**	**R**	**S**
Surface in m²	**100**	**100**	**280**	**270**	**250**	**300**	**E**	**T**
Cover rate %	**80**	**40**	**50**	**60**	**90**	**85**	**S**	**A**
Average height of veg. (m)	**4**	**3.5**	**3.5**	**5**	**5.5**	**4**	**N**	**T**
Slope %	**5**	**5**	**10**	**5**	**5**	**10**	**C**	**U**
Orientation	**W**	**W**	**W**	**N**	**E**	**E**	**I**	**S**
Number field relive	**40**	**41**	**42**	**44**	**47**	**48**	**A**	
Grid number	**P6**	**P7**	**P17**	**P8**	**P13**	**P15**	**S**	
Order number	**1**	**2**	**3**	**4**	**5**	**7**		
Characteristic of the association and upper units								
Tamarix palaestina Bertol	4	2	2	1	2	2	V	E
Tamarix parviflora DC	2	2	1	1	2	2	IV	N
Tamarix tetragyna Ehrenb	1	2	2	1	2	2	III	N
Tamarix jordanis L.		1					I	E
Companions								
Pinus halepensis Mill.	2		1	2	2		III	N
Quercus look Kotschy			1	1			I	E
Quercus libani G. Olivier	2		2	2	1	1	IV	N
Quercus caliprinos webb.					1		I	N
Ceratonia siliqua L.			1			2	II	N
Rubus idaeus L.	1			1		2	I	N
Rubus fruticosus L.	2		1	2	1		III	N
Rhus tripartita Lobadium Raf.					2	1		I
Rhus coriaria L.				1	1		I	N
Pistacia palaestina Boiss.			2			2	II	E
Pistacia saportae Burnat					1		I	N
Pistacia lentiscus L.				2			I	N
Pistacia atlantica Desf.	2			2	1		II	N
Pyrus syriaca Boiss.				1	1		I	E
Quercus ithaburensi Kotschy	2			2	1		II	N
Echinops philistaeus Feinbrun & Zohary	1			1	1		I	E
Cupressus sempervirens L.		1					I	E
Morus nigra L.					1		I	N
Ficus carica L.		1		1			I	N
Populus euphratica L.				1	1		I	N
Abies cilicica (*Antoine & Koschy*)						1		I
Salix acmophylla Boiss				2			I	N
Fagus crenata Blume			1		1		I	E

Continued

Cercis siliquastrum L.				2	1		I	N
Cerasus microcarpa Boiss			1		1		I	N
Rhamnus punctata Boiss	2						I	N
Rhamnus lycioides Brot				2	1		I	N
Rhamnus Palestaestina Boiss	3		2	2	1		III	E
Arbutus andrachne L.							I	E
Olea europaea L.		1					I	N
Pinus canariensis L.			1		1	1	I	N
Pinus brutia L.				1			I	N
Pinus pinea L.			1		1	1	I	N
Cupressus sempervirens Var horizontalis	1	1					I	N
Cupressus arizonica L.			1				I	N
Cupressus macrocarpaa L.						1	I	N
Crataegus aronia L.	1			1			I	N
Crataegus azarolus L.							I	N
Styrax officinalis L.					1	1	I	N
Lycium barbatum L.		1		1			I	N
Acer syriscum L.			1			1	I	E
Acacia cyanophylla L.		1			1		I	N
Eucalyptus camaldulensis L.				1				I
Melia azedarach L.	1					1	I	N

N: native and E: endemic.

Table 4. Synthetic representation ASL4.

Synthetic representation ASL4						
Species	**ASL1**	**ASL2**	**ASL3**	**Life Form**	**Status**	**Family**
Quercus look Kotschy	V	II	II	T	E	Fagaceae
Quercus libani G. Olivier	IV	III	I	T	N	Fagaceae
Quercus caliprinos webb.	III	I	I	T	N	Fagaceae
Quercus ithaburensi Kotschy	II	I	II	T	N	Fagaceae
Fagus crenata Blume	I	I	I	T	E	Fagaceae
Pinus halepinsis Mill.	III	II	III	T	N	Pinaceae
Pinus canariensis L.	I	I	I	T	N	Pinaceae
Pinus brutia L.	I	I	I	T	N	Pinaceae
Pinus pinea L.	I	I	I	T	N	Pinaceae
Abies cilicica (Antoine & Koschy)	I	I	I	T	N	Pinaceae
Cupressus sempervirens L.	I	I	II	T	N	Cupressaceae
Sempervirens Var horizontalis Cupressus	I	I	I	T	N	Cupressaceae
Cupressus arizonica L.	I	I	I	T	N	Cupressaceae

Continued

Cupressus macrocarpaa L.	I	I	I	T	N	Cupressaceae
Ceratonia siliqua L.	V	II	II	T	N	Fabaceae
Cercis siliquastrum L.	I	I	I	T	N	Fabaceae
Rubus idaeus L.	II	I	I	T	N	Rosaceae
Rubus fruticosus L.	V	II	III	T	N	Rosaceae
Cerasus microcarpa Boiss	I	I	I	Sh	N	Rosaceae
Crataegus aronia L.	I	I	I	T	N	Rosaceae
Crataegus azarolus L.	I	I	I	T	N	Rosaceae
Pyrus syriaca Boiss.	I	I	I	T	E	Rosaceae
Tamarix palaestina Bertol	I	II	V	T	E	Tamaricaceae
Tamarix parviflora DC	I	I	IV	T	N	Tamaricaceae
Tamarix tetragyna Ehrenb.	II	I	III	T	N	Tamaricaceae
Tamarix jordanis L.	I	I	I	T	E	Tamaricaceae
Pistacia palaestina Boiss.	II	IV	II	T	E	Anacardiaceae
Pistacia saportae Burnat	I	I	I	T	N	Anacardiaceae
Pistacia lentiscus L.	I	I	I	T	N	Anacardiaceae
Pistacia atlantica Desf.	II	I	II	T	N	Anacardiaceae
Rhus tripartita Lobadium Raf.	III	I	I	T	N	Anacardiaceae
Rhus coriaria L.	I	I	I	T	N	Anacardiaceae
Morus nigra L.	I	I	I	T	N	Moraceae
Ficus carica L.	I	I	I	T	N	Moraceae
Populus euphratica L.	I	I	I	T	N	Salicaceae
Salix acmophylla Boiss	I	I	I	T	N	Salicaceae
Rhamnus punctata Boiss	I	I	I	T	N	Rhamnaceae
Rhamnus lycioides Brot	II	I	I	T	N	Rhamnaceae
Rhamnus Palestaestina Boiss.	II	III	II	T	E	Rhamnaceae
Arbutus andrachne L.	I	I	I	Ar	E	Ericaceae
Styrax officinalis L.	I	I	I	T	N	*Styracaceae*
Lycium barbatum L.	I	I	I	T	N	*Solanaceae*
Acer syriscum L.	I	I	I	T	E	*Aceraceae*
Acacia cyanophylla L.	I	I	I	T	N	*Mimosaceae*
Eucalyptus camaldulensis L.	I	I	I	T	N	*Myrtaceae*
Melia azedarach L.	I	I	I	T	N	*Meliaceae*
Olea europaea L.	I	I	I	T	N	Oleaceae
Echinops philistaeus Feinbrun & Zohary	I	I	I	Annual	E	Boraginaceae

Percentage of plant species presence in the samples and communities: V = 100%, IV = 60.1% - 80%, III = 40.1% - 60%, II = 20.1% - 40% and I = 0.1% - 20%. N: Native and E: Endemic. Association (ASL), GI: Group one, G II: Group two, GIII: Group three, GI or ASL1: *Pinus halepinus-Quercetum lookii.*, G2 or ASL2: *Pistacio paletinae-Ceratonietum siliquae* and G3 or ASL3: *Quercus libanii- Tamaricetum palestineae.*

Pistacio palaestinae-Quercetum lokii.*
Capparido sinaicae-Ceratonietum siliquae.
Cerasus microcarpae-Quercetum ithaburensis.*
Pyro siriacae-Abietetum cilicicae.*
Abio ciliciae-Ceratonietum siliquae.
Periploco aphylli-Pinetum halepensis.
Cytisopsis pseudocytiso-Tamaricetum tetragynae.
Crataego sinaicae-Tamaricetum jordanii.
*Associations in which olive cultivation is possible.

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