

Studies on forest vegetation of Mahmut mountain of Izmir in Turkey

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Abstract: In this study, the forest vegetation of Mahmut Mountain (Izmir-Turkey) was analyzed by the method of Braun-Blanquet. According to their ecological and floristic characters, 4 plant associations were connected to the alliances of *Quercion ilicis* and *Adenocarpus complicati-Pinion pallasianae*. These alliances belong to the classes of *Quercetea ilicis* and *Quercetea pubescentis*.

Key words: Aegean region, Plant ecology, Plant sociology

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Introduction

Western Anatolian vegetation has an important place in the Mediterranean phytogeographical region because of climate, soil, geology, anthropogenic factors, plant migrations, floristical region, landslides, endemic centres, relict areas, gene pools and topography (Davis, 1965; Zohary, 1973). The first studies in the region were carried out by Schwarz (1936) and Krause (1940). The forest vegetation of the region was especially analyzed as a result of the studies carried in the last 30 yr and higher association syntaxa were determined (Secmen, 1983; Akman *et al.*, 1978; 1979 a,b; Gemici, 1988; Duman, 1988).

The studies carried on Mediterranean vegetation exhibit that the vegetation has particular layers from the shore to the alpine belt. Between <500 m: Warm Mediterranean, 500-1000 m: Real Mediterranean, 1000-1500 m: Upper Mediterranean, 1500-2000 m: Montane Mediterranean and after 2000 m High Montane Mediterranean Vegetation (Akman *et al.*, 1979b). In the South Anatolia, because the Taurus range extends parallel to the sea, those vegetation layers have a rather steady appearance. However, as the mountains extend vertically to the shore in the Aegean region, especially the communities belonging to the Warm Mediterranean Vegetation frequently enter to inland. This situation results with a mosaic appearance in some parts of the vegetation. In such areas, it becomes difficult to determine the distribution ranges of the communities and to make the syntaxonomy of the communities.

Mahmut Mountain is a part of Boz Mountains which extends vertically to the sea between Izmir and Manisa in Western Anatolia, and takes place in the west peak of this chain. In the area, the forest vegetation has a mosaic appearance and represented by a total of 4 plant associations belonging to two classes.

The aim of this study is to assess the phytosociological structure of the forest communities found Mahmut Mountain of Izmir, Turkey.

Materials and Methods

After the determination of the Flora of the study area by Aksoy (1992) the vegetation of the area investigated according to Braun-Blanquet (1964) method.

The traditional "floristical unit system" of Braun Blanquet was used for the syntaxonomical analysis of forest vegetation (1964). In the determination of the size of the sample area, the method of "minimal area" followed and these values were determined as 100 m² in the association of *Acino alpini-Juniperetum sabinae* and 1000 m² in the other 3 associations. To determine the correct syntaxonomy of the determined associations, related references were used (Quezel *et al.*, 1992).

Study area: Mahmut Mountain is the part of "Aegean Shore" of Aegean region within the Kemalpaşa county of Izmir province. In the west of the study area, Dagkizilca, in the north Yukankizilca and in the east Bayramli villages occur. The most important river of the area is Armutlu stream (Fig. 1). In the area, altitudes start with 390 m and ends with 1387 m in the summit.

The main mass of Mahmut Mountain is consisted of old schists (Kocman, 1989). In the lower parts there are also in places serpentine. In general, in the river bases which are used for agriculture and settlement and plains; alluvium, gravel, soil and clay is common. In the study area, brown forest soil is pre-dominant. The composition of this soil showing a granular structure is soil-clayed or clayed. In these soils, the organic matter is 19-17%, CaCO₃ 1.1-1.7 and pH is between 5.4 -6.3.



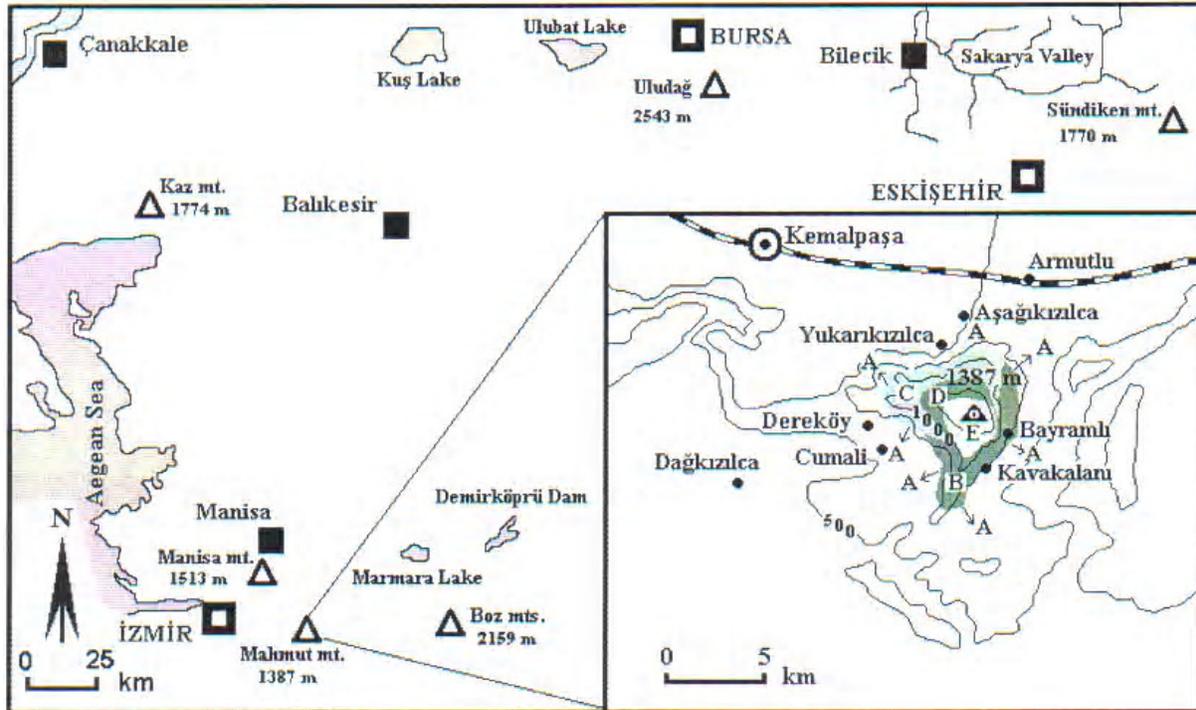


Fig. 1: The geographic and vegetation map of the study area - A: *Phillyreo - Pinetum brutiae*, B: *Paeonio peregrinae-Quercetum cerridis*, C: *Symphyto brachycalicis - Pinetum pallasianae*, D: *Acino alpini - Juniperetum sabinae*

The climate of the study area is evaluated according to the data of Kemalpaşa (Izmir) meteorological station. The mean annual temperature is 16.2°C. The mean highest temperature is 35.8°C in August and the mean lowest temperature is 4.4°C in January. The mean annual precipitation is 1062 mm. The highest precipitation was measured in December (239.3 mm) and the lowest precipitation in August (3.9 mm). The climate data of the station was evaluated according to the climate analyse method of Emberger (1955) (Table 1). According to those data, the pluviometric quotient is 123, 6 and the index of xericity is 0.7. The station is under the effect of "Rainy warmish Mediterranean" climate and the precipitation regime is WSpAS (Akman, 1982).

Results and Discussion

As a result of evaluating the 30 sample area selected from the forest vegetation of Mahmut Mountain, 4 plant associations belonging to two different alliances were determined.

- (1) Class: *Quercetea ilicis* Braun-Blanq. 1947
Order: *Quercetalia ilicis* Braun-Blanq. 1947

Alliance: *Quercion ilicis* Braun-Blanq. (1931) 1936
Association: ***Phillyreo-Pinetum brutiae* (Schwarz, 1936):**

This is an association with the largest distribution range in the study area (Fig. 1, Table 2). Mountain is occupied by this association approximately up to 900 m altitude. In this association which generally prefers 30-45° inclined slopes, the cover ranges between 70-85%. The association usually prefers schist, rarely serpentine mother rock. *Pinus brutia* Ten. and *Quercus infectoria* Olivier subsp. *boissieri* (Reut.) O.Schwarz are dominant in the plant physiognomy.

- (2) Class: *Quercetea pubescentis* (Oberd., 1948) Doing Kraft 1955
Order: *Quercus pseudocerridis-Cedretalia libani* Barbero, Loisel and Quezel 1974
Alliance: *Adenocarpus complicati-Pinion pallasianae* Quezel, Barbero and Akman, 1980
Association: ***Paeonio peregrinae-Quercetum cerridis* Ekim, 1977 em. Akman, Barbero and Quezel, 1979.**

This association, which develops on the 40-60° inclined south, south-east and east slopes of the Mahmut Mountain,

Table 1. Climatic conditions of Kemalpaşa meteorological station

Altitude (m)	P (mm)	M (°C)	m (°C)	Q	PE	S	Precipitation Regime	Variant of mediterranean bioclimatic type
200	1062	35.8	4.4	123.6	24.3	0.7	W.Sp.A.S	Rainy warmish

P: Annual precipitation, M: Maximum temperature for the hottest month, m: Minimum temperature for the coldest month, Q: Pluviometric quotient ($2000.P / M^2 - m^2$), PE: Summer rainfall, S: Index of xericity ($S: PE / M$), W: Winter, Sp: Spring, A: Autumn, S: Summer

Table - 2: Characteristic species of *Phillyrea-Pinetum brutiae* association

Number of releve	1	2	3	4	5	6	7	8	9	10	Presence
Square size (x 10 m ²)	100	100	100	100	100	100	100	100	100	100	
Altitude (x 10 m)	41	42	39	43	58	62	71	72	65	60	
Exposition	NE	NW	E	SE	N	NE	NE	E	SE	S	
Inclination (°)	45	30	30	45	35	30	35	70	50	40	
General cover (%)	85	70	80	80	85	80	85	85	70	80	
Parent rock (SE: Serpentine, SC: Schist)	SE	SE	SC								
Characteristic species of the association											
<i>Pinus brutia</i>	55	45	55	45	55	55	45	55	45	55	10
<i>Cistus creticus</i>	+1	+1	12			+1			+1	+1	6
<i>Jasminum fruticans</i>	+1	+1	-	+1	-	+1	-	+1	+1	-	6
<i>Phillyrea latifolia</i>	12	12	-	-	12	-	-	-	12	-	4
<i>Arbutus andrachne</i>	-	+1	-	-	-	-	+1	-	+1	-	3
<i>Genista anatolica</i>	-	-	-	-	-	-	-	-	13	13	2
<i>Pyrus amygdaliformis</i> var. <i>amygdaliformis</i>	+1	-	-	-	-	-	-	-	-	-	1
<i>Arabis verna</i>	-	-	-	-	-	+1	-	-	-	-	1
Characteristic species of the alliance Quercion ilicis											
<i>Teucrium chamaedrys</i> subsp. <i>tauricola</i>	-	+1	+1	-	-	+1	-	+1	+1	-	5
<i>Quercus coccifera</i>	12	12	12	-	-	-	-	-	-	-	3
Characteristic species of the class Quercetea ilicis and order Quercetalia ilicis											
<i>Quercus infectoria</i> subsp. <i>boissieri</i>	+1	23	+2	+2	12	12		+2		+2	8
<i>Pistacia terebinthus</i> subsp. <i>palaestina</i>	+1	+1	+1	12	+1	-	-	+1	+1	-	7
<i>Asparagus acutifolius</i>	+1	+1	-	+1	-	+1	+1	-	-	+1	6
<i>Juniperus oxycedrus</i> subsp. <i>oxycedrus</i>	-	-	+1	-	-	+1	+1	+1	-	+1	5
<i>Ruscus aculeatus</i>	+1	-	+1	-	-	+1	-	-	-	-	3
<i>Arbutus unedo</i>	+1	+1	-	-	-	-	-	-	-	-	2
<i>Rubia tenuifolia</i> subsp. <i>tenuifolia</i>	+1	-	-	-	-	+1	-	-	-	-	2
<i>Laurus nobilis</i>	-	-	-	+1	+1	-	-	-	-	-	2
Characteristic species of the class Quercetea pubescentis											
<i>Fraxinus ornus</i> subsp. <i>ornus</i>	11	+1	-	-	+1	11	+1	-	-	-	5
<i>Cephalanthera rubra</i>	+1	+1	-	-	+1	-	-	-	+1	+1	5
<i>Doronicum orientale</i>	-	-	-	+1	+1	-	-	+1	+1	+1	5
<i>Quercus cerris</i> var. <i>cerris</i>	-	-	-	-	12	-	22	22	12	-	4
<i>Crataegus orientalis</i> var. <i>orientalis</i>	-	+1	-	+1	-	-	+1	-	-	-	3
<i>Cistus laurifolius</i>	-	-	-	-	-	+1	11	-	-	-	2
<i>Huetia cynapioides</i> subsp. <i>macrocarpa</i>	-	-	-	-	-	+1	11	-	-	-	2
Companions											
<i>Luzula forsteri</i>	12	+2			+2	12	+2		+2	+2	7
<i>Campanula lyrata</i> var. <i>lyrata</i>	+1	+1		+1		+1	+1	+1		+1	7
<i>Cyclamen hederifolium</i>	11	11			+1	+1	+1	+1		11	7
<i>Galium brevifolium</i> subsp. <i>brevifolium</i>	11	11	+1			+1	12			11	6
<i>Dactylis glomerata</i> subsp. <i>hispanica</i>		+1	11		11		+1	12		11	6
<i>Lapsana communis</i> subsp. <i>adenophora</i>	+1		11			+1	+1				4
<i>Epipactis helleborine</i>	+1		+1		+1						3

The following cover-abundance scale values of Braun-Blanquet relate to a reference area that is fixed by the size of the releve: 5-Any number, with cover more than 3/4 the reference area (>75%). 4 - Any number with 1/2-3/4 cover (50-75%). 3-Any number with 1/4-1/2 cover (25-50%). 2-Any number, with 1/2-1/4 cover (5-25%). 1-Numerous, but less than 1/20 cover, or scattered, with cover upto 1/2 (5%). + (Pronounced cross) few with small cover



Table - 3: Characteristic species of *Paeonia peregrinae-Quercetum cerridis* association

Number of releve'	1	2	3	4	5	6	7	8	Presence
Square size (x 10 m ²)	100	100	100	100	100	100	100	100	
Altitude (x 10 m)	70	105	104	88	85	90	92	75	
Exposition	E	S	S	S	E	S	SE	E	
Inclination (°)	45	50	55	60	50	60	45	40	
General cover (%)	90	95	85	95	90	85	80	75	
Parent rock (SC: Schist)	SC								
Characteristic species of the association									
<i>Quercus cerris</i> var. <i>cerris</i>	55	55	45	55	55	55	45	45	8
<i>Quercus pubescens</i>	22	23	22	33	23	23	23	33	8
<i>Coronilla varia</i> subsp. <i>varia</i>	-	-	-	+1	-	+1	-	11	3
<i>Lathyrus digitatus</i>	11	-	-	-	+1	-	-	-	2
<i>Paeonia peregrina</i>	-	-	-	-	-	-	+1	+1	2
Characteristic species of the alliance Adenocarpo complicati-Pinior pallasianae									
<i>Pinus nigra</i> subsp. <i>pallasiana</i>	-	+1	+1	-	-	+1	-	-	3
<i>Cistus laurifolius</i>	-	-	-	+1	+1	-	+1	-	3
Characteristic species of the class Quercetea pubescentis and order Querco-Cedretalia ibani									
<i>Vicia cracca</i> subsp. <i>stenophylla</i>	-	12	2	+12	12	+2	12	-	6
<i>Doronicum orientale</i>	11	11	11	11	-	11	-	-	5
<i>Quercus infectoria</i> subsp. <i>boissieri</i>	-	22	-	-	+2	-	2	-	3
<i>Hypericum montbretii</i>	+1	-	-	-	-	+1	-	-	2
<i>Crataegus orientalis</i> var. <i>orientalis</i>	-	+1	+1	-	-	-	-	-	2
<i>Fraxinus ornus</i> subsp. <i>ornus</i>	-	-	-	-	-	+1	-	+1	2
<i>Colutea cilicica</i>	-	-	-	-	-	-	-	+1	1
Characteristic species of the class Quercetea ilicis									
<i>Pistacia terebinthus</i> subsp. <i>palaestina</i>	+1	+1	+1	12	+1	12	+1	+1	8
<i>Phillyrea latifolia</i>	-	+2	-	-	+1	12	+2	+1	5
<i>Teuchrium chamaedrys</i> subsp. <i>tauricola</i>	-	+2	+2	-	-	-	-	+2	3
<i>Arbutus andrachne</i>	-	+1	-	-	-	-	+1	+1	3
<i>Pinus brutia</i>	-	-	-	+1	+1	-	-	-	2
<i>Asparagus acutifolius</i>	-	-	-	11	-	-	-	11	2
<i>Aristolochia sempervirens</i>	-	-	-	-	+1	-	+1	-	2
Companions									
<i>Thalictrum minus</i> var. <i>minus</i>	-	33	23	12	+1	23	12	22	7
<i>Paeonia peregrina</i>	-	+1	11	12	+1	+1	+1	-	6
<i>Viola suavis</i>	-	+1	+1	-	+1	+1	+1	+1	6
<i>Scilla bifolia</i>	-	+1	+1	+1	-	+1	+1	+1	6
<i>Rubus canescens</i> var. <i>canescens</i>	12	+2	+2	+2	+2	-	-	-	5
<i>Cyclamen hederifolium</i>	-	-	11	11	11	11	+1	-	5
<i>Luzula forsteri</i>	+2	-	+2	12	+1	-	-	-	4
<i>Salvia fruticosa</i>	12	-	-	12	-	+2	-	+2	4
<i>Ranunculus ficaria</i> subsp. <i>ficariiformis</i>	11	+1	-	+1	-	-	-	+1	4
<i>Ornithogalum nutans</i>	+1	-	+1	+1	-	-	-	+1	4
<i>Geranium tuberosum</i> subsp. <i>tuberosum</i>	+1	-	-	-	-	+1	-	+1	3

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Table - 4: Characteristic species of *Symphyto brachycalicis-Pinetum pallasianae* association

Number of releve'	1	2	3	4	5	6	7	8	Presence
Square size (x 10 m ²)	100	100	100	100	100	100	100	100	
Altitude (x 10 m)	101	106	105	108	112	113	110	105	
Exposition	NW	W	W	W	NW	N	NW	N	
Inclination (°)	55	35	50	45	60	50	45	40	
General cover (%)	85	95	80	80	85	90	90	90	
Parent rock (SC: Schist)	SC								
Characteristic species of the association									
<i>Pinus nigra</i> subsp. <i>pallasiana</i>	55	55	45	45	55	55	55	55	8
Characteristic species of the alliance Adenocarpo complicati-Pinion pallasianae									
<i>Adenocarpus complicatus</i>	+1		+1	-	+1	-	+1	-	4
<i>Genista lydia</i> var. <i>lydia</i>	-	+2	-	-	12	+2	-	-	3
Characteristic species of the class Quercetea pubescentis and order Querco-Cedretalia libani									
<i>Huetia cynapioides</i> subsp. <i>macrocarpa</i>	+1	+1	+1	-	+1	+1	+1	+1	7
<i>Quercus cerris</i> var. <i>cerris</i>	+2	-	+1	22	+1	+1	-	12	6
<i>Doronicum orientale</i>	-	23	12	-	22	22	23	12	6
<i>Fraxinus ornus</i> subsp. <i>ornus</i>	+1	+1	+1	+1	+1	-	-	-	5
<i>Vicia cracca</i> subsp. <i>stenophylla</i>	-	+2	-	-	-	12	12	23	4
<i>Digitalis ferruginea</i>	-	-	+1	-	-	+1	+1	-	3
<i>Aristolochia pallida</i>	-	-	+1	-	-	11	-	11	3
<i>Cotoneaster nummularia</i>	+1	+1	-	-	-	-	-	-	2
<i>Crataegus orientalis</i> var. <i>orientalis</i>	-	-	-	+1	-	-	-	+1	2
Characteristic species of the class Quercetea ilicis									
<i>Juniperus oxycedrus</i> subsp. <i>oxycedrus</i>	11	+1	+1	-	11	11	11	+1	7
<i>Phillyrea latifolia</i>	22	-	-	+1	-	-	-	-	2
<i>Teucrium chamaedrys</i> subsp. <i>tauricola</i>	-	-	-	+1	-	-	+1	-	2
Companions									
<i>Thalictrum minus</i> var. <i>minus</i>	-	33	23	12	+1	23	12	22	7
<i>Viola suavis</i>	-	+1	+1	-	+1	+1	+1	+1	6
<i>Scilla bifolia</i>	-	+1	+1	+1	-	+1	+1	+1	6
<i>Paeonia peregrina</i>	-	+1	11	12	+1	+1	+1	-	6
<i>Rubus canescens</i> var. <i>canescens</i>	12	+2	+2	+2	+2	-	-	-	5
<i>Cyclamen hederifolium</i>	-	-	11	11	11	11	+1	-	5
<i>Salvia fruticosa</i>	12	-	-	12	-	+2	-	+2	4
<i>Luzula forsteri</i>	+2	-	+2	12	+1	-	-	-	4
<i>Ranunculus ficaria</i> subsp. <i>ficariiformis</i>	11	+1	-	+1	-	-	-	+1	4
<i>Ornithogalum nutans</i>	+1	-	+1	+1	-	-	-	+1	4
<i>Silene italica</i>	+1	-	+1	-	-	+1	-	-	3
<i>Galium aperina</i>	+1	-	+1	-	-	-	+1	-	3
<i>Geranium tuberosum</i> subsp. <i>tuberosum</i>	+1	-	-	-	-	+1	-	+1	3
<i>Dactylis glomerata</i> subsp. <i>hispanica</i>	-	-	12	-	+1	+1	-	-	3
<i>Corydalis solida</i> subsp. <i>solida</i>	-	-	-	-	-	+1	+1	+1	3
<i>Campanula lyrata</i> var. <i>lyrata</i>	-	+1	-	-	+1	-	-	-	2
<i>Stellaria media</i> subsp. <i>media</i>	-	+1	-	-	-	-	+1	-	2

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Tablo - 5: Characteristic species of *Acino alpini-Juniperetum sabinae* association

Number of releve	1	2	3	4	Presence
Square size (m ²)	100	100	100	100	
Altitude (x 10 m)	121	129	127	118	
Exposition	NE	NE	E	N	
Inclination (°)	50	60	65	30	
General cover (%)	100	95	90	100	
Parent rock (SC: Schist)	SC	SC	SC	SC	
Characteristic species of the association					
<i>Juniperus sabina</i>	55	54	55	55	4
<i>Arabis caucasica</i> var. <i>caucasica</i>	+1	+1	+1		3
Characteristic species of the alliance Adenocarpo complicati-Pinion pallasianae					
<i>Genista lydia</i> var. <i>Lydia</i>	-	+2	+2	-	2
<i>Pinus nigra</i> subsp. <i>pallasiana</i>	-	-	+1	-	1
Characteristic species of the class Quercetea pubescentis and order Querco-Cedretalia libani					
<i>Huetia cynapioides</i> subsp. <i>macrocarpa</i>	+1	+1	-	+1	3
<i>Vicia cracca</i> subsp. <i>stenophylla</i>	-	+1	-	+1	2
<i>Digitalis ferruginea</i> subsp. <i>ferruginea</i>	-	-	+1	+1	2
<i>Seseleria alba</i>	-	-	+1	+1	2
<i>Doronicum orientale</i>	-	-	+1	-	1
Characteristic species of the class Quercetea ilicis					
<i>Juniperus oxycedrus</i> subsp. <i>oxycedrus</i>	+1	-	+1	+1	3
<i>Teuchrium chamaedrys</i> subsp. <i>tauricola</i>	-	+1	-	-	1
Companions					
<i>Galanthus elwesii</i>	+1	+1	+1	-	3
<i>Festuca pinifolia</i> var. <i>pinifolia</i>	+2	+2	-	2	3
<i>Geranium tuberosum</i> subsp. <i>tuberosum</i>	+1	+1	-	+1	3
<i>Dianthus erinaceus</i> var. <i>erinaceus</i>	+1	-	+1	+1	3
<i>Poa bulbosa</i>	+1	-	+1	+1	3
<i>Scilla bifolia</i>	-	+1	+1	+1	3
<i>Fritillaria bithynica</i>	+1	+1	-	-	2
<i>Veronica pectinata</i> var. <i>pectinata</i>	+2	-	+2	-	2
<i>Thalictrum minus</i> var. <i>minus</i>	+1	-	+1	-	2
<i>Briza humilis</i>	+1	-	-	+1	2
<i>Lamium garganicum</i> subsp. <i>reniforme</i>	-	+1	+1	-	2
<i>Galium incanum</i> subsp. <i>centrale</i>	-	-	+1	+1	2
<i>Thymus sipyleus</i> var. <i>sipyleus</i>	+3	-	-	-	1
<i>Asperula daphneola</i>	+1	-	-	-	1
<i>Minuartia juniperina</i>	-	+2	-	-	1
<i>Ranunculus reuterianus</i>	-	+1	-	-	1
<i>Campanula lyrata</i> var. <i>lyrata</i>	-	+1	-	-	1
<i>Ornithogalum umbellatum</i>	-	+1	-	-	1
<i>Lonicera etrusca</i> var. <i>etrusca</i>	-	-	+1	-	1
<i>Cerasus mahaleb</i> var. <i>mahaleb</i>	-	-	+1	-	1
<i>Ornithogalum nutans</i>	-	-	+1	-	1

The following cover-abundance scale values of Braun-Blanquet relate to a reference area that is fixed by the size of the releve: 5-Any number, with cover more than 3/4 the reference area (>75%). 4 - Any number with 1/2-3/4 cover (50-75%). 3-Any number with 1/4-1/2 cover (25-50%). 2-Any number, with 1/2-1/4 cover (5-25%). 1-Numerous, but less than 1/20 cover, or scattered, with cover upto 1/2 (5%). + (Pronounced cross) few with small cover.

generally prefers schist mother rocks between 900-1050 m (Fig. 1, Table 3). The starting point of the association sometimes steps down to 700 m in the more moist southern slopes. The general cover ranges between 75-95% in the association which shows distribution on the brown forest soil on schist mother rock. The characteristic species such as *Quercus cerris* L. var. *cerris*, *Quercus pubescens* Willd. and contributor *Thalictrum minus* L. var. *minus* are dominant in the plant physiognomy.

(3) Association: ***Symphyto barchycalycis-Pinetum pallasianae***
Akman, Barbero and Quezel 1979

This association was observed in the 35-60° inclined west, northwest and north slopes between 1010-1130 m in the study area (Fig. 1, Table 4). This association which prefers the same mother rock and soil with the association of *Paeonio peregrinae-Quercetum cerridis* has a general cover range between 80-90%. The characteristic species of *Pinus nigra* J.F. Arnold subsp. *pallasiana* (Lamb.) Holmboe and the accompanied *Thalictrum minus* L. var. *minus* are pre-dominant in the plant physiognomy.

(4) Association: ***Acino alpini-Juniperetum sabinae***:

The species of *Juniperus sabina* L. forms a rather unmixed association in the 35-65° inclined north, north-east and east slopes near the summit of the study area (Fig. 1, Table 5). In the association which prefers 1180-1290 m altitudes, the general cover ranges from 90-100%. This association with a rather poor floristic composition has a distribution range on brown soil forests on schist mother rock.

The summit parts of Mahmut Mountain is covered with xerofic subalpine formation in which the species, *Astragalus angustifolius* Lam. subsp. *angustifolius* var. *angustifolius*, *Dianthus erinaceus* Boiss. var. *erinaceus* and *Cerasus prostrata* (Labill.) Ser. var. *prostrata* are pre-dominant.

The forest vegetation of Mahmut Mountain shows more or less harmonious stratification with Mediterranean vegetation belts. The stratification starts with "Real Mediterranean" belt in the study area. This belt starts from the base (390 m) and follows up to approximately 900 m. *Phillyreo-Pinetum brutiae* is the only association of this belt which surrounds the area. In the area, "Higher Mediterranean" belt occupies approximately between 900-1300 m. However, the lower and upper border of this belt can change up to the slopes. In this belt, there are three associations distributed according to slopes and altitudes. Syntaxonically, the belt of "Real Mediterranean" belongs to the *Quercion ilicis* alliance of *Quercetea ilicis* classes and the "Higher Mediterranean" belt belongs to the *Quercetea pubescentis* class which belongs to the *Adenocarpus complicati-Pinion pallasianae* alliance (Braun-Blanquet, 1936; Quezel *et al.*, 1980).

The association of *Phillyreo-Pinetum brutiae* was first determined during the field studies carried in the western parts of

Turkey between 1930-1932 by Zohary, but described later in the north-east of Bornova by Schwarz (Schwarz, 1936; Zohary, 1973). The borders of the association which has a distribution range in the vicinities of Izmir, Bahkesir and Bilecik; extend up to Sakarya canyon (Zohary, 1973; Akman *et al.*, 1978). The association of *Paeonio peregrinae-Quercetum cerridis* was first determined by Ekim and Akman (1991) in Siindik mountains (Eskisehir). *Paonia peregrina* Mill, which is one of the character species of the association, is densely found in the association of *Senecioni castagneani-Paonietum peregrinae* (Duman, 1988) which takes place in Manisa Mountain, 30 km (bird fly) to the study area. This species also has a distribution in the vicinities of Canakkale, Bursa and Kastamonu in Turkey (Akman *et al.*, 1979a; Duman, 1988; Davis, 1965). Because of this, the association which has a pieced distribution could probably be in different localities of west and north-west Anatolia. This association which occupies the south-east and east slopes in the study area determines the lower border of the "Upper Mediterranean" belt. The association of *Symphyto barchycalycis-Pinetum pallasianae* is common in vicinities of Izmir and Bahkesir. In the area, it shows distribution on schist mother rock in the north-west and north slopes. This association which takes place in the "High Mediterranean" layer prefers the altitudes between 1010-1130 m (Akman *et al.*, 1979a).

The association of *Acino alpini-Juniperetum sabinae* was observed in Manisa Mountain which takes place in the northwest of the study area (Duman, 1988). *Acinos alpinus* (L.) Moench, which is one of the characteristic species of the association could not be observed in Mahmut Mountain. This association is the last shrubby association before the xerofic subalpine formation which is predominant in the summit. In this association, which determines the upper level of "High Mediterranean" belt, the individual cover of *Juniperus sabina* ranges between 80-90%.

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