

A PHYTOSOCIOLOGICAL RESEARCH ON THE SYLVATIC VEGETATION OF ÇANKIRI, ÇORUM AND SUNGURLU

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SUMMARY

This study was carried out on the sylvatic vegetation in the north-east part of the peripheral zone of the Central Anatolia. The vegetation which is under the effective control of a semi arid-very cold type of Mediterranean climate was analyzed by the three dimensional ordination technique based on the BRAUN-BLANQUET approach. The associations described in the area were included in the class *Quercetea ilicis* of Mediterranean origin and in the alliance *Quercion anatolicae* of the class *Quercetea pubescentis* regarding their ecologic and floristic peculiarities.

INTRODUCTION

The study area is situated in the north-east of the Central Anatolia, Çankırı in the west, Çorum in the east and Sungurlu in the south.

The previous works done on the vegetation of Turkey covers particularly the northern and southern parts of Anatolia. Much less attention has been paid to the vegetation of the ecotones between the main geographical region in Anatolia even though they exhibit an interesting structure in respect to flora, plant ecology and phytosociology.

The aim of the study is to determine the syntaxonomical units in such area like that and their relationships with the environment.

In the present work, the phytosociological structure of the plant groups in the area was described for the first time.

The geographical and climatical conditions of the area have entailed to form three different plant groups.

It is believed that this study will supply a complementary information to the floristic and vegetational researches carrying out in Turkey.

MATERIAL and METHODS

The study was carried out in two years, between the periods of early spring 1984 and autumn 1986. The specimens of the plants were collected and the quadrats which belongs to plant communities were done during the study.

In the course of the study, the vegetation of the area was tried to be described by means of the quadrats laid in the area with a homogeneous plant cover.

A great number of plant specimens collected in the study area were identified by the authors in the herbarium of the biology department of the Science Faculty of Ankara and some were sent to the other herbaria.

The geological data were obtained from the reports of the M.T.A. institute. The climatic characteristics were estimated depending on the data of the meteorological bulletins of State Meteorological Service of Turkey.

The soil specimens which belong to plant groups were taken during the study and then were analyzed in the laboratory of the biology department of Science Faculty of Ankara, using the following methods;

Texture: With hydrometer method of Bouyoucos

Gypseous: With acetone method

Lime % and CaCO_3 %: With titration

pH: With pH meter

Conductance: With Conductance Bridge instrument

The solved Cations within the water:

Mg and Ca : With titration

Na and K : With the Flame photometric method.

The quadrats were classified by the polar ordination methods (Bray and Curtis, 1953) based on Braun-Blanquet approach in order to form the syntaxonomical units in the area.

BRIEF DESCRIPTION OF THE STUDY AREA (Map: 1)

The study area situated in the north-east of the central Anatolia is generally covered with the calcerous soils. While the altitudinal

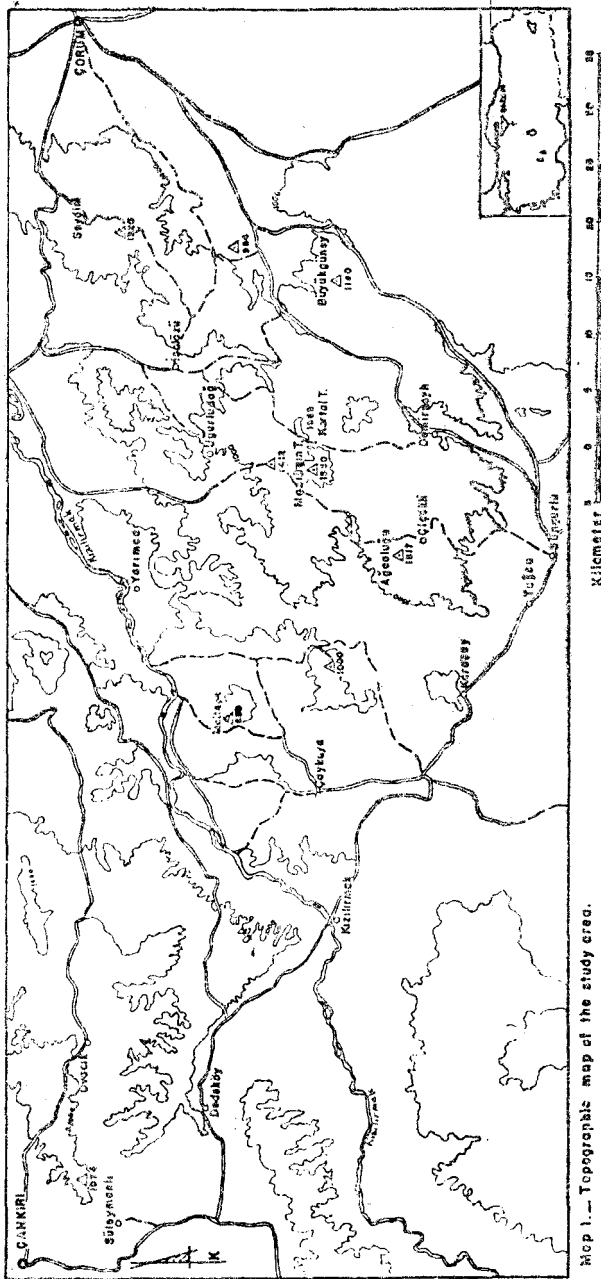


Рис. 1. — Топографическая карта изучаемой территории.

range of the area varies between 1000–1500 meters, the highest peak reaches to 1585 meters (Kartal tepe).

The climatic conditions of the region are characterized by cold winter, often with frost and hot summer with drought periods. The data of the meteorological stations of Çankırı, Çorum, and Sungurlu and Bayat having only the precipitational measurements were used to determine the type of climate in the area. All the climatological data have been seen in the tables no 1–2–3–4–5–6–7. The total amount of rainfall in the region varies between 384.9–687.7 mm. The mean minimum temperature of the coldest month (m) is -4.0°C in Çankırı and -4.6°C in Çorum and the maximum ones of the hottest month varies from 29°C (in Çorum) to 7°C (in Çankırı).

The bioclimatological values obtained by the present data are as follows:

Altitude (m)	p (mm)	M ($^{\circ}\text{C}$)	m ($^{\circ}\text{C}$)	Q_2	PE/ME	Type bioclimate
Çankırı 751	384.9	30.7	-4.0	38.7	2.2	Semi arid-very cold type of Mediterranean
Çorum 798	417.7	29.0	-4.6	43.5	2.8	

According to the pluviothermic quotient of Emberger (Q_2), the area is under the influences of a semi arid-very-cold type of Mediterranean bioclimate.

VEGETATION

The study area situated in the peripheral zone of the Central Anatolia exhibits a vegetation which composed of deciduous woody species and the steppe ones. In the study, the phytosociological structure of the woody communities was examined. As in the most of the world, the steppe vegetation peripherically delimited by sylvatic plant groups of Anatolian territory has been exploited by men particularly through grazing and intensive agricultural purposes. So it, here, is possible to see some degradation phases of vegetation types.

In the region two distinct group of woody vegetation can be mainly distinguished, one is of mediterranean origin and the others are Anatolian. Among these, the ones of mediterranean origin are included in the class *Quercetea ilicis* and the others were attached

Table 1. Monthly and annual mean temperature (°C)

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	-0.6	1.0	5.4	10.9	16.1	19.9	23.1	22.0	17.0	11.4	5.8	1.6	11.1
Çorum	798	-0.6	1.1	4.8	10.5	15.1	18.5	21.1	21.0	17.0	12.1	6.6	1.8	10.7

Table 2. Monthly and annual minimum mean temperature (°C)

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	-4.0	-3.1	-0.1	6.6	8.9	11.7	13.8	13.5	9.3	4.7	0.8	-1.7	4.9
Çorum	798	-4.6	-3.3	-0.8	3.7	7.7	10.2	12.5	12.6	9.2	5.2	1.4	-2.0	4.3

Table 3. Monthly and annual maximum temperature (°C)

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	3.3	5.5	11.3	17.6	22.7	26.6	30.5	30.7	25.8	20.0	12.6	5.6	17.7
Çorum	798	3.8	6.0	11.0	17.2	22.1	25.7	28.7	29.0	24.9	19.9	13.2	6.2	17.3

Table 4. Minimum temperature (°C)

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	-25.0	-24.0	-15.5	-4.7	-22.6	1.6	6.4	4.6	-2.0	-6.3	-19.4	-17.7	-25.0
Çorum	798	-25.6	-25.5	-19.0	-7.8	-3.0	0.2	4.0	3.0	-3.0	-6.3	-21.5	-24.4	-25.6

Table 5. Maximum temperature (°C)

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	14.3	22.0	29.0	31.0	33.4	37.0	41.7	41.8	36.7	33.6	23.1	18.2	41.8
Çorum	798	17.0	20.3	28.6	30.2	35.1	37.1	39.7	39.4	36.9	33.6	25.6	19.0	39.7

Table 6. Mean relative humidity %

Stations	h(m)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual mean
Çankırı	751	79	75	67	62	62	57	52	52	59	65	73	80	65
Çorum	798	76	74	67	62	61	57	52	53	57	62	70	77	64

Table 7. Monthly and annual mean precipitation

Stations	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	annual mean precip.	the regime of precip.
Çankırı	46.0	38.3	37.8	38.9	55.0	39.9	13.0	13.3	15.1	17.1	23.5	47.2	384.9	Sp,W,Sm,A
Çorum	44.4	31.2	38.1	46.1	60.9	47.5	17.7	12.9	19.5	25.0	30.6	43.8	417.7	Sp,W,Sm,A

Table 8. Soil analysis

Plant Group	Physical Analysis						Chemical Analysis						
	gyp-sum	CaCO ₃ %	Sand	Silt	Clay	Texture class	pH	Conduc-tance m.mhos/cm	Soluble Cations meq/lt.				
									Mg	Ca	Ca+Mg	N	K
Carici-Quercetum	—	0.7	67.43	26.26	6.30	Sandy-Loam	7.6	0.770	2.6	4.8	7.4	0.130	0.090
Carici-Quercetum	—	0.6	47.23	50.14	2.62	Silty-Loam	7.4	0.774	1.4	5.9	7.3	0.102	0.086

to the class *Quercetea pubescentis*. These units were classified by ordinating the quadrats according to the three dimensional ordination technique of Bray and Curtis, 1957 (Figure no 1).

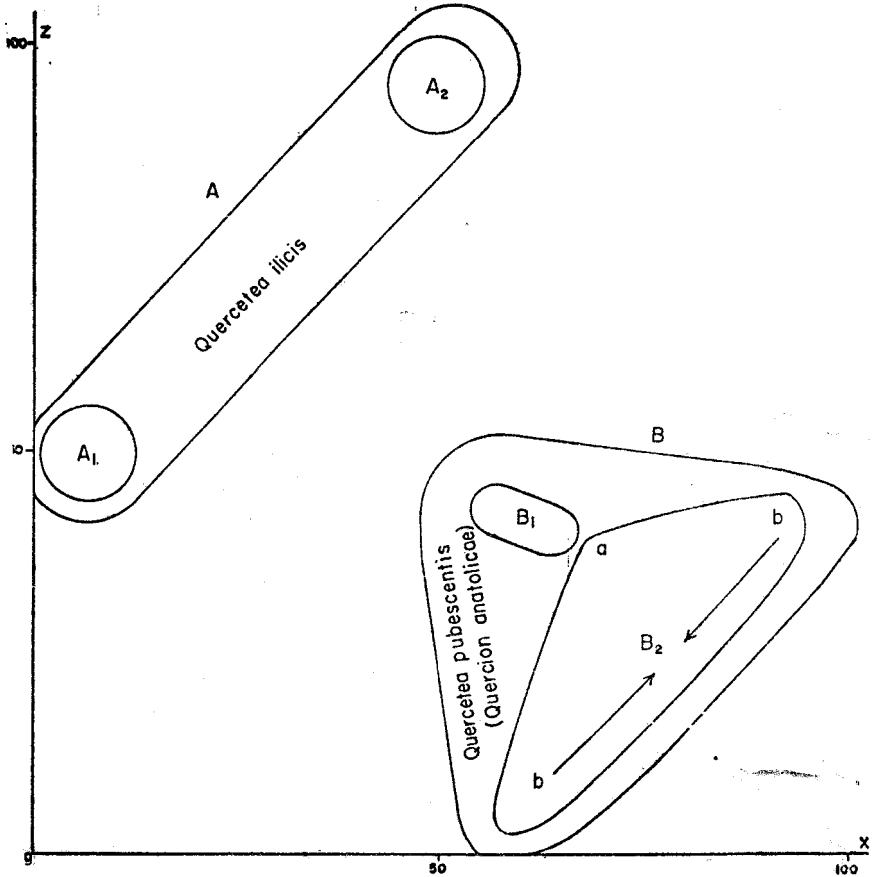


Figure 1. Ordination of the Plants associations. A₂- Juniperus excelsa Plant group, A₁- Salvia-Rhoetum coriariae, B₁- Carici-Pinetum nagrae, B₂- Carici-Quercetum cerridis a) quercetosum pubescentis, b) quercetosum macrantherae.

Class: *Quercetea ilicis* Br.-Bl. 1936 em.

Rivas-Martinez 1975

The mediterranean originated plants groups spreading around Harami stream between the towns of Çorum and Bayat have been classified in two units.

a) *Juniperus excelsa*-*Paliurus spina-christi* plant group (Table no 1)

Although it can be differentiated by the mediterranean species such as *Juniperus excelsa* and *Paliurus spina-christi*, this community was considered, for now, as a plant group instead of association due to its local distribution. It is a woody community composed of the steppe and sylvatic species and it occupies the sites in the form of stream beds with an altitude of 950 m. Although its phytosociological interpretation is difficult, the plant group is included in the class *Quercetea ilicis* due to the dominance of the species of mediterranean origin.

b) *Salvia-Rhoetum coriariae* ass.nova (Table no 1)

Characteristic and differential species :

Rhus coriaria, Salvia heldreichiana,

Habitat and structure :

This is an association which occupies the same site of 800 m as the previous one and spreads out on the hills with an inclination of 40 %. *Salvia heldreichiana* plays a co-dominant role in this association dominated by *Rhus coriaria*. The soil surface have a stony appearance due to the erosion. The coverage percentage of the association is about 50 %. The components of the floristic composition along with the characteristic species belongs to the syntaxa of mediterranean origin.

Distribution :

The association has a local distribution in the area.

Syntaxonomy :

The association was considered in the class *Quercetea ilicis* extending in the whole mediterranean region due to the phytogeographical characteristics of the species.

Holotype : Table no 1 quadrat no 59.

Class: *Quercetea pubescentis* Oberd. 1948; Doing Kraft 1955.

Order: *Quercetalia* Quézel, Barbéro, Akman 1980
Alliance: *Quercion anatolicae* Quézel Barbéro, Akman 1977

Table 1: Plant communities of the Class Quercetea ilicis

Quadrat no	54	55	56	57	58	59	60	Presence
Altitude (m)	950	950	950	800	800	800	800	
Inclination (%)	0	0	0	40	40	40	40	
Direction	N	N	N	S	S	S	S	
Area of the quadrat (m ₂)	100	100	100	100	100	100	100	
Coverage (%)	40	40	40	50	50	50	50	
Bedrock	CM	CM	CM	C	C	C	C	
Characteristic and differential species:								
<i>Juniperus excelsa</i>	33	33	33	.	.	.	.	III
<i>Paliurus spina-christi</i>	23	12	23	.	.	.	.	III
<i>Linaria simplex</i>	+1	+1	+1	.	.	.	.	III
<i>Rhus coriaria</i>	.	.	.	33	33	34	33	IV
<i>Salvia heldreichiana</i>	.	.	.	22	22	23	23	IV
Characteristics of the Quercetea ilicis:								
<i>Juniperus oxycedrus</i>	12	+1	12	.	.	.	.	III
<i>Cotoneaster nummularium</i>	++	11	11	.	.	.	.	III
Characteristics of the Quercetea pubescentis:								
<i>Berberis crataegyna</i>	12	12	12	.	.	.	.	III
<i>Quercus pubescens</i>	.	.	.	12	+	+1	12	IV
Characteristics of the Querco-Fagea and Querco-Fagetea:								
<i>Teucrium chamaedrys</i>	+1	+1	+1	.	.	.	.	III
<i>Myosotis sylvatica</i>	.	++	+1	.	.	.	.	II
Characteristics of the Astragalo-Brometea and Orobrycho armeni-Thymetalia leucostomi:								
<i>Teucrium polium</i>	.	+1	+1	+1	+1	11	+1	V
<i>Ziziphora capitata</i>	.	.	.	++	++	+1	++	IV
<i>Thymus leucostomus</i> var. <i>leucostomus</i>	.	.	.	+1	+1	+1	+1	IV
<i>Centaurea virgata</i>	.	.	.	+1	+1	+1	+1	IV
<i>Koeleria cristata</i>	.	.	.	.	11	+1	11	III
<i>Paronychia kurdica</i> subsp. <i>kurdica</i>	+1	11	11	.	.	.	.	III
<i>Minuartia hamata</i>	+1	+1	+1	.	.	.	.	III
<i>Causinia birandiana</i>	.	.	.	.	.	.	.	II
<i>Alyssum sibiricum</i>	.	+1	+1	.	.	.	.	II
Companions:								
<i>Callipeltis cucullaria</i>	+1	+1	+1	+1	+1	+1	+1	V
<i>Carex panicea</i>	.	.	.	+1	+1	+1	+1	IV
<i>Centaurea urvillei</i>	.	.	.	++	++	++	++	IV
<i>Linaria corififolia</i>	.	.	.	+1	+1	+1	++	IV
<i>Paracaryum ancyritanum</i>	.	.	.	++	++	++	+1	IV
<i>Nepeta italica</i>	.	.	.	+1	+1	+1	+1	IV
<i>Bromus japonicus</i>	.	.	.	.	+1	+1	+1	III
<i>Astragalus xylobasis</i> var. <i>angustus</i>	.	.	.	.	+1	+1	11	III
<i>Aethionema arabicum</i>	+1	+1	+1	.	.	.	.	III
<i>Velezia rigida</i>	+1	+1	+1	.	.	.	.	III
<i>Valerianella vesicaria</i>	+1	++	+1	.	.	.	.	III
<i>Senecio vernalis</i>	++	++	+1	.	.	.	.	III
<i>Arenaria leptoclados</i>	++	++	+1	.	.	.	.	III
<i>Medicago minima</i>	++	++	++	.	.	.	.	III
<i>Galium tenuissimum</i>	+1	+1	+1	.	.	.	.	III
<i>Holosteum umbellatum</i>	+1	+1	11	.	.	.	.	III
<i>Sanguisorba minor</i>	.	++	++	.	.	.	.	II
<i>Scabiosa rotata</i>	.	.	.	.	.	++	++	II
<i>Scabiosa plumosa</i>	.	+1	+1	.	.	.	.	II

C : Calcareous

M : Marl

Carici-Quercetum cerridis ass. nova (Table no 2).

Characteristics and differential species :

Quercus cerris var. *cerris*, *Carex divisula* var. *leersii*.

Habitat and structural characteristics :

In the study area, the deciduous forest are formed by *Quercus cerris* var. *cerris*, *Quercus pubescens* subsp. *anatolica* and *Quercus macranthera* subsp. *sispyrensis*. *Quercus cerris* var. *cerris* is a dominant species in the area and the others are co-dominant ones. These types of forests are especially widespread in the sites of 1550–1500 m. where the rainfall increases.

This association which is described through 19 quadrats is characterized by *Quercus cerris* var. *cerris* and *Carex divisula* subsp. *leersii* and is spread out on the soils derived from calcereous mainrock (pH: 7.4–7.6).

The soils on which the association is spread out has a sandy and loamy clayey texture as seen in the table no 8.

The floristic composition of these forests is nearly heterogeneous although they have an homogeneous aspect from the physionomical point of view.

According to the co-dominant species, characteristics and exposition, two subassociations can be distinguished;

1- *Quercetosum pubescentis*

This subassociation which is differentiated by *Quercus pubescens* subsp. *anatolica* and *Vicia grandiflora* var. *grandiflora* is individualized on the south slopes of the Uğurludağ.

2- *Quercetosum macrantherae*

Especially *Quercus macranthera* subsp. *sispyrensis* and *Telephium imperati* play an important role as a differential species in this subassociation.

Distribution :

This association is widespread on the north slopes of Uğurludağ between Çorum and Bayat.

Syntaxonomy :

The association were included in the alliance *Quercion anatolicae* of the order *Quercu-Carpinetalia* belonging to the superclass *Quercu-Fagea*. The species of the class *Astragal-Brometea* don't play an important role here.

Holotype: Table no 2, quadrat no 80

Carici-Pinetum nigrae

(Table no 3)

Habitat and structural characteristics :

The black pine association covers a narrower area in the region than that of Oaks.

The association is characterized by *Pinus nigra* subsp. *pallasiana*, *Carex distachya*, *Anthyllis vulneraria* subsp. *boissieri*, *Lathyrus spatulatus*, *Epipactis helleborine* and *Campanula rapunculoides*.

This association which is localized around Uğurludağ display a degraded structure while the tree layer is composed of the type species *Pinus nigra* subsp. *pallasiana*, *Quercus pubescens* subsp. *anatolica*, *Quercus cerris* var. *cerris* and *Colutea cilicica* forms the scrub layer. The grassy layer is composed of some the steppe species.

In the area, the northern slopes between 1000-1050 m. are occupied by this association.

Although steppe species and sylvatic ones were found together in the area because of its phytogeographical situation, this association is more homogenous than the previous one from the physiognomic and floristic point of view.

Distribution :

Uğurludağ, Hacilarhanı and Misler ovası are occupied by this association.

Syntaxonomy :

In the study area, this association were considered in the class *Quercetea pubescentis* and in its alliance *Quercion anatolicae*.

Table 3: Carici-Pinetum nigrae

Quadrat no	43	44	45	46	47	76	65	48	49	50	Presence
Altitude (m)	1100	1100	1150	1050	1100	1100	1000	1150	1100	1100	
Inclination (%)	30	30	25	20	25	5	5	20	20	30	
Direction	N	N	N	N	N	SE	NV	N	N	N	
Area of the quadrat (m ²)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Coverage (%)	60	60	70	60	60	60	40	70	60	60	
Bedrock	C	C	C	C	C	C	C	C	C	C	
Characteristic and differential species of the association:											
<i>Pinus nigra</i> subsp. <i>pallasiana</i>	33	33	34	33	34	33	33	44	44	44	V
<i>Carex distachya</i>	+1	11	+1	11	11	.	22	11	12	+1	V
<i>Anthyllis vulneraria</i> subsp. <i>boissieri</i>	.	.	+1	+1	+1	.	.	+1	11	11	III
<i>Lathyrus spatulatus</i>	.	.	.	+	+	.	.	++	++	+1	III
<i>Epipactis helleborine</i>	.	.	.	.	++	.	.	+1	+1	.	II
<i>Campanula rapunculoides</i>	.	.	.	.	.	.	.	+1	+1	+1	II
<i>Quercus macranthera</i> subsp. <i>sypirensis</i>	.	.	.	.	.	.	.	+1	+1	+1	II
Characteristics of the Quercion anatolicae:											
<i>Coronilla varia</i>	+1	+1	.	+1	+1	.	.	.	+1	+1	III
<i>Quercus pubescens</i> subsp. <i>anatolica</i>	.	.	.	.	++1	12	12	.	.	12	II
<i>Vicia cracca</i> subsp. <i>stenophylla</i>	.	.	.	.	+1	.	.	.	.	.	I
Characteristics of Quercetea pubescentris:											
<i>Quercus cerris</i> subsp. <i>cerris</i>	+1	+1	+	+1	+1	12	.	+1	+1	12	V
<i>Dorycnium pentaphyllum</i>	.	.	+1	22	+1	++	12	+1	+1	+1	IV
<i>Silene italica</i>	.	.	+1	+1	+1	.	.	+1	11	+1	III
<i>Cephalanthera rubra</i>	.	+1	.	+	+	11	.	+	.	.	III
<i>Colutea ciliata</i>	.	.	.	+	+	.	.	+	+	.	II
<i>Pimpinella tragium</i> subsp. <i>polyclada</i>	.	.	.	.	+1	.	.	+1	+1	+1	II
<i>Trifolium medium</i>	.	.	.	.	.	11	.	11	+1	.	II
<i>Astragalus glycyphyllos</i> subsp. <i>glycyphylloides</i>	.	.	.	.	.	.	.	.	+1	+1	I
<i>Tanacetum poteriifolium</i>	.	.	.	.	.	.	+1	.	.	.	I
<i>Pyracantha coccinea</i>	.	.	.	.	.	.	.	.	.	+	I
Characteristics of the Querco-Fagea and Querco-Fagetea:											
<i>Silene alba</i> subsp. <i>ericalcinea</i>	+	+	+	+	+	.	.	+	+	+	IV
<i>Veronica hamaedrys</i>	+1	+1	+1	11	+1	.	.	+1	11	11	IV
<i>Poa nemoralis</i>	.	.	+1	11	11	+1	.	+1	11	11	IV
<i>Lapsana communis</i> subsp. <i>intermedia</i>	.	.	.	.	.	+1	.	.	+1	+1	II
<i>Clinopodium vulgare</i> subsp. <i>vulgare</i>	.	.	.	.	.	.	.	+1	+1	.	I
<i>Ligustrum vulgare</i>	.	.	.	.	.	.	.	.	.	+	I
Characteristics of Astragalo-Brometea and Onobrycho armeni-Thymetalia leucostomi:											
<i>Festuca valesiaca</i>	+1	+1	+1	11	+1	11	23	+1	11	+1	V
<i>Koeleria cristata</i>	.	+1	+1	+1	+1	.	12	+1	+	+1	IV
<i>Leontodon asperrimus</i>	.	+	+	+	+1	+1	.	+	+	+	IV
<i>Teucrium polium</i>	.	+	+	++	+1	.	.	+1	+1	+1	IV
<i>Ziziphora tenuior</i>	++	+1	++	.	++	.	.	++	.	++	III
<i>Polygala pruinosa</i>	.	+1	+1	.	+1	.	.	.	+1	+1	III
<i>Paronychia kurdica</i> subsp. <i>kurdica</i>	.	.	.	.	.	12	.	.	.	.	I
Compenions:											
<i>Poa bulbosa</i>	+1	++	11	11	11	+1	+1	11	11	+1	V
<i>Dactylis glomerata</i>	++	++	++	+1	+1	.	22	+1	+1	+1	V
<i>Bunium microcarpum</i> subsp. <i>bourgei</i>	+1	++	++	++	++	.	+1	+	+	+1	V
<i>Muscari racemosum</i>	+	+	+1	11	+1	11	.	+1	+1	+1	V
<i>Helianthemum canum</i>	+1	22	12	22	22	.	.	+1	11	+1	IV
<i>Globularia trichosantha</i>	11	+1	+1	+1	11	.	.	11	+1	+1	IV
<i>Briza media</i>	+1	+1	+1	11	+1	.	.	+1	++	11	IV
<i>Fibigia clypeata</i>	+1	++	++	++	++	.	.	+	+	+1	IV
<i>Acantholimon acerosum</i>	11	12	11	+	+1	.	.	+1	.	+1	IV
<i>Astragalus campylosema</i> subsp. <i>campylosema</i>	.	+1	+	+1	11	.	.	+1	11	+1	III
<i>Coronilla orientalis</i>	.	.	+1	+1	+1	.	.	+	+	11	III
<i>Myosotis lithospermifolia</i>	.	.	+1	+1	+1	.	.	+1	+1	+1	III
<i>Astragalus densifolius</i>	.	+1	.	11	.	.	.	+1	+1	+1	III
<i>Inula ensifolia</i>	.	.	+1	+1	+1	.	.	+1	+1	.	III
<i>Aethionema arabicum</i>	.	.	+	.	+	.	.	.	+	+	II
<i>Aethionema armenum</i>	+	+	+	.	.	.	.	.	.	+	II
<i>Pilosella piloselloides</i> subsp. <i>megalomastix</i>	.	.	.	.	.	.	+1	+1	+1	.	I
<i>Alyssum murale</i>	.	.	.	.	.	.	.	+1	+1	.	I

C : calcereon

However some steppe species which belongs to the *Astragalobrometea* can also be seen here, they don't have a phytosociological significance Holotype: Table no 3, Quadrat no 47.

DISCUSSION

The study area situated in the north-east part of the peripheral zone of the Central Anatolia is phytogeographically localized in Irano-Anatolian floristic region.

The associations described here were considered in the following syntaxa;

Superclass: *Quercio-Fagea* Fukaret et Fabi-Janik 1968

Class : *Quercetea pubescentis* Oberd. 1948;
Doing Kraft 1955

Order : *Quercio-Carpinetalia* Quezël, Barbëro,
Akman 1980

Alliance : *Quercion anatolicae* Quezël, Barbëro,
Akman 1977

Class : *Quercetea ilicis* Br.-Bl. 1936 em Rivas-
Martinez 1975

Quercetea pubescentis :

Its borders are extended from the Mediterranean to Eurosiberian region in the north. This class has been divided into two orders, one of them is *Quercetalia pubescentis* and the other *Quercio-Cedretalia libani*.

The recent researches proved that *Quercetalia pubescentis* should be considered together with the *Quercio-Carpinetalia* owing to its special alliances. This order is represented by the alliance of *Quercion anatolicae* in the region.

Quercetea ilicis:

This class extends to whole Mediterranean basin, from Greece to the near east. A lot of sclerophyllous and also deciduous species were included in this class. Several plant groups which belong to this class were attached to the order *Quercetalia ilicis*.

Class : *Quercetea ilicis*

Juniperus excelsa-*Paliurus spina-christi* plant group:

In Turkey, *Juniperus excelsa* is generally common in the Mediterranean phytogeographical region, in steppe-forest transitional belt of Central Anatolia and at low levels of Prepontic region in north Anatolia of between 1000-1200 meters. These forest types indicating a degradation phase in vast part of Anatolia are under the effects of man in various ways such as excessive grazing and extensive farming. This kind of effects caused some steppe species to penetrate into its floristic composition. The same situation was observed in the study area. *Juniperus excelsa* was thought as a plant group instead of plant association because of its local distribution and floristics aspect. Due to the fact that some differential and dominant species except for the steppe ones belong to the *Quercetea ilicis*, this group was considered in this class.

The same plant group had been determined by Quezel et al. (1980) in north Anatolia, Çetik (1976) in Elmalı, Ovacakverdi (1983) in Seydişehir and Kılınç (1985) in Devrez Kızıdırnak region.

Salvio-Rhoetum coriaria:

Rhus coriaria is a Mediterranean element but it has a large ecological range that is why it is widespread on the eroded red-brown calcareous soils.

This association is characterized by the Mediterranean originated species. The large number of the components forming its floristic composition comprise of steppe species. However, this association was considered in the class of *Quercetea ilicis*, due to its characteristics and differential species. There is not a similarity between *Ephedro-Rhoetum coriariae* determined by Çetik (1985) in Aksaray and this association described here due to the their distinct geographical distributions.

Class : *Quercetea pubescentis*

Alliance : *Quercion anatolicae*

Carici-Pinetum nigrae:

Pinus nigra subsp. *pallasiana* is more widespread than the other pine species in Turkey. This plant group forms local communities ni

the area which is situated transitional zone of steppe and forest in Central Anatolia of between 1000–1150 meters.

This sylvatic group was researched by indigenous and foreign researchers in vast part of Turkey so far.

The black pine communities were considered within the alliance *Pinion nigrae* by Zohary (1973) owing to the fact that they showed an ecological and floristical peculiarities in different geographical regions.

This alliance was separated into two groups by the author; *Pinion nigrae orientalis* which is located in the Oromediterranean zone of Mediterranean region and *Pinion nigrae xero-euxinum* which is spreading out in the Xero-Euxinion zone of Central Anatolia. The other black pine communities determined in the north of Armutlu around İzmir were considered as *Pinetum nigrae typicum* by Schwarz (1936). On the other hand a group of this community in Anatolia was attached to the order *Quercus-Cedretalia libani* which is common in the Mediterranean region and the others were attached to *Quercus-Carpinetalia* by Akman, Quezél and Barbéro (1978) due to the its ecological and floristical differences.

In this study, this association has been included in the alliance *Quercion anatolicae* of the class *Quercetea pubescentis*.

Carici-Quercetum Cerridis:

The communities of *Quercus cerris* which is a Mediterranean element were described with local species by Çetik (1985) in Ereiyes mountain, by Düzenli (1976) in Hasan mountain and Vural et al. (1985) in National park of Afyon.

In the area, *Quercus cerris* showing a large distribution forms an association in which *Quercus pubescens* and *Quercus macrenthera* were appeared as co-dominant species in different expositions. Two distinct subassociations were formed by two oak species within the association characterized by *Quercus cerris* and *Carex divisula*. In the association, although some species of *Astragalus-Brometea* were increased in number because of its phytogeographical situation, They

don't play any important role from the point of phytosociological view.

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