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Investigations Flora in Mersin: Kozlar Highplateau of South Turkey

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Abstract: Kozlar highplateau of the Mut in the Mersin settled in central of Kozlar in 1400 m have been investigated. Except *Cedrus libani* plantation, there are a few of the natural *Cedrus libani*, *Abies cilicica* trees in the area. The area contains the old forest of *Pinus brutia* and *P. nigra*. Additionally, the some of the new records such as *Jurinea cypria* in the area have been reported. The floristic list of Kozlar highplateau with 272 species have been presented. The dominant families are Lamiaceae, Asteraceae, Fabaceae, Poaceae, Boraginaceae, Brassicaceae.

Key words: Flora, taurus mountains south Turkey (Mediterranean region: Mersin)

INTRODUCTION

Turkey and the Mediterranean Region, (Taurus mountains) have rich and interesting flora. This is owing to diverse variations in climate, topography, geology, geomorphology, range of altitudes (0-1000 m) and bodies of water (sea, lakes, streams etc.)^[1].

In Taurus Mountains, Kozlar highplateau (Mut) is a limestone formation includes deep valleys, fossil zones, huge limestone blocks, several caves, forest of *Pinus brutia* and *Pinus nigra*, *Cedrus libani* and *Abies cilicica* and cushion forming plants of steppe areas, such as *Acantholimon* and *Astragalus*. Also, central Kozlar contains the settled and destroyed area (Fig. 1).

There are a numbering studies that investigate plant communities of the area nearby ^[2,3]. This area was chosen for study owing to its diverse geographical elements and its variable climate ranging from Mediterranean to terrestrial and its interesting the geological structure.

MATERIALS AND METHODS

Materials: The flora was surveyed in 2000-2002 and the collections are housed in the herbarium of Mersin University.

Description of the research area

Geographical properties of the research area: The research area, Kozlar highplateaus situated between

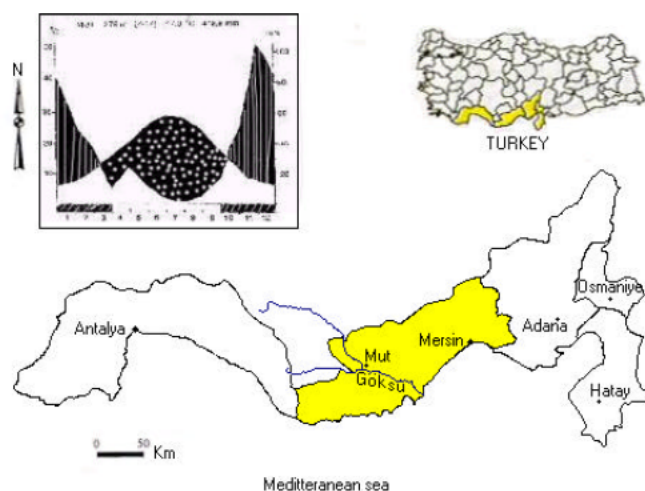


Fig. 1: The research area

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36°44' 00"-36°45' 00" latitude and 33°30' 00"- 33°31' 30" longitude.

The geological structure of the research area: The research area is made of limestone, grey limestone, marl, sandstone and conglomerates which were formed in the sub Miocene Period. There are various kinds of marine fossils (starfish, oysters etc.) especially between 1200-1300 m. This shows that there was an inner sea in the area in the past and that these areas were formed as a result of the sea draining from Göksu valley^[4].

The terrestrial clastic rock units of the Derinçay formation, outcropping widely in the Mut region, consist on conglomerates, sandstones, siltstones and mudstones of alluvial fan and meandering river origin. This formation is underlain by the limestone and marl dominated marine Mut and Köseli formations. The rich small mammal fauna collected from the mudstones of the thick lake sediments of the meandering river parts of this clastic unit. The associated crocodylia, Chelonia, Cyprinidae indicate that there was a tropical/subtropical climate in the Mut region, 18-19 my ago^[5].

The climatic properties of the research area: Data reflecting climatic properties of the area were taken from Mut Meteorology station which is close to the research area and at an altitude of 275 m. The research area enjoys a Mediterranean climate and also the terrestrial climate of the Middle Anatolia Region. In summer it is hot and dry with low humidity while in winter it is warm and rainy. However above 1000 m precipitation falls as snow. Rain in region is sometimes heavy and therefore here is some danger of erosion. This is especially so in regions with sparse vegetation. Hot dry winds in July and August cause drought and the danger of fire (Fig. 1).

In particular around Göksu river, there are several number of *Populus euphratica* that is an element of Mesopotamian origin and rich endemic and new record plants, e.g. *Jurinea cyprea* which can be said to be a speciality of the local climatic conditions^[6,7].

Methods: Freres^[8], Rechingers^[9], Meikle^[10], Davis^[11,12], Tutin *et al.*^[13], Feinborn^[14], Davis *et al.*^[15], Viney^[16], Troisieme^[17], Güner *et al.*^[18] and the other keybooks were principally used to identify the specimens and compared with plants of Gazi Herbarium and Akdeniz Herbarium in 2001 and also controlled in Botanical Museum, Berlin-Dahlem Herbarium in September 2002. The plant families represented in the area in the appendix there order follows Davis^[11,12].

RESULTS

The taxons identified in the research area are listed below:

SPERMATOPHYTA

GYMNOSPERMAE

CUPRESSACEAE

Juniperus drupacea Lab.

Küçük Kozlar area, open areas, 1430 m, 11.06.2001, Seyhan, 204.

J. excelsa Bieb.

Küçük Kozlar area, *P. brutia* forest, 1430 m, 11.06.2001, Seyhan, 202.

J. oxycedrus L. subsp. *oxycedrus*

Kozlar kapızi, open areas, 1400m, 27.05.2000, Seyhan, 203.

PINACEAE

Abies cilicica (Ant. et Kotschy) Carr. subsp. *cilicica*

Burgulu area, steppe, rocky area, 1600 m, 27.05.2000, Seyhan, 207, Mediterranean element.

Cedrus libani A. Rich. Burgulu area, 1600 m, 27.05.2000, Seyhan, 208, Mediterranean element.

P. nigra Arn. subsp. *pallasiana* (Lamb.) Holmboe Küçük Kozlar area, 1430 m, 11.06.2001, Seyhan 205.

Pinus brutia Ten. Küçük Kozlar area, 1430 m, 11.06.2001, Seyhan, 206, Mediterranean element.

ANGIOSPERMAE

DICOTYLEDONAE

ACANTHACEAE

Acanthus hirsutus Boiss. Kozlar kapızi, rocky area, 1350 m, 13.07.2001, Seyhan, 183, Irano-Turanian element, endemic.

APIACEAE (UMBELLIFERAE)

Bifora radians Bieb. Kozlar Kapızi, rocky area, 1380 m, 18.06.2001, Seyhan, 75.

Falcaria vulgaris Bernh. Katran Belt, rocky area, steppe, 1600 m, 27.07.2001, Seyhan, 78.

Malabalia secacul Banks and Sol. Katran Belt, rocky area, steppe, 1600 m, 18.06.2001, Seyhan, 80, east Mediterranean element.

Tordylium apulum L. Kozlar center, gardens, 1400 m, 20.05.2000, Seyhan, 141, Mediterranean element.

Scandix pecten-veneris L. Kozlar center, gardens, 1400 m, 18.06.2001, Seyhan, 74.

S. iberica Bieb. İşemik area, fields, 1550 m, 18.06.2001, Seyhan, 77.

Caucalis platycarpos L. Kozlar center, fields, 1400 m, 18.06.2001, Seyhan, 76.

Daucus carota L. Ayı river, rocky, 1360 m, 11.08.2001, Seyhan, 79.

APOCYNACEAE

Vinca herbaceae Waldst. et Kit. Küçük Kozlar area, rocky, 1420 m, 06.04.2001, Seyhan, 72.

V. major L. subsp. *major* Ayı river area, edge of garden, 1370 m, 27.05.2000, Seyhan, 73, Mediterranean element.

ARISTOLOCHIACEAE

Aristolochia maurorum L. Ayı river area, streams, 1380 m, 11.06.2001, Seyhan, 120, Irano-Turanian element.

ASTERACEAE (COMPOSITAE)

Anthemis hyalina DC. Küçük Kozlar area, *P. brutia* forest, 1450 m, 18.06.2001, Seyhan, 176, new record for C4.

A. nobilis L. Kozlar kapızı, rocky, 1380 m, 18.06.2001, Seyhan, 175.

A. tinctoria L. var. *tinctoria* Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 52.

Achillea falcata L. subsp. *neilreichii* (Kerner) Formanek Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 50, Euro-Siberian element.

A. wilhelmsii C. Koch. Kozlar center, edge of road, 1400 m, 18.06.2001, Seyhan, 48, Irano-Turanian element.

Centaurea drabifolia Sm. in SibthandSm. subsp. *cappadocica* (DC.) Wagenitz.

İşemik area, steppe, rocky slopes, 1550 m, 27.05.2000, Seyhan, 153.

C. calcitrapa L. subsp. *calcitrapa* Kozlar center, gardens, 1400 m, 20.07.2001, Seyhan, 54, Mediterranean element.

C. depressa Bieb. Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 156.

C. mathiolifolia Boiss. Katran Belt, rocky, steppe, 1600 m, 18.06.2001, Seyhan, 157, Irano-Turanian element, new record for C4, endemic.

C. solstitialis L. subsp. *solstitialis* Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 155.

C. triumfettii All. Kozlar center, gardens, 1410 m, 27.05.2000, Seyhan, 158.

C. urvillei DC. subsp. *stepposa* Wagenitz. İşemik area, steppe, rocky, 1550 m, 27.05.2000, Seyhan, 159, Irano-Turanian element.

Cichorium intybus L.

Kozlar center, edge of garden, 1400 m, 11.06.2001, Seyhan, 56.

Crupina crupinastrum (Moris.) Vis. Kozlar kapızı, open oaks woods, 1380 m, 16.06.2000, Seyhan, 49.

Hieracium pannosum Boiss. Kozlar kapızı, rocky, 1370 m, 18.07.2000, Seyhan, 51, east Mediterranean element.

H. paphlagonicum Freyn and Sint. Kozlar kapızı, rocky, 1380 m, 18.06.2001, Seyhan, 172, endemic.

Hedpnois cretica (L.) Dum. - Cours. Yıkılğan, rocky area, 1420 m, 13.07.2001, Seyhan, 146, Mediterranean element.

Inula montbretiana DC. İşemik area, steppe, rocky, 1500 m, 27.05.2000, Seyhan, 54, Irano-Turanian element.

I. heterolepis Boiss. var. *heterolepis* İşemik area, steppe, on limestone rocks, 1550 m, 18.06.2001, Seyhan, 143, east Mediterranean element.

Jurinea cypria Boiss. Ayı river area, 1360 m, 27. 5.2000, Everest, 882, new record for Turkey, endemic.

Leontodon asperrimus (Willd.) J. Ball. Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 53, Irano-Turanian element.

Picnomon acarna (L.) Cass. Yıkılğan, woodlands, rocky, 1420 m, 20.07.2001, Seyhan, 60, Mediterranean element.

Scorzonera cana (C.A. Meyer.) Hoffm. var. *cana* Küçük Kozlar area, *P. brutia* forest, rocky, 1450 m, 18.06.2001, Seyhan, 140.

T. buphtalmoides (DC.) Boiss. var. *buphtalmoides* Kozlar center, 1400 m, 12.5.2002, Everest, 890.

Taraxacum cf. officinale Weber Kozlar kapızı, edge of garden, 1400 m, 12.5.2002, Everest, 892, new record for C4.

Tragopogon longirostris Bisch. ex Schultz Bip. var. *longirostris* Kozlar center, edge of road, 1400 m, 20.07.2001, Seyhan, 55.

Tussilago farfara L. İşemik area, edge of road, 1500 m, 06.04.2001, Seyhan, 59, Euro-Siberian element.

Xanthium spinosum L. Kozlar center, edge of road, 1400 m, 20.07.2001, Seyhan, 174.

X. longipapposum Fisch and Mey. İşemik area, rocky, 1550 m, 18.06.2001, Seyhan, 58, Irano-Turanian element.

Xeranthemum annuum L. İşemik area, rocky area, 1550 m, 13.07.2001, Seyhan, 55.

BERBERIDACEAE

Berberis crataegina DC. Kozlar kapızı, rocky slopes, 1400 m., 12.5.2002, Everest, 888, Irano-Turanian element.

BORAGINACEAE

Alkanna orientalis (L.) Boiss. var. *orientalis* Katran Belt, destroyed forest, 1600 m, 18.06.2001, Seyhan, 26, Irano-Turanian element.

A. aucheri D. C. Steppe, 1400 m., 12.5.2002, Everest, 1034, endemic.

A. cappadocica Boiss. and Bal. subsp. *orientalis* Kozlar kapızı, steppe, 1400 m., 12.5.2002, Everest, 1033, Irano-Turanian element.

A. hispida Hub-Mor. Mavga castle around, rocky area, 1360 m, 18.06.2001, Seyhan, 27, east Mediterranean element, endemic.

Anchusa leptophylla Roemer and Schultes subsp. *incana* (Ledeb) Chamb. İşemik area, edge of road, 1600 m, 18.06.2001, Seyhan, 31, Irano-Turanian element, endemic.

A. azurea Miller. var. *macrocarpa* (Boiss. and Hohen.) Chamb. Kozlar kapızı, edge of road, 1380 m, 20.07.2001, Seyhan, 30.

A. strigosa Labill. Kozlar center, rocky area, 1400 m, 18.07.2000, Seyhan, 35.

A. undulata L. subsp. *hybrida* (Ten.) Coutinho İşemik area, edge of road, 1600 m, 18.06.2001, Seyhan, 36, Mediterranean element.

Arnebia densiflora (Nordm.) Ledeb. Mavga castle around, rocky slopes, 1380 m, 11.06.2001, Seyhan, 152, Irano-Turanian element.

Buglossoides arvensis (L.) Johnston. Küçük Kozlar area, rocky area, 1430 m, 18.06.2001, Seyhan, 29.

Cerintho minor L. subsp. *auriculata* (Ten.) Domac. Kozlar center, garden, 1400 m, 18.06.2001, Seyhan, 28.

Cynoglossum creticum Miller.

Ayı river area, rocky area, 1360 m, 27.05.2000, Seyhan, 34.
Cynoglottis chetikiana Vural and Kit-Tan. Steppe, 1400 m, 12.5.2002, Everest, 1035.

Echium angustifolium Miller. Kozlar kapızı, edge of road, 1360 m, 18.06.2001, Seyhan, 32, Mediterranean element.

Myosotis lithospermifolia (Willd.) Hornem. Kozlar kapızı, rocky area, 1380 m, 27.05.2000, Seyhan, 33.

Onosma lycaonicum Hub.-Mor. Küçük Kozlar area, rocky, 1430 m, 18.06.2001, Seyhan 38, 1400 m, 12.5.2002, Everest, 1036, steppe, Irano-Turanian element, endemic.

O. bracteosum Hausskn and Bornm. Küçük Kozlar area, rocky, 1453 m, 18.6.2001, Seyhan.

O. hebebulbus DC. Ayı river area, rocky, 1370 m, 18.06.2001, Seyhan, 37, Irano-Turanian element, new record for C4.

BRASSICACEAE (CRUCIFERAE)

Alyssum condensatum Boiss. and Hausskn. subsp. *flexibile* (Nyar.) Dudley Küçük Kozlar area, Rockies, 1450 m, 27.05.2000, Seyhan, 43.

A. pinardii Boiss. Küçük Kozlar area, rocky area, 1380 m, 18.06.2001, Seyhan, 178, Irano-Turanian element, endemic.

A. strigosum Banks and Sol. subsp. *strigosum* Kozlar center, gardens, 1400 m, 18.06.2001, Seyhan, 42.

Aubrieta canescens (Boiss.) Bornm. subsp. *canescens* Küçük Kozlar area, rocky area, 1380 m, 18.06.2001, Seyhan, 41, endemic.

Capsella bursa-pastoris (L.) Medik. Kozlar center, edge of fields, 1400 m, 27.05.2000, Seyhan, 179.

Cardaria draba (L.) Desv. subsp. *draba* Kozlar center, gardens, 1400 m, 27.05.2000, Seyhan, 45.

Clypeola johntlaspi L. Kozlar kapızı, rocky area, 1350 m, 11.06.2001, Seyhan, 214.

Erysimum hamosum Blanche. ex Post. Küçük Kozlar area, 1420 m, 18.06.2001, Seyhan, 40, rocky, Irano-Turanian element.

Fibigia eriocarpa (DC.) Boiss. Kozlar center, edge of fields, 1400 m, 27.05.2000, Seyhan, 39.

Isatis callifera Boiss. and Bal. Ayı river area, edge of river, 1360 m, 20.07.2001, Seyhan, 177, east Mediterranean element, new record for C4, endemic.

I. tinctoria L. subsp. *tomentella* (Boiss.) Davis Ayı river area, edge of river, 1360 m, 20.07.2001, Seyhan, 46.

Mathiola longipetala (Vent.) D.C. subsp. *bicornis* (Sibth and Smith) Kozlar Kapızı, steppe, 1400 m, 12.5.2002, Everest, 1013.

Neslia apiculata Fisch. Mey. and Ave-Lall. Ayı river area, edge of river, 1360 m, 18.06.2001, Seyhan, 134.

Sisymbrium altissimum L. Küçük Kozlar area, edge of garden, 1430 m, 18.06.2001, Seyhan, 44.

Thlaspi perfoliatum L. Ayı river area, rocky, 1370 m, 06.04.2001, Seyhan, 47.

CAMPANULACEAE

Asyneuma limonifolium (L.) Janchen subsp. *limonifolium* Burgulu area, rocky area, steppe, 1700 m, 20.07.2001, Seyhan, 68, endemic.

A. rigidum (Willd.) Grossh. subsp. *rigidum* Ayı river area, rocky area, 370 m, 11.06.2001, Seyhan, 139, Irano-Turanian element.

Campanula strigosa Banks and Sol. Ayı river area, rocky, 1360 m, 11.06.2001, Seyhan, 137, east Mediterranean element.

C. myrtifolia Boiss. and Heldr. Kozlar kapızı, rocky, 1380 m, 27.05.2000, Seyhan, 13, east Mediterranean element, endemic.

Legousia pentagonia (L.) Thell. Kozlar kapızı, steppe, 1400 m., 12.5.2002, Everest, 905, East Mediterranean element.

L. speculum veneris (L.) Chaix.

Kozlar kapızı, steppe, 1400 m., 12.5.2002, Everest, 906.

Michauxia campanuloides L. Hérit ex Aiton. Kozlar kapızı, rocky area, 1330 m, 11.06.2001, Seyhan, 69, east Mediterranean element.

CARYOPHYLLACEAE

Bufonia calyculata Boiss. et Bal. Kozlar kapızı, rocky area, 1360 m, 18.07.2000, Seyhan, 130, endemic.

Dianthus elegans d'Urv. var. *elegans* Küçük Kozlar area, rocky area 1430 m, 16.06.2000, Seyhan, 83.

D. orientalis Adams.

Küçük Kozlar area, rocky area, 1430 m, 16.06.2000, Seyhan, 84.

Gypsophylla sphaerocephala Fenzl. Kozlar Kapızı, steppe, 1400 m, 12.5.2002, Everest, 1031.

Saponaria mesogitana Boiss. İşemik area, roadsides, streamsides, 1570 m, 18.07.2000, Seyhan, 82, east Mediterranean element.

Silene compacta Fish. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1032.

S. vulgaris (Moench.) Garcker var. *vulgaris* Kozlar kapızı, rocky area, 1350 m, 18.06.2001, Seyhan, 145.

Vaccaria pyramidata Medik. var. *pyramidata* Kozlar kapızı, rocky, 1350 m, 18.06.2001, Seyhan, 129.

Velezia pseudorigida Hub. - Mor. Kozlar kapızı, rocky, 1360 m, 20.07.2001, Seyhan, 81, east Mediterranean element, new record for C4, endemic.

CISTACEAE

Fumana paphlagonica Bornm. and Janchen Kozlar kapızı, rocky area, 1360 m, 20.07.2001, Seyhan, 131, Irano-Turanian element, endemic.

Helianthemum sancti-antonii Boiss.

Kozlar kapızı, steppe, 1400 m., 12.5.2002, Everest, 1010.

CONVOLVULACEAE

Convolvulus arvensis L. Kozlar center, garden, 1400 m, 13.07.2001, Seyhan, 121.

C. betonicifolius Miller subsp. *betonicifolius* Küçük Kozlar area, edge of river, rocky, 1450 m, 16.06.2001, Seyhan, 122, new record for C4.

CRASSULACEAE

Sedum amplexicaule DC. Kozlar Kapızı, 1350 m, 18.06.2001, Seyhan, 199, Mediterranean element, new record for C4.

S. hispanicum var. *hispanicum*

Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 893.

S. litoreum Guss. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 894.

Rosularia globularifolia (Fenzl.) Berger Steppe, 1400 m, 12.5.2002, Everest, East Mediterranean element, endemic.

DIPSACACEAE

Pterocephalus pinardii Boiss.

Kozlar kapızı, steppe, 12.5.2002, 1400 m, Everest, 902, endemic.

Scabiosa plumosa Sibth. and Sw.

Kozlar kapızı, steppe, 12.5.2002, 1400 m, Everest, 1018.

S. prolifera L.

Kozlar kapızı, steppe, 12.5.2002, 1400 m, Everest, 903, new record for C4.

ELAEAGNACEAE

Elaeagnus angustifolia L.

Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 117.

EUPHORBIACEAE

Euphorbia rigida Bieb. Kozlar center, rocky area, 1420 m, 06.04.2001, Seyhan, 92, Mediterranean element.

E. virgata Waldst. and Kit.

Mavga castle around, rocky slopes, 1380 m, 27.05.2000, Seyhan, 134.

FABACEAE (LEGUMINOSAE)

Astragalus angustifolius Lam. subsp. *longidens* Hub.-Mor. and Mathews Kozlar kapızı, macchie, 1360 m, 16.06.2000, Seyhan, 65.

A. granceus Boiss. and Sprun. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 884, Irano-Turanian element, new record for C4, endemic.

A. leporinus Boiss. var. *hirsutus* (Post) Chamb. Kozlar kapızı, steppe, 1360 m, 12.5.2002, Everest, 883.

A. tmoleus Boiss. var. *bounacanthus* Yıkılğan, rocky area, 1450 m, 13.07.2001, Seyhan, 142.

Colutea cilicica Boiss. and Bal.

Yıkılğan, rocky slopes, 1430 m, 13.07.2001, Seyhan, 63.

Coronilla emerus L. subsp. *emeroides* (Boiss. and Sprun.) Uhrova Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 150.

C. varia L. subsp. *varia* Kozlar center, garden, 1400 m, 18.07.2001, Seyhan, 168.

Dorcnium hirsutum (L.) Ser. Kozlar center, 1390 m, 18.07.2001, Seyhan, 171, edge of road, Mediterranean

element, new record for C4.

Genista albida Willd. İşemik area, rocky, steppe, 1600 m, 18.07.2001, Seyhan, 170.

Lotus palustris Willd.

Mavga castle area, rocky, by rivulets, 1370 m, 16.06.2001, Seyhan, 67.

L. aegaeus (Gris.) Boiss. Kozlar kapızı, *P. brutia* forest, 1360 m, 16.06.2000, Seyhan, 64, Irano-Turanian element.

L. corniculatus L. var. *corniculatus*

Kozlar center, edge of gardens, 1400 m, 16.06.2000, Seyhan, 61.

L. cystosoides L. Kozlar kapızı, steppe, 1360 m, Everest, 886, 12.5.2002, east Mediterranean element, new record for C4.

Medicago sativa L. subsp. *sativa*

Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 151.

Melilotus officinalis (L.) Desr. Kozlar center, edge of gardens, 1400 m, 20.07.2001, Seyhan, 166.

Onobrychis cornuta (L.) Desv.

Steppe, 1500 m, 16.06.2002, Everest 1000, Irano-Turanian element.

Ononis spinosa L. subsp. *leiosperma* (Boiss.) Sirj. Burgulu area, rocky, steppe, 650 m, 20.07.2001, Seyhan, 162, new record for C4.

Oxytropis persica Boiss. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 885, Irano-Turanian element, new record for C4.

Trifolium campestre Schreb. Kozlar center, fields, 1400 m, 18.07.2001, Seyhan, 167.

T. bullatum Boiss. and Hausskn. Kozlar center, Rockies, 1420 m, 27.05.2000, Seyhan, 180, new record for C4.

T. pratense L. var. *pratense* Kozlar center, fields, 1420 m, 27.05.2000, Seyhan, 149.

Vicia cracca L. subsp. *stenophylla* Vel.

Kozlar center, fields, 1420 m, 27.05.2000, Seyhan, 66.

V. galilaea Plitm. and Zoh. Ayı river area, edge of river, 1370 m, 18.07.2001, Seyhan, 169, new record for C4.

V. villosa Roth subsp. *dasycarpa* (Ten.) Cav. Kozlar center, gardens, 1400 m, 27.05.2000, Seyhan, 165, new record for C4.

FAGACEAE

Quercus coccifera L. Küçük Kozlar area, *P. brutia* forest, 1400 m, 11.06.2001, Seyhan, 197, Mediterranean element.

Quercus trojana P. B. Kozlar kapızı, steppe, 1500 m, Everest, 1025, east Mediterranean element.

Q. infectoria Olivier subsp. *boissieri* (Reuter) O. Swartz Kozlar kapızı, steppe, 1500 m, Everest, 1023.

GENTIANACEAE

Blackstonia perfoliata (L.) Hudson subsp. *perfoliata* Kozlar center, gardens, 1370 m, 20.07.2001, Seyhan, 144.

Centaureum erythraea Rafn. subsp. *erythrae* Steppe, 1400

m, 12.5.2002, Everest, 1029, Euro-Siberian element, new record for C4.

GERANIACEAE

Erodium cicutarium (L.) L. Her. Kozlar kapızı, 1400 m, 12.5.2002, Everest, 1015.

E. acaule (L.) Becherer and Thell. Ayı river area, fallow fields, 1390 m, 16.06.2001, Seyhan, 161, Mediteranean element, new record for C4.

Geranium cinereum Cav. subsp. *subcaulescens* (L.) Heritand DC. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1014.

G. tuberosum L. subsp. *tuberosum* Ayı river area, fallow fields, 1380 m, 20.07.2001, Seyhan, 123.

HYPERICACEAE (GUTTIFERAE)

Hypericum aviculariifolium Jaub. and Spach. subsp. *depilatum* (Freyn. and Bornm.) Robson var. *leprosum* (Boiss.) Robson. Kozlar kapızı, rocky area, 1380 m, 18.06.2001, Seyhan, 71, east Mediterranean element, endemic.

H. perforatum L. Kozlar center, cultivated fields, 1420 m, 18.06.2001, Seyhan, 200.

H. triquetrifolium Turra Kozlar center, cultivated fields, 1420 m, 18.06.2001, Seyhan, 70.

JUGLANDACEAE

Juglans regia L. Kozlar center, gardens, 1400 m, 11.06.2001, Seyhan, 135.

LAMIACEAE (LABIATAE)

Ajuga chamaepitys (L.) Schreber.

Mavga castle, open areas, 1360 m, 18.06.2001, Seyhan, 1.

Ballota saxatilis Sieb. ex J. and C. Presl. subsp. *saxatilis* Kozlar kapızı, rocky area, 1350 m, 13.07.2001, Seyhan, 2, east Mediterranean element.

Clinopodium vulgare L. subsp. *vulgare* Kozlar kapızı, rocky area, 1375 m, 27.05.2000, Seyhan, 18, new record for C4.

Lamium amplexicaule L. Ayı river area, 1360 m, 27.05.2000, Seyhan, 136, macchie, Euro-Siberian element.

Marrubium vulgare L.

Küçük Kozlar area, *P. brutia* forest, 1460 m, 20.07.2001, Seyhan, 19.

M. astracanicum Jacq. subsp. *astracanicum* Ayı river area, rocky, 1370 m, 16.06.2000, Seyhan, 20.

Phlomis pungens subsp. *pungens* Willd. var. *hirta* Velen. Kozlar center, steppe, 1400 m, 20.07.2001, Seyhan, 11, Kozlar kapızı, edge of garden, 1400 m, 12.5.2002, Everest, 1019.

P. armeniaca Willd. Kozlar center, rocky area, 1400 m, 27.05.2000, Seyhan, 4, Irano-Turanian element, endemic.

P. nissolii L. Kozlar center, garden, 1400 m, 13.07.2001, Seyhan, 17, Irano-Turanian element, endemic.

Prunella vulgaris L.

Yıkılğan, rocky area, 1430 m, 13.07.2001, Seyhan, 3, Euro-Siberian element.

Salvia recognita Fisch. and Mey. Kozlar center, rocky area, 1400 m, 11.06.2001, Seyhan, 21, Irano-Turanian element, endemic.

S. albimaculata Hedge and Hub-Mor. Kozlar kapızı, Steppe, 1400 m, 12.5.2002, Everest, 1020, Mediteranean element, endemic.

S. blepharochlaena Hedge. and Hub.-Mor. Yıkılğan, woodlands, 1420 m, 11.06.2001, Seyhan, 23, Irano-Turanian element, endemic.

S. heldreichiana Boiss. and Bentham Küçük Kozlar area, *P. brutia* forest, 1470 m, 13.07.2001, Seyhan, 22, east Mediterranean element, endemic.

S. hypargeia Fisch. and Mey. Yıkılğan, rocky, 1420 m, 11.06.2001, Seyhan, 13, Irano-Turanian element, endemic.

S. sclarea L. Kozlar center, rocky area, 1400 m, 20.07.2001, Seyhan, 7.

S. virgata Jacq. Küçük Kozlar area, *P. brutia* forest, 1470 m, 18.06.2001, Seyhan, 6, Irano-Turanian element.

Scutellaria orientalis L. subsp. *pectinata* (Bentham.) Edmondson

Burgulu area, rocky area, steppe, 1650 m, 18.06.2001, Seyhan, 14, Irano-Turanian element, endemic.

S. diffusa Bentham Kozlar kapızı, steppe, 1400 m., Everest, 1022, Mediteranean element, new record for C4.

S. orientalis L. subsp. *pinnatifida* Edmondson

Burgulu area, rocky area, steppe, 1650 m, 18.06.2001, Seyhan, 15.

Sideritis syriaca L. subsp. *nusairiensis* (Post.) Hub.-Mor. Ayı river area, rocky, 1380 m, 20.07.2001, Seyhan, 24, east Mediteranean element, new record for C4.

S. bilgeriana P.H. Davis Steppe, 12.5. 2002, 1400 m, Everest, 1027, endemic.

S. erythrantha Boiss. and Heldr. var. *erythrantha* Kozlar kapızı, steppe, 1400 m, 12.5. 2002, Everest, 1026.

S. libanotica Labill. subsp. *libanotica* Yıkılğan, rocky area, 1460 m, 11.08.2001, Seyhan, 9, east Mediterranean element, new record for C4.

S. montana L. subsp. *montana* Steppe, 12.5. 2002, 1400 m, Everest, 1028.

Stacys lavandulifolia Vahl. var. *lavandulifolia* Kozlar kapızı, rocky hills, 1380 m, 27.05.2000, Seyhan, 5, Irano-Turanian element.

S. annua (L.) L. Steppe, 1400 m., 12.5.2002, Everest, 1024, Irano-Turanian element.

S. iberica Bieb subsp. *stenostachya* (Boiss.) Rech.fil. Ayı river area, rocky area, 1380 m, 18.06.2001, Seyhan, 148, Irano-Turanian element.

Teucrium chamaedrys L. subsp. *chamaedrys* Ayı river area, woodlands, 1370 m, 18.06.2001, Seyhan, 10, Euro-Siberian element.

T. polium L. Mavga castle around, edge of road, 1380 m, 27.05.2000, Seyhan, 8.

Thymus sipyleus Boiss. subsp. *sipyleus* Jalas Kozlar kapızi, steppe, 1400 m, 12.5.2002, Everest, 1020, new record for C4.

Wiedemannia orientalis Fisch. and Mey. Kozlar center, edge of garden, rocky, 1400 m, 18.06.2001, Seyhan, 16, Irano-Turanian element, endemic.

Ziziphora clinopodioides Lam.

Kozlar kapızi, rocky, 1390 m, 18.06.2001, Seyhan, 25.

Z. taurica Bieb. subsp. *taurica* Yıkılğan, rocky area, 1420 m, 11.06.2001, Seyhan, 12, Irano-Turanian element. Kozlar kapızi, steppe, 1400 m, 12.5.2002, Everest, 1017.

MALVACEAE

Alcea pallida Waldst. and Kit.

Kozlar kapızi, rocky area, 1350 m, 18.06.2001, Seyhan, 187.

MORINACEAE

Morina persica L.

Küçük Kozlar area, steppe, rocky area, 1550 m, 11.06.2001, Seyhan, 185.

OLEACEAE

Jasminium fruticans L. Kozlar center, garden, 1400 m, 18.06.2001, Seyhan, 110, Mediterranean element.

ONAGRACEAE

Epilobium hirsutum L. Ayı river area, gardens, 1390 m, 27.05.2000, Seyhan, 128.

OROBANCHACEAE

Orobanche ramosa L.

Burgulu area, in the shrub, 1700 m, 18.06.2001, Seyhan, 115.

O. caucasia G. Beck. Burgulu area, in the shrub, 1700 m, 18.06.2001, Seyhan, 116.

PAPAVERACEAE

Fumaria cilicica Hausskn. Kozlar center, gardens, 1410 m, 27.05.2000, Seyhan, 87, Irano-Turanian element.

Glaucium leiocarpum Boiss. Burgulu area, near the river, 1700 m, 16.06.2000, Seyhan, 88.

Hypocoum procumbens L. Küçük Kozlar area, *P. brutia* forest, 1450 m, 16.06.2000, Seyhan, 85, Mediterranean area.

Papaver rhoeas L. Kozlar kapızi, rocky area, 1380 m, 18.06.2001, Seyhan, 209.

Roemeria hybrida (L.) DC. subsp. *hybrida* Kozlar kapızi, rocky area, 1380 m, 18.06.2001, Seyhan, 86.

PLANTAGINACEAE

Plantago lanceolata L. Kozlar center, gardens, 1400 m, 18.06.2001, Seyhan, 118.

PLATANACEAE

Platanus orientalis L.

Ayı river area, edge of garden, 1390 m, 11.06.2001, Seyhan, 198.

PLUMBAGINACEAE

Acantholimon libanoticum Boiss. Küçük Kozlar area, *P. brutia* forest, 1400 m, 11.06.2001, Seyhan, 184, east Mediterranean element, new record for C4

POLYGALACEAE

Polygala pruniosa Boiss subsp. *pruniosa* Kozlar kapızi, steppe, 1400 m, 12.5.2002, Everest, 1016.

PRIMULACEAE

Androsace maxima L. Ayı river area, rocky area, 1380 m, 11.06.2001, Seyhan, 108.

Cyclamen persicum Miller Burgulu area, rocky area, 1650 m, 15.09.2000, Seyhan, 182, east Mediterranean element.

Lysimachia vulgaris L.

Ayı river area, garden, streams, 1380 m, 11.06.2001, Seyhan, 109.

RANUNCULACEAE

Adonis aestivalis L. subsp. *aestivalis*

Kozlar kapızi, garden, 1380 m, 20.07.2001, Seyhan, 99.

A. aestivalis L. subsp. *parviflora* (Fisch. ex DC.) Bussch Kozlar center, gardens, 1400 m, 27.05.2000, Seyhan, 147, new record for C4.

Anemone blanda Schott. et Kotschy Kozlar center, rocky slopes 1400 m, 06.04.2001, Seyhan, 201.

Consolida orientalis (Gay.) Schröd. Kozlar center, 1400 m, 16.06.2001, Seyhan, 98, Kozlar kapızi, rocky area, steppe, 1400 m, 12.5.2002, Everest, 1005, Irano-Turanian element.

Ranunculus argyreus Boiss. Kozlar center, gardens, 1400 m, 18.06.2001, Seyhan, 100.

R. constantinopolitanus (DC.) d' Urv. Kozlar center, near the river, 1400 m, 27.05.2000, Seyhan, 101.

RESEDACEAE

Reseda lutea L. var. *lutea*

Kozlar kapızi, rocky area, 1390 m, 18.06.2001, Seyhan, 107.

RUBIACEAE

Asperula arvensis L. Ayı river area, rocky area, 1360 m, 27.05.2000, Seyhan, 103, Mediterranean element.

Cruciata taurica Miller Ayı river area, rocky area, 1360 m, 27.05.2000, Seyhan, 102, Irano-Turanian element.

Galium verum L. subsp. *verum* Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 105, Euro-Siberian element.

G. verum L. subsp. *glabrescens* Ehrend. Katran Belt, rocky area, steppe, 1600 m, 18.06.2001, Seyhan, 104, Irano-Turanian element.

G. canum Reg. and DC. subsp. *canum* Steppe, 1400 m, 12.5.2002, Everest, 1008.

G. regelii Pjark. Steppe, 1400 m, 12.5.2002, Everest, 1007.

G. murale (L.) All. Kozlar kapızi, garden, 1410 m, 18.06.2001, Seyhan, 106, Mediterranean element.

ROSACEAE

Crataegus monogyna Jacq. subsp. *monogyna* Yıkılğan, rocky area, 1420 m, 16.06.2000, Seyhan, 112.

Potentilla reptans L. Yıkılğan, edge of streams, 1420 m, 16.06.2000, Seyhan, 113.

Prunus spinosa L. subsp. *dasyphylla* (Schur.) Domin. Kozlar center, 1400 m, 27.05.2000, Seyhan, 111, edge of garden, Euro-Siberian element, new record for C4.

Rosa canina L. Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 188.

Rubus sanctus Schreber

Kozlar center, edge of garden, 1400 m, 27.05.2000, Seyhan, 210.

Sanguisorba minor Scop. subsp. *magnolii*

Küçük Kozlar area, rocky area, 1430 m, 16.06.2000, Seyhan, 114.

SAXIFRAGACEAE

Saxifraga sibthorpii Boiss. Steppe, 1400 m, Everest, 895, new record for C4.

SCROPHULARIACEAE

Linaria genistifolia (L.) Miller. subsp. *genistifolia* Kozlar kapızı, edge of garden, rocky area, 1380 m, 27.05.2000, Seyhan, 95, Euro-Siberian element.

L. corifolia Desf. Ayı river area, rocky area, 1370 m, 16.06.2000, Seyhan, 132, Irano-Turanian element, endemic.

Scrophularia xanthoglossa Boiss. var. *decepiens* (BoissandKoch.) Boiss. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1037, Irano-Turanian element.

S. umbrosa Dumort Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1009.

Verbascum orientale (L.) All. Mavga castle around, rocky, 1360 m, 18.06.2001, Seyhan, 172, east Mediterranean element.

Veronica hispidula Boiss. and Huet. subsp. *ixodes* (Boiss. and Bal.) M.A. Fischer Kozlar center, gardens, 1400 m, 27.05.2000, Seyhan, 60, Irano-Turanian element, new record for C4, endemic.

V. lycica E. Lehm.

Ayı river area, 1400 m, 12.5.2002, Everest, 1039, new record for C4.

V. macrostachya Vahl. subsp. *sorgerea* M. A. Fischer Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1039, East Mediterranean element, endemic.

V. multifida L. Mavga castle around, rocky slopes, 1370 m, 18.06.2001, Seyhan, 96, Irano-Turanian element, endemic.

V. orientalis Miller. Mavga castle around, rocky slopes, 1370 m, 18.06.2001, Seyhan, 97.

URTICACEAE

Urtica dioica L.

Kozlar center, garden, 1400 m, 18.06.2001, Seyhan, 119, Euro-Siberian element.

VALERIANACEAE

Valeriana dioscoridis Sm. Kozlar center, gardens, 1400 m, 27.05.2000, Seyhan 126, east Mediterranean element, steppe, 1400 m, 12.5.2002, Everest, 1003.

V. pumila (L.) D. C. Ayı river area, rocky, 1400 m, 12.5.2002, Everest, 1004, Irano-Turanian element.

ANGIOSPERMAE

MONOCOTYLEDONAE

AMARYLLIDACEAE

Galanthus elwesii Hooker fil. Kozlar Kapızı, rocky area, 1370 m, 06.04.2001, Seyhan, 127, Mediterranean element.

CYPERACEAE

Carex divulsa Stokes subsp. *coriogyne* (Nelmes) O. Nisson

Steppe, 1400 m, 12.5.2002, Everest, 898.

C. distans L. Steppe, 1400 m, 12.5.2002, Everest, 897.

IRIDACEAE

Gladiolus anatolicus (Boiss.) Stapf. Küçük Kozlar area, 1450 m, 18.06.2001, Seyhan, 181, *P. brutia* forest, east Mediterranean element, endemic.

LILIACEAE

Allium scorodoprasum L. subsp. *rotundum* (L.) Stearn Küçük Kozlar area, rocky, 1450 m, 18.06.2001, Seyhan, 186, Mediterranean element.

A. scabriflorum Boiss. Küçük Kozlar area, rocky area, 1500 m, 18.06.2001, Seyhan, 187, Irano-Turanian element, endemic.

Asphodeline taurica (Pallas.) Kunth. İşemik area, rocky area, steppe, 1550 m, 20.07.2001, Seyhan, 188, east Mediterranean element

Muscari neglectum Guss.

Kozlar Kapızı, rocky area, 1380 m, 05.05.2000, Seyhan, 131.

Ornithogalum lanseolatum Labill. Ayı river area, garden, 1390 m, 16.06.2001, Seyhan, 93, east Mediterranean element.

O. armeniacum Baker. Ayı river area, garden, 1390 m, 16.06.2001, Seyhan, 94, east Mediterranean element.

Smilax aspera L. Kozlar kapızı, rocky, macchie, 1350 m, 06.04.2001, Seyhan, 189.

Tulipa humilis Herbert. Kozlar kapızı, rocky area, 1390 m, 06.04.2001, Seyhan, 211.

ORCHIDACEAE

Epipactis palustris (L.) Crantz. Küçük Kozlar area, *P. brutia* forest, 1450 m, 18.06.2001, Seyhan, 212, Euro-Siberian element, new record for C4.

E. helleborine (L.) Crantz. Küçük Kozlar area, *P. brutia* forest, 1450 m, 18.06.2001, Seyhan 213,

Ophrys transhyrcana Czernjack subsp. *transhyrcana* Steppe, 1400 m, 12.5.2002, Everest, 901, Irano-Turanian element.

Orchis anatolica Boiss Steppe, 12.5.2002, 1400 m, Everest, 900, East Mediterranean element.

Limodorum abortivum (L.) Swartz Steppe, 1400 m, 12.5.2002, Everest, 899.

POACEAE (GRAMINEAE)

Aegilops umbellulata Zhukovsky Kozlar kapızı, edge of road, 1400 m, 16.06.2001, Seyhan, 91, Irano-Turanian element.

A. biuncialis Vis. Kozlar kapızı, rocky area, 1380 m, 16.06.2001, Seyhan, 89.

A. geniculata Roth. Kozlar kapızı, rocky area, 1380 m, 16.06.2001, Seyhan, 90, Mediterranean element.

Bromus tectorum L.

Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 191.

B. cappodicus Boiss and Bal. subsp. *cappodicus* Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1045.

B. sterilis L. Kozlar kapızı, steppe, 1400 m, 12.5.2002, Everest, 1044.

Cynodon dactylon (L.) Pers. var. *villosus* Regel Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 207.

Dactylis glomerata L. subsp. *glomerata* Kozlar center, 1400 m, 18.06.2001, Seyhan, 194, edge of garden, Euro-Siberian element.

Festuca valesiaca Schleicher. ex Gaudin

İşemik area, rocky area, steppe, 1550 m, 20.07.2001, Seyhan, 193.

Hordeum bulbosum L.

Küçük Kozlar area, *P. brutia* forest, 1430 m, 16.06.2001, Seyhan, 190.

Imperata cylindrica (L.) Raeuschel

Kozlar center, steppe, 1400 m, 12.5.2002, Everest, 1043.

Melica ciliata L. subsp. *ciliata*

Kozlar center, edge of garden, 1400 m, 18.06.2001, Seyhan, 195.

M. persica Kunth subsp. *jacquemontii* (Decne. ex Jacquem.) P.H. Davis

Küçük Kozlar area, *P. brutia* forest, 430 m, 16.06.2001, Seyhan, 196, Irano-Turanian element, new record for C4.

Phleum subulatum (Savi.) Asch. et Graebn. subsp. *subulatum*

Küçük Kozlar area, *P. brutia* forest, 1430 m, 16.06.2001, Seyhan, 163.

P. paniculatum Hudson. subsp. *ciliatum* (Boiss.) M. Doğan

İşemik area, rocky, steppe, 1550 m, 16.06.2001, Seyhan, 162, Irano-Turanian element, new record for C4.

Piptatherum holiciforme (Bieb.) Roex. Sch. var. *glabrum* Kozlar kapızı, Steppe, 1400 m, 12.5.2002, Everest, 1042, new record for C4, endemic.

Poa bulbosa L. Kozlar kapızı, rocky area, 1380 m, 16.06.2001, Seyhan, 192.

DISCUSSION

The most of the families respectively, Lamiaceae (35), Asteraceae (30), Fabaceae (24), Poaceae, Boraginaceae and Brassicaceae (15) and Caryophyllaceae and Scrophullariaceae (9), Liliaceae, Campanulaceae, Ranunculaceae (8), Rubiaceae (7), Ranunculaceae (6), Orchidaceae, Papaveraceae, Rosaceae (5), Geraniaceae,

Pinaceae (4), Saxifragaceae, Fagaceae, Hypericaceae, Cupressaceae, Dipsacaceae, Primulaceae (3) and the others.

Comparing of the ratio (%) of the phytogeographical elements and endemism and new records to close areas which were Mut-Ermenek and Taşeli Plateau^[2,3] are presented:

Phytogeographic area	Vural, ^[2]	Sümbül, ^[3]	Present research, 2002
Widespread and unknown	58.0	45.3	60.0
Mediterranean element	22.9	32.0	18.7
Irano-Turanian elements	17.0	16.9	16.9
Euro-Siberian elements	1.9	5.8	4.4
Endemism ratio	21.3	20.2	12.0
New records	20.2	-	7.6

In conclusion present research area contains the ratio of 60% of widespread and unknown elements belongs to the settled area and the ratio of 4.4% of euro-siberian elements belongs to river rivulets.

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