

ISSN 1300-2953

OT
SİSTEMATİK BOTANİK DERGİSİ
THE HERB JOURNAL OF SYSTEMATIC BOTANY



CİLT
21
VOLUME

SAYI
2
NUMBER

YIL
2014
YEAR

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OT Sistematik Botanik Dergisi
21, 2, 1-14, 2014-ISSN 1300-2953

**Three new species on *Allium*, *Galium* and *Rubus*
from Bingöl and Sivas, Turkey**

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Abstract

Three new species, *Allium bingoelense* Yıld. & Ö. Kılıç, *Rubus sivasicus* Yıld. & Ö. Kılıç and *Galium bingoelense* Yıld. & Ö. Kılıç from Bingöl and Sivas provinces, Turkey, respectively are described and illustrated.

Key Words: *Allium bingoelense*, *Rubus sivasicus*, *Galium bingoelense*, Bingöl, Sivas, Turkey

Türkiye'nin Bingöl ve Sivas illerinden *Allium*, *Galium* ve *Rubus* cinslerine ilgin üç yeni tür

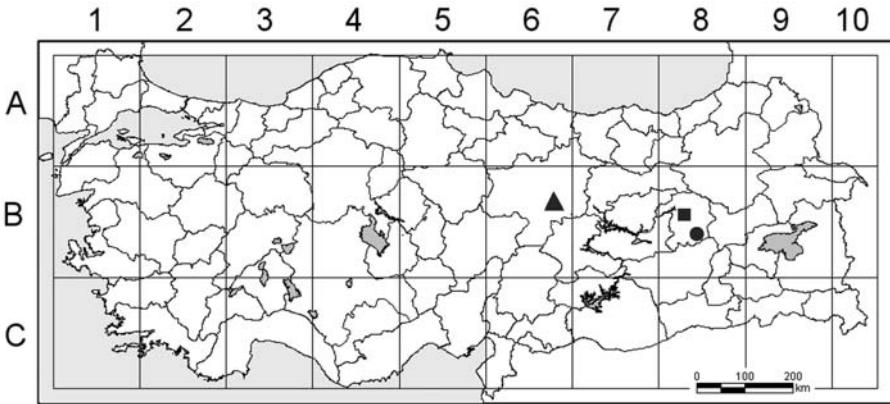
Özet

Türkiye'nin Bingöl ve Sivas illerinden üç yeni tür, *Allium bingoelense* Yıld. & Ö. Kılıç, *Rubus sivasicus* Yıld. & Ö. Kılıç and *Galium bingoelense* Yıld. & Ö. Kılıç betimlenmiş ve fotoğraflanmıştır.

Bulduru Sözcükleri: *Allium bingoelense*, *Rubus sivasicus*, *Galium bingoelense*, Bingöl, Sivas, Türkiye

Introduction

Some floristic results of our botanical exploration to Yozgat, Sivas, Erzincan and Bingöl, where are the provinces of inner and east Anatolia, Turkey, in june 2014. We collected 420 herbarium specimens in this field trips and evaluated them in Yıldırımılı Otluk'u (Hb. Yıldırımılı). As a result, a total of 3 species of *Allium bingoelense* Yıld. & Ö. Kılıç (*Alliaceae*), *Rubus sivasicus* Yıld. & Ö. Kılıç (*Rosaceae*) and *Galium bingoelense* Yıld. & Ö. Kılıç (*Rubiaceae*), respectively, are given as new for science from Bingöl center, Sivas, and Bingöl, Solhan, Turkey (Map 1).



Map 1. The localities of ■ *Allium bingoelense*, ▲ *Rubus sivasicus* and ● *Galium bingoelense*

These new and their related species were checked from “Flora of Turkey” (1-4) and some neighbouring floras (5-15), some “efloras” (16-20), and revision articles (21-39).

The holotype vouchers are deposited in Yıldırımli Otluk (Hb. Yıldırımli) and some isotypes specimens in BİN, GAZİ, HUB, the others various herbaria of Turkey, and Hb. Yıldırımli.

The name, description, type locality, distribution, flowering time, habitat, altitude, English diagnose, etymology or eponymy, are given for each species.

The taxa are listed in order alphabetic.

ALLIACEAE

Allium bingolense Yıldırımli & Ö. Kılıç, **sp. nova**, figures 1, 2

Close to *Allium microspatum* Ekberg but bulbs 0.8-1.0 cm diameter, globose (not c. 1.2 cm diameter, ovoid); tunic white to clear brown (not black); leaves 2 (not 4-5), sheathed to 1/3-1/4 or more of its length (not to 3/4 or more of its length); spathe 10 mm, yellow (not 2.5 mm, brownish); umbel 2.5-4 cm diameter (not 1-1.5 cm); pedicels unequal, without bracteolate (not equal, with bracteate); perianth 4 mm, cylindrical, yellow (not 2.5-2.7 mm, subglobose, brownish); capsules 4 mm (not 2 mm).

Type. Turkey. B8 BİNGÖL: Merkez, Dikme köyü, volkanik kayalık ve taşlık, meşelik ve açıklığı, 1750-2000 m, 21.06.2014, Şinasi Yıldırımli 40265 & Ömer Kılıç (holo. Hb. Yıldırımli; iso. BİN, HUB).

Paratype. Turkey. B8 BİNGÖL: Merkez, Direkli köyünün doğusu, bozkır, kayalık yamaçlar, 1700-1750 m, 10.06.2014, Ömer Kılıç 5798 (Hb. Yıldırımli, BİN, GAZİ).

Bulbs 0.8-1.0 cm diameter, globose; tunic white to clear brown, membranous. Stems 8.5-15 cm long including inflorescence, erect, cylindrical, solid, striate, purplish, glabrous. Leaves 2, 5-13 x 0.5-1 mm, as long as or slightly longer than inflorescence, cylindrical, striate, glabrous, indistinctly scabridulose at base, sheathed to 1/3-1/4 or more of its length. Spathe 10 x 1.5-2 mm, long ovate, acuminate, yellow, 1-paired, persistent, shorter than umbel. Umbel hemispherical, 2.5-4 cm diameter, 16-32-flowered. Pedicels unequal, 5-15 mm, cylindrical, yellow, glabrous, without bracteolate. Perianth 4 x 2 mm, cylindrical to little barrel, yellow; outer segments 4 x 1.5 mm, oblong, cymbiform, 1-midribbed, obtuse at apex; inner segments simi-

lar to outer ones. Filaments exerted, ovoid-linear, simple, without tooth. Anthers yellow. Styles 6-7 mm long, white. Capsules 4 x 4 mm, subglobose to globose, glabrous; carpels 3, white, membranous, reticulate; seeds c. 3 x 1 mm, scapulate, dark black, wrinkled, glabrous. *Fl. 6. Volcanic stony slopes in mountain steppe, quercetum, c. 1750-2000 m.*



Figure 1. *Allium bingoelense* Yıldırımılı & Ö. Kılıç, habitus in vivo (Ş. Yıldırımılı 40265 & Ö. Kılıç)



Figure 1. View of *Allium bingoelense* habitat

Endemic. Anatolia-Turanian element.

Etymology. The specific epithet refers to Bingöl, where is one of the provinces of East Anatolia, Turkey.

Anatolia is situated at the junction of three major phytogeographical regions (Euro-Siberian, Anatolia-Turanian and the Mediterranean) and it ranges in altitude from sea level to 4000-5000 m a.s.l., and varies geologically and topographically. Bingöl province, in the eastern part of Turkey, are important locations for systematic researches because of very limited researches in this region and many areas are still remains to be investigated. *Allium* L. genus an extremely polymorphous and taxonomically complicated genus, includes approximately 750 species widely distributed over the hol-arctics from dry subtropics to boreal zone (21, 22). *Allium* was revised by Kollmann (4) for the "Flora of Turkey and east Aegean Islands" in which 141 species, 161 taxa were recognized. Since then 30 new species have been defined from Turkey in the last 30 years; according to updated knowledge, the total number of *Allium* species has increased to 170 species, 190 taxa (21, 26). Since than with the 11 new taxa from literature (23-29) and here, the total taxa number in the *Allium* genus has risen to 201 in Turkey alone.

ROSACEAE

Rubus sivasicus Yıldırımli & Ö. Kılıç, **sp. nova**, figures 3-5

Close to *Rubus saxatilis* L. but stems 20-30 cm (not 8-20 cm), all patent, 1-2 mm straight prickled, 0.1-0.2 mm long capitate, dark brown glandular hairy and white pilose hairy (not one kind of pubescent); stipules linear-elliptic (not obovate-oblong); stem leaves glabrous above, pilose beneath, slightly lobed, margins dentate-crenate (not \pm doubly serrate-dentate); sepals caudate apex (not acuminate).

Type. Turkey. B6 SİVAS: Zara, Halkalı ve Korkut köyleri karşısı, bozkır, jipizli dere, tepe, bayır, karışık orman ve açıklığı, 1385-1500 m, 19.06.2014, Şinasi Yıldırımli 40086 & Ömer Kılıç (holo. Hb. Yıldırımli; iso. BİN).

Perennial, rhizomatous, herbaceous. Stems 20-30 cm long, erect; all patent, 1-2 mm straight prickled, 0.1-0.2 mm long capitate, dark brown glandular hairy and white pilose hairy. Stipules 6-7 x 1-1.5 mm, linear-elliptic, indumentum as leaves. Stem leaves petioles 3.5-7 cm long, ascending-erect,

indumentum as stem. Stem leaves 8-14 x 6-10 cm, all ternate, glabrous above, pilose beneath, slightly lobed, margins dentate-crenate; lateral leaflets 3-5 x 2-5 cm, ovate, cuneate to \pm truncate, sessile; the terminal ones 4-6 x 3-6 cm, ovate-orbicular, 0.5-1.5 cm petiolate. Pedicels 0.8-3 cm long, indumentum as stem. Inflorescence 1-3-flowered, laxe, cyme-corymbose. Flowers white. Sepals 5, c. 8 x 4 mm excluding 3.5-4 mm caudate apex, ovate, capitate, dark brown glandular hairy and white pilose hairy, caudates only pilose hairy. Petals 5, as long as sepals, glabrous. Stamens many borne on a narrow perigynous zone. Style few to many. Fruits unknown. *Fl. 6. Steppe, gypsaceous areas, clearings of mixed forest, 1385-1500 m.*



Figure 3. *Rubus sivasicus* Yild. & Ö. Kılıç, habitus in vivo
(Ş. Yıldırımılı 40086 & Ö. Kılıç)



Figure 4. View of *Rubus sivasicus* habitat



Figure 5. View of *Rubus sivasicus* habitat and Ş. Yıldırımli

Endemic. Anatolia-Turanian element.

Etymology. The specific epithet refers to Sivas, where is one of the provinces of inner Anatolia, Turkey.

The family *Rosaceae* is represented 31 native genera, 8 non native genera and 1 nothogenus, totally 40 genera and 239 native species, 12 native subspecies, 23 native varieties, 89 endemic species (37.2 %), 1 endemic subspecies, 14 nothospecies and 59 non native species, 1 non native subspecies, 1 non native variety, totally 312 species in Turkey (30). *Rubus* L. is in the *Rosaceae* family that contains 10 species, 1 variety and no endemic species in the flora of Turkey with this study *Rubus* has risen to 11 species (30). The genus *Rubus* in the *Rosoideae* subfamily is including shrub plants or rarely perennial herbaceous plants; the spiny stem and flowering branch usually occur on the long wooden stems belonging to previous year. Inflorescence is compound raceme; it has five sepals, no lateral sepals and five petals, red, pink or white (31). In addition *Rubus* is one of the most complexes because of its hybridization, polyploidy, agamospermy, and loss of the concept of species (32). This complex taxonomy has resulted in broad disagreement about the number of species in the genus, with different estimates ranging from 600 to several thousand (33, 34) and, recently, *Rubus* Linnaeus (1753: 492), consisting of approximately 700 species, is one of the largest genera in the *Rosaceae* and is found in all continents except Antarctica (35).

RUBIACEAE

Galium bingoelense Yıldırımli & Ö. Kılıç, **sp. nova**, figures 6-10

Close to *G. setaceum* Lam. but habitus of plant large (not strict) and yellowish (not blackish); upper leaves with 0.3-0.6 mm long white hyaline apex (not with very short hyaline apex, to c. 0.075 mm); Inflorescence dense (not lax), very crowd flowered (not 3-9-flowered); bracts 1.5-3 mm long (not 3-12 mm); mericarps with sparsely and completely adpressed white hairs, 0.00 mm (not with patent \pm uncinatate or adpressed hairs (to c. 0.3-0.4 mm).

Type. Turkey. B8 BİNGÖL: Solhan, Hazarşah köyü, Aksakal Göl mezrası, derenin volkanik taşlı yamaçları, 1700 m, 22.06.2014, Şinasi Yıldırımli 40313 & Ömer Kılıç (holo. Hb. Yıldırımli; iso. BİN, GAZİ, HUB, Hb. Yıldırımli).

Annual slender, herbaceous. Stems c. 25-40 cm long, erect-ascending, nearly branched from base, tetragonale, retrosely scabrid and very narrowly white winged at gons, surface of stem between gons glabrous. Basal leaves unknown because of falling out. Floral leaves in whorls of 6, 3-4 x 0.1-0.2 mm, linear, nearly flat, glabrous to sparsely hirsute towards base above, acute to aristate with 0.3-0.6 mm long white hyaline apex, glabrous to sparsely scabrid. Inflorescence dense, diffuse, in outline pyramidal paniculate, pleio-casium, cymes axillary and terminal dicotomic branched, very crowd flowered subtended by filiform bracts. Bracts 1-2, 1.5-3 x 0.1-0.2 mm, glabrous. Pedicels c. 8-16 mm long, capillary, divaricate, erect-ascending, glabrous. Corolla unknown. Mericarps 0.8-1 x 0.5-0.6 mm, broadly reniform, black, glabrous, with sparsely and completely adpressed white hairs. *Fl.* 5-6. *Steppe, volcanic scree slopes, 1700 m.*

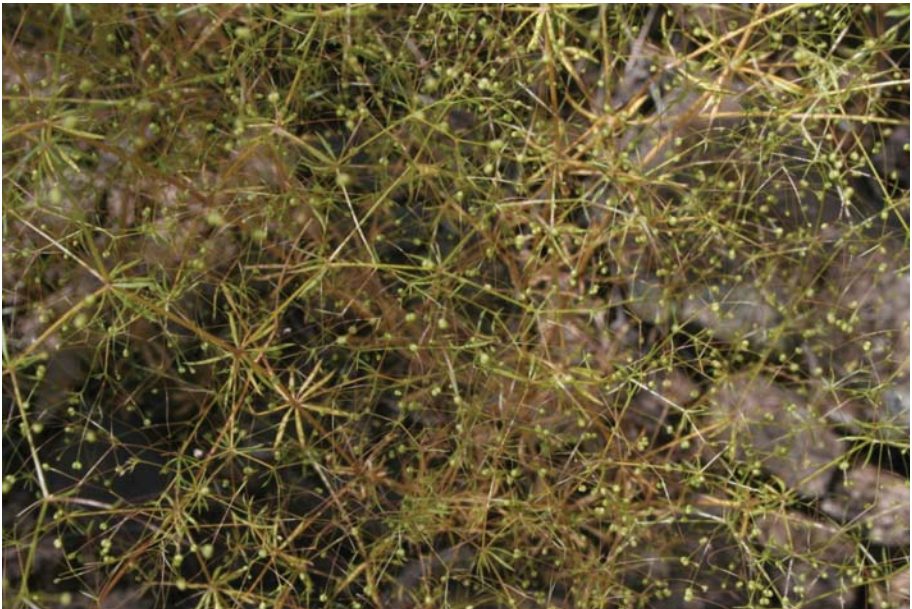


Figure 6. *Galium bingoelense* Yıld. & Ö. Kılıç, habitus in vivo
(Ş. Yıldırımli 40313 & Ö. Kılıç)



Figure 7. *Galium binguelense* Yıld. & Ö. Kılıç, habitus in vitro
(Ş. Yıldırımmlı 40313 & Ö. Kılıç)



Figure 8. *Galium binguelense* Yıld. & Ö. Kılıç, infructescence
(Ş. Yıldırımmlı 40313 & Ö. Kılıç)

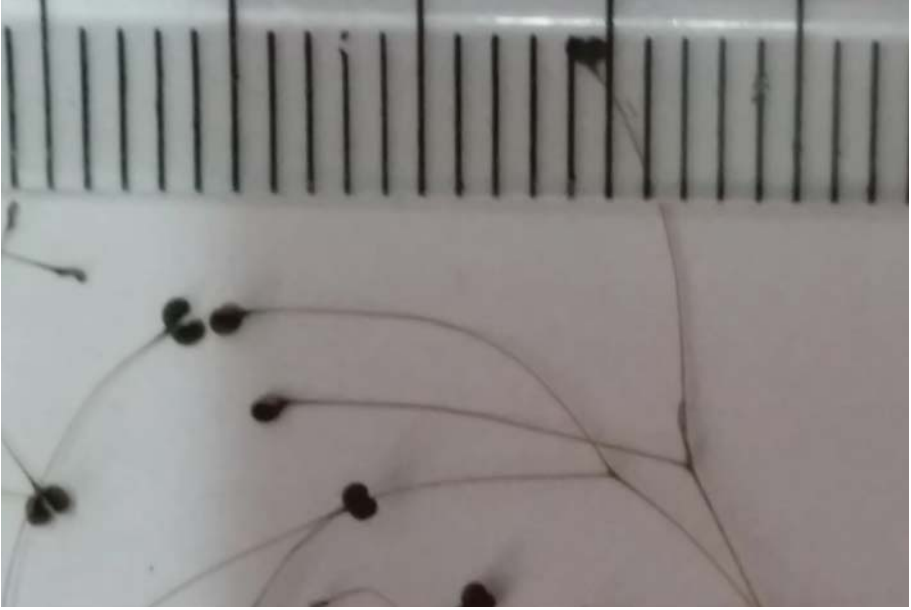


Figure 9. *Galium bingoelense* Yıld. & Ö. Kılıç, infructescence
(Ş. Yıldırımli 40313 & Ö. Kılıç)

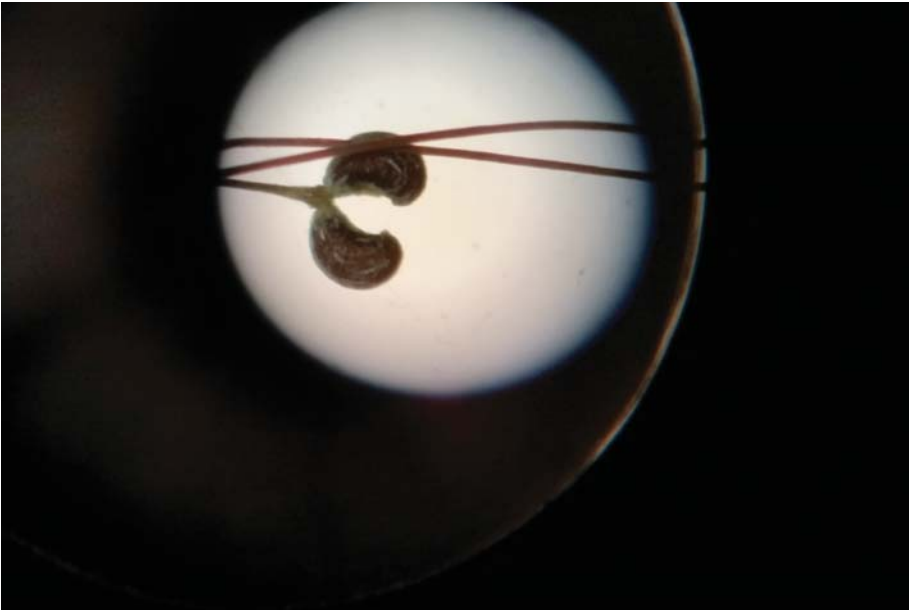


Figure 10. *Galium bingoelense* Yıld. & Ö. Kılıç, fruit
(Ş. Yıldırımli 40313 & Ö. Kılıç)

Endemic. Anatolia-Turanian element.

Etymology. The specific epithet refers to Bingöl, where is one of the provinces of East Anatolia, Turkey.

Rubiaceae form the fourth largest angiosperm family after *Asteraceae*, *Orchidaceae* and *Fabaceae* and comprise more than 10000 species belonging to 640 genera in the world and this family are usually considered a natural monophyletic and easily circumscribed family (36). *Galium* L. is the largest native genera of *Rubiaceae* family that includes 108 species, 13 subspecies, 2 varieties, 59 endemic species (54.6 %), 2 endemic subspecies in the flora of Turkey (37). Hence, this species is described here as new to science, bringing a total number of the species of *Galium* known from Turkey to 108. And so, the *Galium* species in Turkey risen to 110 including this new species (38). *Galium* taxa are generally low subshrubs, perennial or annual herbs. Leaves usually in whorls of 4-14; inflorescence thyrsoid, broadly paniculate or reduced; flowers with pedicels usually longer than ovary, without bracteoles, hermaphrodite, rarely polygamous or dioecious (39).

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