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A new genus record for Türkiye: *Sesbania* Adanson (*Fabaceae*)

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ABSTRACT
The genus *Sesbania* Adanson (*Fabaceae*) is recorded for the first time in the flora of Türkiye. Collected specimens of this genus from Tarsus/Mersin are described here as a new record, *Sesbania herbacea* (Mill.) McVaugh which is an alien weed. Its detailed morphological features, Turkish name and photographs in its natural habitat, and the finding location are given in this study.

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Türkiye İçin Yeni Bir Cins Kaydı: *Sesbania* Adanson (*Fabaceae*)

ÖZET
Sesbania Adanson (*Fabaceae*) cinsi Türkiye'de ilk kez kaydedilmiştir. Bu cinse ait örnekler Mersin ilinden toplanmış ve yabancı orjinli bir yabancı ot türü olarak *Sesbania herbacea* (Mill.) McVaugh. adıyla yeni bir tür olarak tanımlanmıştır. Türe ait örneğin morfolojik özellikleri, Türkçe ismi, doğal yayılım alanından alınan fotografları ve bulunduğu lokasyon bu çalışmada verilmiştir.

Bitki Koruma

Araştırma Makalesi

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Anahtar Kelimeler
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Yeni kayıt
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INTRODUCTION
The family *Fabaceae* Lindl. includes 793 genera worldwide (POWO, 2024). The genus *Sesbania* Adanson, one of its members, is annual or perennial (trees, shrubs) and is widely distributed throughout the tropics and subtropics of the world (Evans, 1990; Lavin & Schrire, 2005). It is a taxonomic group in the subfamily of *Papilionoideae*, and it is one of the largest genera in these three subfamilies (*Mimosoideae*, *Papilionoideae*, and *Caesalpinioideae*) of the family *Fabaceae*, which contains the highest proportion of species noduled by nitrogen fixative rhizobial bacteria (Sprent, 2001). *Sesbania* species which are tolerant of both drought and waterlogged conditions, prefer riparian or wetland habitats, and their ecological preference is the most unusual compared to especially their closest relatives (tribes *Loteae* and *Robinieae*) (Evans, 1990; Schrire et al., 2005a, b). *Sesbania herbacea* (Mill.) McVaugh. is native to North America and occurs naturally in the United States from New York to the Southeast, and southwest to Texas and California. It is also present in Mexico and Central America (Sheahan, 2013; POWO, 2024).

There are seventy-two *Fabaceae* genera in Türkiye (Güner et al., 2012). Although there are 60 accepted species of *Sesbania* genus in the world, this genus does not exist in Türkiye (POWO, 2024).

The *genus Sesbania* Adanson was found for the first time in Türkiye as a result of the identification of *Sesbania herbacea*. The species is described in detail, supported by photographs. Additionally, a scientific Turkish name is suggested for the *S. herbaceae* species.

MATERIAL and METHOD

The living plant samples of *Sesbania herbacea* were collected in Mersin (S. Tünk, collector number CUBK-1LEGF-10) during a weed survey in soybean fields at Adana, Mersin, Osmaniye, and Hatay provinces in Türkiye in September 2021 (Figure 1).

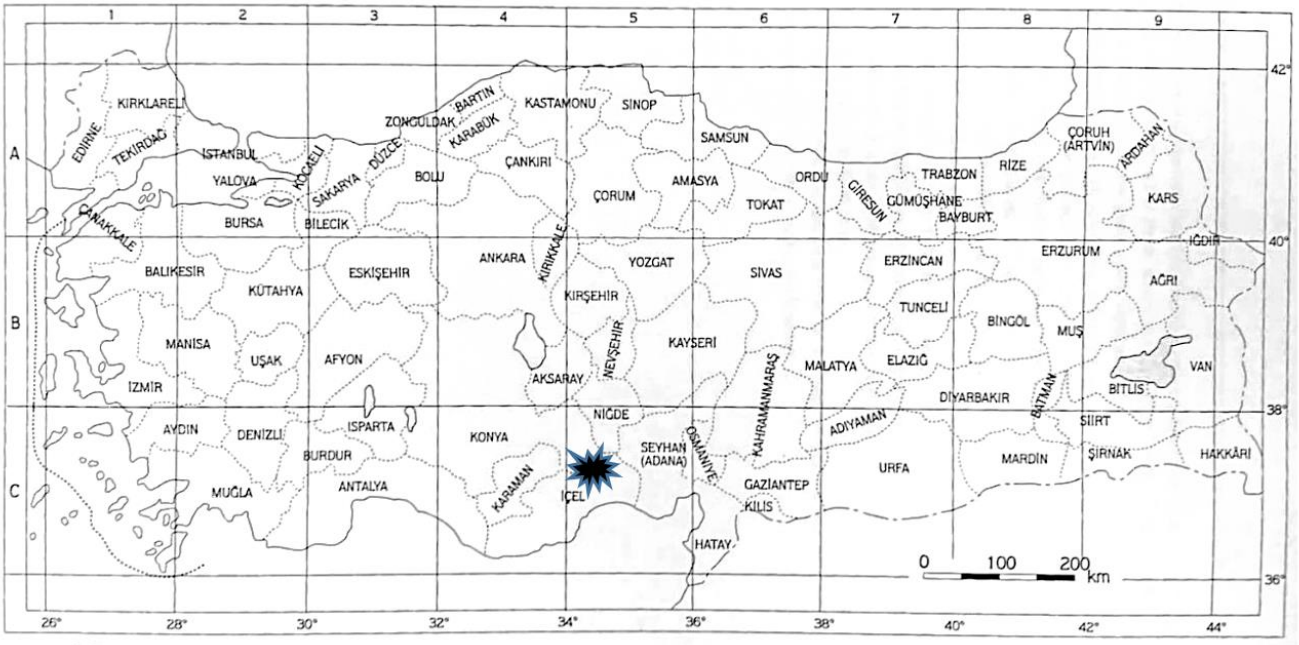

Figure 1. Collecting site of *hemp sesbania (Sesbania herbacea)* in Türkiye [The map of Türkiye according to the grid system of P. H. Davis (1965)].

Şekil 1. Akasya Otu (Sesbania herbacea)'nun Türkiye'de görüldüğü yer (P. H. Davis (1965)'de kareleme sistemine göre Türkiye haritası).

The specimens of this species were photographed and dried according to the herbarium techniques, and then the necessary morphological examinations were made on them. The voucher specimens were kept at the Herbarium of the Plant Protection Department of Çukurova University. When we checked the Flora of Turkey, we found that plant taxa were not found in the flora. On top of this, the species was identified and determined using the diagnostic key of the possible land of origin (North America) (Anonymous, 2024; Farruggia, 2009). The description of the species was written according to the data obtained in this study. This material was photographed under the DMSZ7P Digital Microscope to determine the seed and dissected flower properties.

RESULTS

Sesbania Adanson

Annual or perennial herbs, shrubs, or small trees. Stems and twigs unarmed or with prickles. Indumentum simple. Stipules are usually present. Leaves alternate, once paripinnate, Leaflets opposite or subopposite. Inflorescences racemes or panicles, ascending, lax or pendant, axillary; bracts and paired bracteoles early deciduous. Flowers 1-12; calyx campanulate; teeth subequal, shorter than the tube; corolla glabrous, pale yellow, orange to orange-red; stamens 9+1, diadelphous, anthers dorsifixed; pistil glabrous or style with spreading hairs; stigma capitate or slightly elongate, at the same position as anthers; ovules 1-many. The pod is usually long, dehiscent, beaked, sometimes winged, and transversely septate (Gillett, 1963; Brummitt et al., 2007).

Farruggia et al. (2018) mentioned the variation among the fruits of *Sesbania* in their study based on different research (Rydberg, 1923; Gillett, 1963; Hutchinson, 1964; Lavin & Sousa, 1995). It was grouped as;

1) Tardily dehiscent, linear, and many-seeded (e.g. S. sect. *Sesbania*);

2) Tardily dehiscent, torulose, and few- to several-seeded (S. sect. Daubentoniopsis (Rydb.) Lavin;

3) Tardily dehiscent, bladdery-inflated, and 2-seeded (S. sect. Glottidium (Desv.) Lavin) and 4) Sometimes indehiscent, quadrangular to 4-winged, and several seeded (S. sect. Daubentonia (DC.) Benth.).

This newly recorded genus of *Sesbania* taxonomically takes part in the clade of Robinioids. This clade could also comprise the tribes of *Sesbanieae*, *Robinieae,* and *Lotaeae*. This new record is represented by these three tribes in the Flora of Turkey. There is no close genera to *Sesbania* in the flora of Türkiye.

Sesbania herbacea (Mill.) McVaugh

Turkish Name: Akasya Otu

Annual or semi-woody perennial herbs. **Stems**, erect, glabrous, mostly herbaceous, become woody when it gets older. The plant can grow up to 3.5 m in height (Figure 2). Its leaves are alternate, pinnately compound, 7-20 cm; stipules 10.0-10.3 mm. The leaves have 20 to 72 oppositely arranged leaflets. **Leaflets**, oblong to linear, entire, mostly glabrous, (9.0-)15-24(-30) mm long, (1.0-)3.0-5.0(-6.0) mm wide. Inflorescences racemes, in axial, glabrous; peduncle (3-) 13.0-17.0(-43) mm (Figure 2). **Flowers,** hermaphrodite, papilionaceous and zygomorphic. Flower size (10.0-)15.0-17.0(-20.0) mm long; calyx radial, (4.0-)5.0-6.0(-8.0) mm long, teeth 5, subulate-acuminate, (0.6-)1.4-1.6(-2.6) mm long; calyx tube rim with short hairs, the banner of petals yellow-orange with purplish spots on the outer surface, ovate to obovate, (7.0-)12.0-13.0(-16.0) mm long, (6-)13.0-14.0(-17.0) mm wide; wings of petals yellow-orange, (7.0-)11.0-12.0(-14.0) mm long, (2.5-)4.0-5.0(-6.0) mm wide; keel yellow-orange, purple or maroon at apex, apex rounded-acute, (7.2-)10.0-11.0(-13) mm long, (4.2-)6.0-7.5(-8.0) mm wide; stamen strongly curved inward within keel; style curved back towards banner (Figure 3). **Roots** contain nodules that fix nitrogen on both below-ground roots and laterally on above-ground stems (Figure 4). **Legumes,** a linear pod, brown with maroon-red mottling, (82-)180.0-220.0 (-254.0) mm long, (2.0)2.3-3.0(4.0) mm wide; stipe (2.5-)4.0-6.0(-8.5) mm in fruit; beak (3-)5.0-6.0(-11.0) mm, narrowly tapering (Figure 5). **Seeds** are oblong, green-brown, brownish, generally with purple-black mottling, 3.0-4.0 mm long (Figure 6).

Flowering/Fruiting season: July-October

Examined material: South of Türkiye, Mersin, Tarsus, a soybean field, S. Tünk, CUBK-1LEGF-10 (Çukurova

University, Agricultural Faculty, Dept. of Plant Protection Herbarium)

Figure 2. Hemp sesbania (*Sesbania herbacea*) in soybean field (S. Tünk, CUBK-1LEGF-10).
Şekil 2. Soya tarlasında Akasya Otu (Sesbania herbacea) (S. Tünk, CUBK-1LEGF-10).

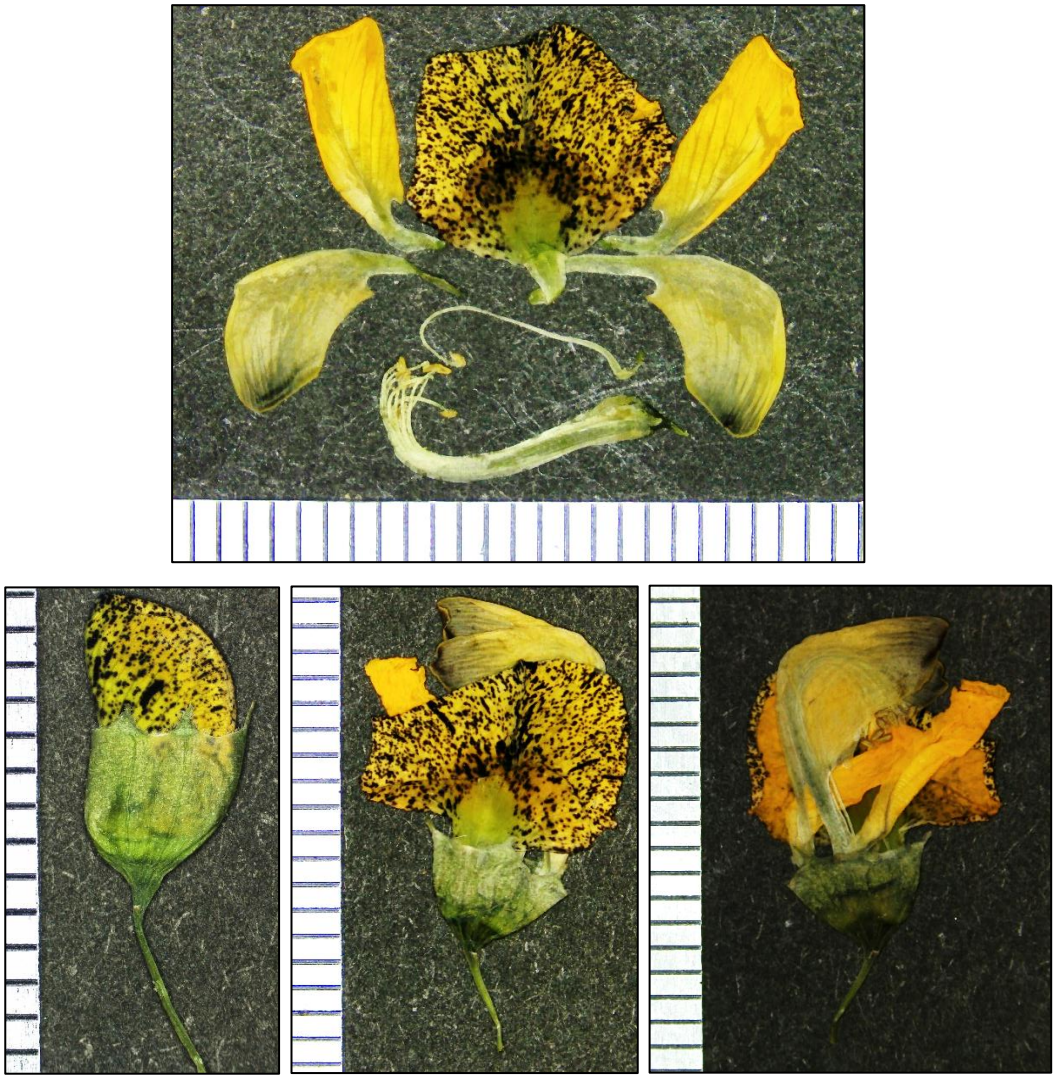

Figure 3. Flowers of hemp sesbania (*Sesbania herbacea*) (Scale 1 mm) (S. Tünk, CUBK-1LEGF-10).
Şekil 3. Akasya Otu (Sesbania herbacea)' nun çiçekleri (Ölçek 1mm) (S. Tünk, CUBK-1LEGF-10).

Figure 4. Root and root nodules of hemp sesbania (*Sesbania herbacea*) (S. Tünk, CUBK-1LEGF-10).
Şekil 4. Akasya Otu (*Sesbania herbacea*)*'nun kök ve kök nodülleri* (S. Tünk, CUBK-1LEGF-10).

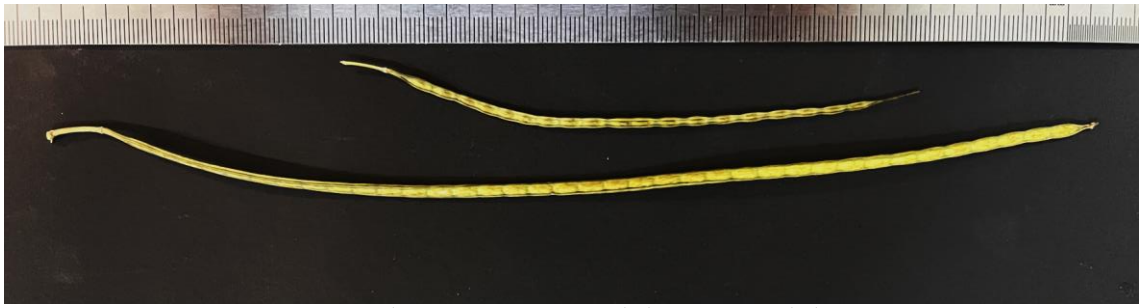

Figure 5. Fruits of hemp sesbania (*Sesbania herbacea*) (Scale 1 mm) (S. Tünk, CUBK-1LEGF-10).
Şekil 5. Akasya Otu (Sesbania herbacea)'nun meyveleri (Ölçek 1mm) (S. Tünk, CUBK-1LEGF-10).

Figure 6. Seeds of hemp sesbania (*Sesbania herbacea*) (Scale 1 mm) (S. Tünk, CUBK-1LEGF-10).
Şekil 6. Akasya Otu (Sesbania herbacea)'nun tohumları (Ölçek 1mm) (S. Tünk, CUBK-1LEGF-10).

As a conclusion, the number of *Fabaceae* genus increased by seventy-two due to the new record of genus *Sesbania* in Türkiye. Also, *Sesbania herbacea* is the first species of the genus. The increase in plant diversity research in Türkiye leads to the definition of new taxa and the determination of new record plant taxa for Türkiye (Behçet & Altınsoy, 2023).

DISCUSSION

Sesbania herbacea species belonging to the genus *Sesbania* were observed as seeds in the soybean harvested material at Tarsus/Mersin in 2020. During the weed surveys carried out in Tarsus in August-September 2021, the plant was found in the soybean field. This species determined that it is not native to the flora of Türkiye like *Sida spinosa* belonging to the new record genus *Sida* (Tünk et al., 2024).

S. herbacea is found on sandy soils, shallow flooded areas, disturbed habitats, and cultivated fields. It is a semi-woody plant and can be grown as a perennial legume in frost-free regions, and as an annual warm-season legume in frost regions because it dies from frost (Sheahan, 2013). This weed has symbiotic associations with *Rhizobium* bacteria that perform nitrogen fixation in its roots and mycorrhizal fungi (Aziz et al., 1995; Wang & Martínez-Romero, 2000).

It prefers clay and heavy loamy soils but grows poorly in sandy soils (Johnston et al., 1979, McWhorter & Anderson, 1979).

Sesbania species have alkaloids called saponins, which are poisonous to cattle and can cause death (Allen & Allen, 1981; Powell et al., 1990). However, the leaves and seeds of *S. herbacea* are non-toxic and its saponins are not harmful to ruminants (Evans & Rotar, 1987). Also, it does not contain toxic sesbanimides (Powell et al., 1990); but it can have low toxicity in domestic animals (Burrows & Tyrl, 2001).

Sesbania herbacea can easily become an invasive weed. It is an important weed that is a problem in soybean, cotton, sweet potato, rice, and summer crops in the world (Evan & Rotar, 1987; Smith, 1968; Woon, 1987, Norsworthy & Oliver, 2002). It can grow rapidly

and increase its population in cash crops such as soybeans. Since it supports nitrogen-fixing symbiotic bacteria, it relatively does not need soil nitrogen for growth. It produces root exudates that inhibit soybean nodulation, so nitrogen fertilization sometimes allows soybeans to compete with this weed (King & Purcell, 1997). Since it tends to colonize the edges of waterways and spread seeds by water, it can easily spread over large areas by running water (Meert & Hester, 2009).

The economic threshold of *S. herbacea* is approximately 0.5 plants/m^2 in soybean fields (McWhorter & Anderson, 1979). In its management, sowing soybeans early helps the soybean to grow more competitively against *S. herbacea* (King & Purcell, 1997). Tillage with a tine weeder and rotary hoe is partially effective in the control. This species does not usually emerge until late July or early August, but most competition occurs 4-10 weeks after soybean emergence (McWhorter & Anderson, 1979). However, it should be mowed just after flowering has begun to reduce seed production (Norsworthy & Oliver, 2002). On the other hand, In the control of this species, no pre or post-emergence herbicide could provide enough control throughout the season (Bryson, 1990). This shows us that this species can be harmful weed species in soybean and other irrigable cultures.

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Author's Contributions

The contribution of the authors is equal.

Statement of Conflict of Interest

The authors have declared no conflict of interest.

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