The OSCAR PUBLISHING Services
American Journal Of Agriculture And Horticulture Innovations

VOLUME Vol.05 Issue12 2025
PAGE NO. 38 -43
DOI 10.37547/ajahi/Volume05Issue12-10

Morphological And Palynological Characteristics Of Rumex L. Species

Ergasheva Gulmira Ostonovna

Doctoral student (PhD), Andijan State University, Faculty of Natural Sciences, Department of Ecology and Sustainable Development, Andijan, Uzbekistan

Turakhujaeva Nodirakhon Tokhirkhuja kizi

Master student, Andijan State University, Faculty of Natural Sciences, Department of Ecology and Sustainable Development, Andijan, Uzbekistan

Received: 23 October 2025; **Accepted:** 14 November 2025; **Published:** 19 December 2025

Abstract: This article presents information on the systematic analysis, morphological characteristics, phenology, distribution areas and ecological characteristics of plant species belonging to the genus Rumex L. distributed in the flora of Uzbekistan. During the research, the root system, stem structure, leaf shapes, flower and fruit morphology of the species were analyzed in detail. Also, the morphological characteristics of the pollen of the most widespread species, Rumex confertus Willd., were studied separately. Pollen grains were analyzed palynologically, and their size, number and shape of stigmas, exine structure were determined. The obtained data are of great importance in identifying Rumex L. species, determining their place in the systematics and elucidating the mechanisms of ecological adaptation. Phenological observations reveal the periodicity of growth and development of species, while areal analysis reveals the regularities of their distribution in various ecological conditions. The research results can be applied in the fields of botany, systematics, palynology and aerobiology.

Keywords: Pollen, polymorph, palynology, morphological, phenological, ecological.

Introduction: It belongs to the family Polygonaceae. The genus Rumex L. consists of 193 species worldwide, which are native and generally widespread in temperate regions [1,2,3].

Rumes L. turdari is found on all continents, except for acidic soils and peat, on a variety of soil types: stagnant water, brackish water, sand, gravel, clay, sandy soil and limestone. It grows especially well on disturbed (abandoned or modified) soils (up to 3500 m above sea level) [1,4].

Plants of this genus have monoecious, biennial and perennial life forms, and can be toxic to livestock and poultry due to the oxalates, rumitin, and chrysorobiu compounds contained in their seeds [1,5,6].

METHODS

The systematics of the species of the genus Rumex L. was determined using the sites https://powo.science.kew.org, https://www.gbif.org. Morphology and distribution areas were described based on various sources. The inflorescence of the species Rumex confertus Willd. was studied using the microscopic method [7,8,9].

RESULTS

The book Flora of Uzbekistan analyzed information about 10 out of 16 species belonging to this genus, and provided information about their growing areas [10].

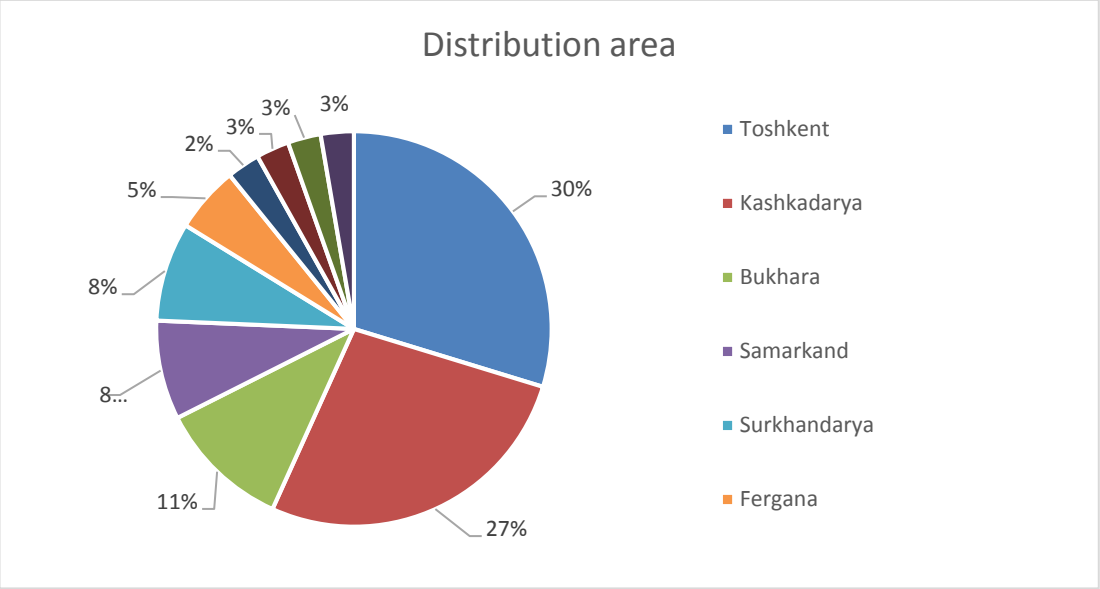
Table 1

Флора Узбекистана. II том	http://powo.sciense.kew.org	Distribution area

Rumex acetosa L.	*R.acetosa L*	Pamir - Aloy, Turkestan and Hissar mountain ranges
R.thyrsiflorus	*R.thyrsiflorus*	Tashkent, Kashkadarya (Shakhrisabz)
R.pamiricus	*R.patientia*	Samarkand, Kashkadarya
R.crispus	*R.crispus*	Tashkent, Samarkand
R.confertus	*R.confertus*	Tashkent, Kashkadarya
R.rechingerianus	*R.patientia subsp.pamiriceus*	Tashkent, Samarkand
R.paulsenianus	*R.paulsenianus*	Samarkand, Kashkadarya
R.aquaticus	*R.aquaticus*	Near the border of Uzbekistan (Brich - Mulla, Chotkol river slope), Tashkent
R.angreni	*R.rectinervius*	Tashkent (Said, Angren)
R.conglomeratus	*R.conglomeratus*	Tashkent, Samarkand, Bukhara, Kashkadarya, Surkhandarya
R.stenophyllus	*R.stenophyllus*	Tashkent, Kashkadarya
R.anisotylodes	*R.anisotylodes*	Mirzachul district, Slavyansky village
R.halaczii	*R.dentatus*	Tashkent, Fergana, Samarkand, Bukhara, Kashkadarya, Surkhandarya
R.syriacus	*R.chalepensis*	Tashkent, Namangan, Fergana, Bukhara, Kashkadarya, Surkhandarya
R.drobovii	*R.chalepensis*	Tashkent, Fergana, Samarkand, Kashkadarya, Bukhara
R.marschallianus	*R.marschallianus*	Tashkent (Chinaz), Bukhara, Karakalpakstan

If we analyze the species of the Rumex L. family by area, the most widespread area, 30%, falls on Tashkent, followed by Kashkadarya and Bukhara.

Diagram 1



Karakalpakstan, Fergana, Surkhandarya, and Samarkand are the places with a small distribution area.

Morphological description of the plant

R.thyrsiflorus Fengerh. Height: 30-70-75 cm. 60-100-120 cm. Stem: white at the base. 5-10 mm thick,

branched: Stem: smooth, sometimes short-haired, ribbed stem. Stem thinly lanceolate, base wedge-shaped. Up to 25 cm, lower leaves banded, almost the entire plate oblong-lanceolate. 6-9 cm long and 2-3 cm wide, margins slightly serrate or wavy. This makes the leaf appear toothed; the tip is shortly pointed, and the base is cordate. The upper leaves are smaller, the band is shorter, almost without a band at the end. The lower ones are mostly banded, attached to the cordate stem. Flower: consists of bisexual, seedless florets. Flower bands are paired or attached to the stem. Sepals cordate-rounded, 3-4 mm long. The margin is smooth, the three main segments are winged, the apex is without leaves: The fruit is a nut-like, dark green, heart-shaped-round, 2 mm to 2.5 mm.

R.crispus L. Height: 60-100-120 cm. Root: up to 2 cm thick: Stem: single, erect, thick, fissured, branched, with short lateral branches in the upper part, 5-10 mm in diameter. Leaves: lanceolate, flat, with sharp tips, the main part is heart-shaped or elongated, the edges are finely toothed. Upper leaves - simple, narrowed at the base, Lower leaves - rounded or elongated-cordate in shape, 10-28 cm long, 1.5-4 cm wide. Leaf edges are wavy or slightly toothed. Leaf sheaths are medium dense, partially convex, with one or more teeth. Flower: yellowish-green, 1.5-2.5 mm long, 1-1.5 mm wide. Each calyx tooth is small, with spines at the tips, and the calyx teeth have a groove along the middle. Flower: a cup-shaped, leafy fruit. Fruit: 2-3 mm long, round, smooth, with serrated wings [10,11].

R.confertus. Height: 50-100 cm. Root: 5-25 mm thick. Stem: single or multiple, grooved, 2-6 mm thick, usually reddish-green, branched at the top, Leaf: lower leaves with long bands, plate oblong-rounded, 6-14 cm long, heart-shaped or rounded, heart-shaped base, acute tip, slightly wavy margins. Middle leaves 2-3.5 cm wide, upper leaves narrower and smaller. Flowers in dense racemes, 5-8 cm long, arising from the lower leaf axils, Flower bracts jointed in the middle, thin at the lower end, fruits heart-shaped-triangular, smooth or toothed at the edges. Fruit: 4-6 mm wide with wing-like growth, seed periphery completely covered, yellowish-green, triangular. 3-4 mm wide.

R.patientia subsp.pamiriceus. Bush; 40-200 cm. Root: Xerosti stem (rhizome) 2-3 cm thick: Stem: straight, produces several strong, fissured stems, which are 5-10 mm thick, reddish-purple, often branching from the middle of the stem. Leaf: smooth, flat or slightly serrated at the edges, usually slightly rough along the veins. Lower leaves oblong-ovate. 25-30 cm long and 5-8 cm wide, with a lanceolate base, long-stalked; middle leaves with shorter plates, upper leaves narrowly lanceolate or oblong-lanceolate. 14.22 cm long and 4.6 cm wide. The tips are shortly acute, some narrow towards the base. Uppermost leaves 0.5–2 cm long, cordate-based; Flowers: in axillary flower spikes, up to 10–12 flowers per spike. Inner bracts light green, often with purple spots. 4–6 mm wide, broadly cordate, slightly acute at the tip, sometimes rounded, ovate, fairly dense, one or all rather hairy. 1.5–2 mm long, sometimes 1–1.5 mm wide, nut 2.5–3 mm long or about 1.5 mm wide, glabrous.

R.rectinervius. Height: 100-120 cm. The root is thick, usually from a single plant. 10-15 mm in diameter; Stem: smooth, with a straight stem, unbranched, branching only in the flowers: Leaves: lower leaves ovate-lanceolate, up to 50 cm long, 12 cm wide. Smooth above, veined below. The edges are slightly wavy, heart-shaped at the base, with a sharp tip.

The upper leaves are similar in shape and size to the lower leaves. The leaf blades are yellowish-green, long, sometimes 3-4 times shorter than the lower leaves. The flowers are in racemes, sparse, arising from the axils of the lower leaves: Flower: large, sparse, 4-5 cm long including the stem. The flower blades are thin, 3-5 mm long when in fruit. The inner part of the fruit corolla is 3-4 mm long, 2-2.5 mm wide, heart-shaped-triangular, pointed, with smooth or vaguely toothed edges: Fruit; sharp-pointed, with wings on average 2-3 mm wide, almost the same size as the seed, reddish-brown in color [10].

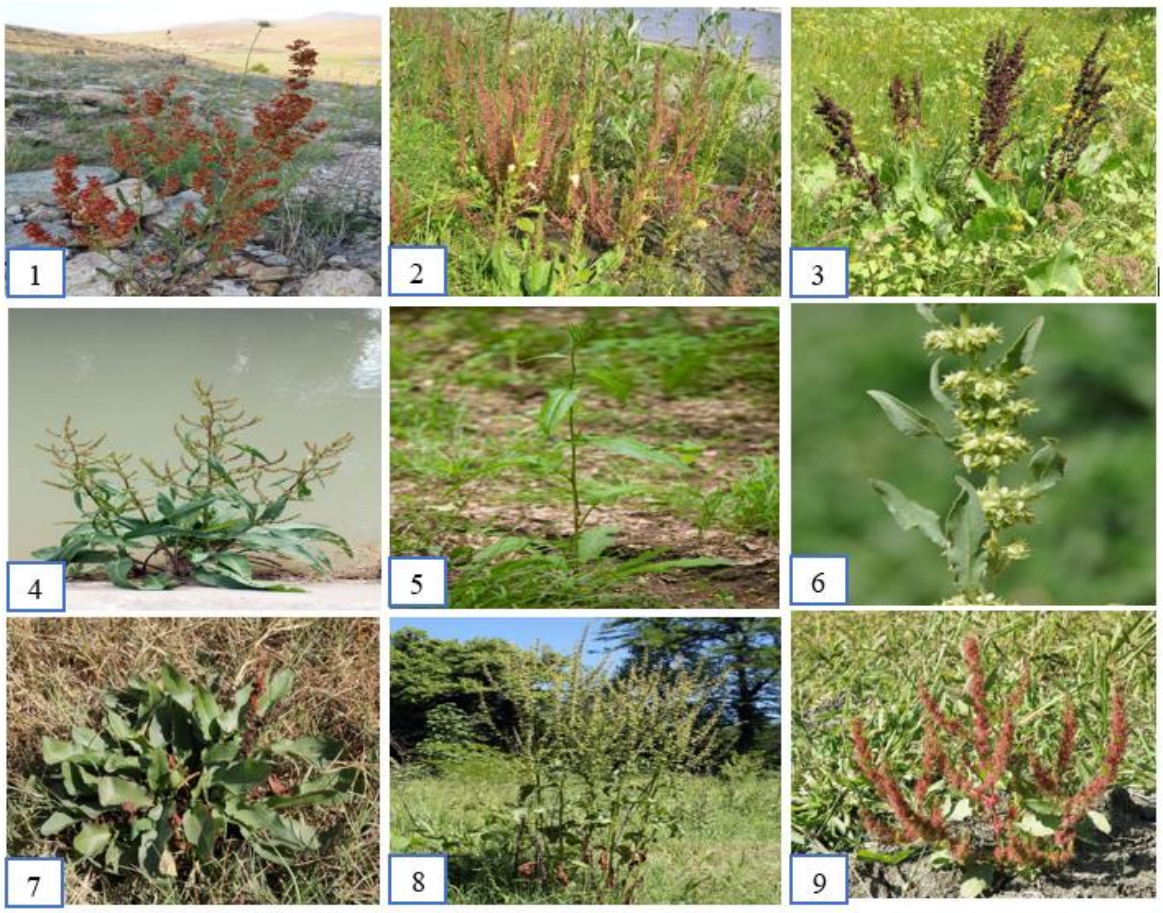


Figure 1: Rumex L. turkum turlarining umumiy ko'rinisi. 1-R.thyrsiflorus Fengerh., 2-R.crispus L., 3-R.confertus., 4- R.patientia subsp.pamiriceus., 5- R.conglomeratus Murr., 6- R.dentatus., 7- R.chalepensis., 8-R.chalepensis., 9- R.marschallianus.

R.conglomeratus Murr. Height: 50-100 cm. Stem: 5-25 mm thick: Stem: produces several chorionate stems, branched, 26 mm wide, usually reddish-green. Branched in the upper part, covered with spikes: Leaf: lower leaves with a long band almost cordate base, 6-14 cm or 7-11 cm long and 1.2 3.5, 2.4 cm wide. band 4.2 cm, the upper ones narrow and small, lanceolate, slightly ovate-lanceolate. 58 cm long or 6-10 mm wide, tip acute: Flower: in relatively dense inflorescences, 58 cm wide surrounded by the central leaves, visible at the lower end. The inflorescence is almost half located at the lower end. Internal segments convex, 3-4 mm long, cordate or oblong-triangular-lanceolate, margins serrate or shortly serrate, glabrous. Fruit: nutlet, ovoid, three-sided; Seed: pitted, smooth, gray.

R.dentatus. Height: 15-50 cm. Root: often multiple, with a single taproot. Stem: single or multiple, 2.6 mm thick, taproot, usually branched from the base. Leaves: lower leaves 10-28 cm long x 1.5-4 cm wide, serrated, oblong-ovate, large, gradually becoming smaller as they ascend, upper leaves unserrated or with short serrations. Leaf blade slightly wavy above, covered with large veins on the underside, lower leaves deeper, sometimes with serrated margins; upper leaves more glabrous; Flower: in a panicle, undecorated. The flower bracts are pointed at the lower end. The outer petals are oblong in fruit, the inner petals are cordate-triangular, 5-6 mm long and 5-7 mm wide, the edges are almost entire or slightly toothed: Fruit: triangular, brown-green, with clearly separated edges, reaching a width of 3-4 mm in the central part.

R.chalepensis. Height: 30-100 cm. Root: woody, perennial, 1.5-2 cm thick; Stem: smooth, produces a hoe-like root, 5-8 mm thick.; Leaves: lower leaves are banded. oblong-lanceolate or oblong-lanceolate, 11-18 cm long, 8–11 cm wide, 2-4 cm wide, leaf blade 5-17 cm long, slightly wavy edge, tip short-acuminate, base cordate, upper leaves smaller, banded shorter, terminal ones almost bandless. Flower: calyx dense. bisexual, calyx lobes arranged in several pairs, calyx 2.5-3 mm long, cordate-rounded, with straight edges. Fruit: ovoid, three-sided, three-lobed achene, 1.5-2 mm long and 1 mm wide, shiny, brown.

R.chalepensis. Height: 1 m. Stem: about 2 cm thick: Stem; several, straight. with a choroidal crown, 7-10 mm thick, the upper part strongly pubescent, the branches diverge from the stem at an acute angle. Leaf: The leaves on the stem are narrowly obovate, deeply heart-shaped, with rounded tips, margins with blue teeth, lobes 5 17.cm. The plate is 11-18 (27) cm long

and 8-11 cm wide, the veins and lobes are covered with coarse hairs, the leaves on the upper stem are much smaller, lanceolate, 5-8 cm long and 1.5-2.5 cm wide, the base is narrowly narrowed, with a short lobe or almost without lobes; Flower: small, the flower lobe is 1-1.5 cm. Located in a large raceme. The sepals are simple, with outer lobes lanceolate-rounded or lanceolate. 2-3 mm long and 0.5-1 mm wide, inner lobes 6-8 mm long and wide, reticulate, heart-shaped-rounded with a sharper apex. Each side has 3-5 short teeth (0.5-1 mm), only one has a large gland 3-4 mm long. The golgi may have very small glands. Fruit: ovoid-triangular, shiny, with deeply concave edges, 3-4 mm long and 2-2.5 mm wide, the widest part is located in the lower 1/4 of the fruit [10,11].

R.Marschallianus. Boixi: up to 50 cm. Root: thin, straight, sparsely branched, 1-2 mm thick, underground parts strongly developed; Stem: with flowering shoots, strong, 0.5-2 mm thick; Leaf: long-banded, heart-shaped-rounded, with sharp tips, upper leaves lanceolate, narrowed near the base, with finely toothed edges. Leaf blade hairy on both sides, especially the lower side, 6-15 cm long, 3-10 cm wide. Flower: banded, 2-4 cm, corollas thin, 1-1.5 cm long. Flowers are located in a flower band. Outer corollas are often smaller than the inner ones, lanceolate. 2-4 mm long or 1 mm wide. Inner parts heart-shaped, with finely toothed edges, 2-6 times longer than the outer leaves, only one has a large gland [10].

Table 2

Bioecological characteristics of species belonging to the genus Rumex L.

№	Scientific name	Uzbek name	Ecological distribution area
1	R.thyrsiflorus Fengerh	Ekma otquloq, shovil	Roadsides, arable lands, vegetable gardens
2	R.crispus L.	Jingalak otquloq	Moist soils along lakes, rivers and ditches, edges of irrigated crops, streams, ravines
3	R.confertus	Qalin to'pgulli sho'ra	River banks, streams, wetlands
4	R.patientia subsp.pamiriceus	Otquloq	River banks, streams, wetlands
5	R.rectinervius	To'g'ri tomirli otquloq	Along ditches and canals, and around crops
6	R.conglomeratus Murr.	Qizg'ish otquloq	River and ditch banks, swamps, roadsides and edges of crops, streams, distributed in the mountain zone
7	R.dentatus	Tishli otquloq	In wet soil areas, along rivers, near villages and settlements
8	R.chalepensis	Suriya otqulog'i	River and ditch banks, saline abandoned lands, among crops
9	R.chalepensis	Drobov otqulog'i	Ditches, roadsides, gardens and crops, mountain slopes, between villages
10	R.Marschallianus	Marshallning otquloq	River and lake banks, in saline soils

Classification

Kingdom: Plantae

Phylum: Tracheophyta

Class: Magnoliopsida

Order: Caryophyllales

Family: Polygonaceae

Genus: Rumex L.

Species: Rumex confertus Willd.

Morpho-palynological Features

Rumex confertus Willd. Pollen unit: monad, size pollen unit: medium-sized 26-50 µm. Pollen class: colporate, aperture number: 3, aperture type: colporus, aperture condition: triporate, colporate. In Table 2 below, Rumex confertus Willd. microscopic structure of the pollen of the species is shown.

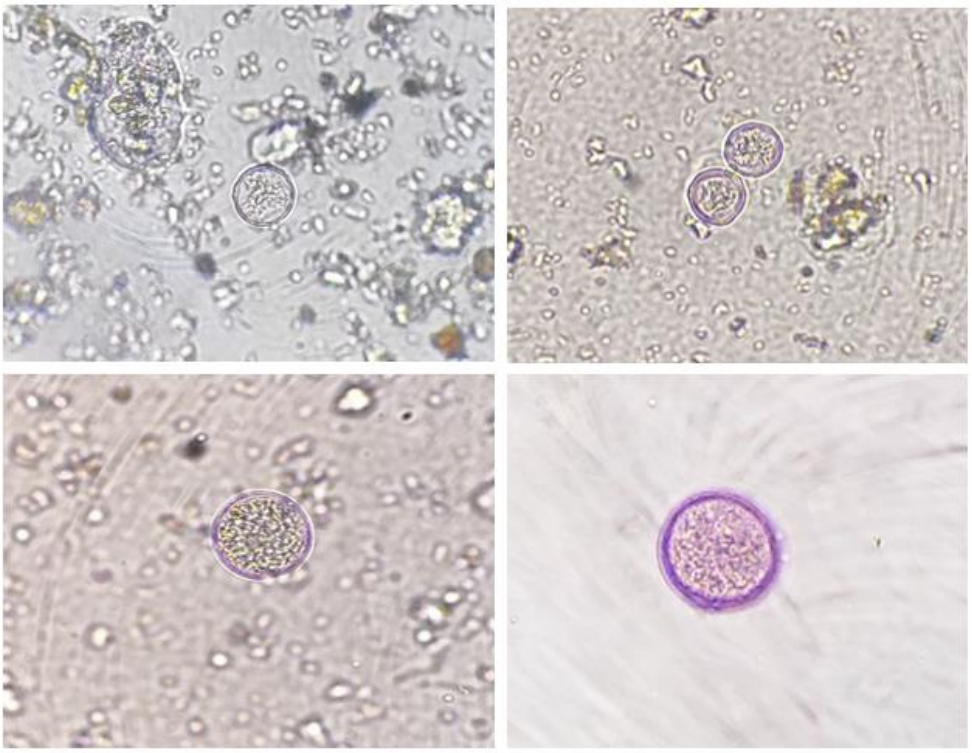


Figure 2. Light microscopic pollen grains of Rumex confertus Willd.

CONCLUSION

According to the results of the study, Rumex, a widespread species in the flora of Uzbekistan, Plants belonging to the genus are morphologically diverse, and their phenological development has been observed to be adapted to different ecotopes. The distribution areas of species are closely related to ecological requirements, and it was found that some species are widespread in humid environments, while others are widespread in dry conditions. Palynological analyses have shown the morphological characteristics of the inflorescence of the species Rumex confertus Willd. and their significance in systematics. The data obtained serve as an important scientific basis for species identification, assessment of flora biodiversity, and determination of ecological adaptation features.

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