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*Research note/Araştırma notu*

# Notes on *Riccia fluitans* and *Riccia lamellosa* (Ricciaceae, Hepaticae) in Turkey

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**Abstract**

In this study, the terrestrial form of *Riccia fluitans* L. was reported for the first time from Turkey and *R. lamellosa* Raddi, which was first given by Jovet-Ast from West Anatolia without locality details, was collected for the second time. New findings with substrates, associated bryophytes, taxonomical and distributional remarks are presented.

**Key words:** Liverworts, *Riccia fluitans*, *Riccia lamellosa*, Hepaticae, Turkey

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## Türkiye'deki *Riccia fluitans* ve *Riccia lamellosa* (Ricciaceae, Hepaticae) üzerine notlar

**Özet**

Bu çalışmada, *Riccia fluitans* 'ın karasal formu Türkiye'den ilk kez rapor edildi ve ilk kez Jovet-Ast tarafından Batı Anadolu'dan lokalitesi belirtilmeksizin kaydı verilen *R. lamellosa* da ikinci kez toplandı. Yeni bulgular substratları, birlikte yaşadıkları biryofitler, taksonomik ve dağılım özellikleriyle sunuldu.

**Anahtar kelimeler:** Ciğerotları, *Riccia fluitans*, *Riccia lamellosa*, Hepaticae, Türkiye

## 1. Introduction

Among *Ricciaceae*, the genus *Riccia* L. accounts for the great majority of taxa in Turkey, with 23 taxa reported up to now (Gökler and Öztürk, 1991; Kürschner and Erdağ, 2005; Ros *et al*., 2007; Özenoğlu Kiremit and Keçeli, 2009; Özenoğlu Kiremit and Hugonnot, 2010; Özenoğlu Kiremit, 2011). This genus is recorded from Northwest, West and South Anatolia areas with Mediterranean-type climates. This paper contributes new records that intend to increase our knowledge on the distribution of *R. fluitans* and *R. lamellosa* in Turkey (Figure 1).

## 2. Results

### *2.1. Turkish Material of Riccia fluitans L.*

**Specimen studied:** Turkey, Aydın, Koçarlı, Mersinbelen village, 37° 41' 35''N; 27° 41' 23''E, 800 m, in a well developed *Pinus brutia* Ten forest, in a small streambed, on wet soil bank. Associated bryophytes are *Lunularia cruciata* (L.) Dumort. ex Lindb., *Reboulia hemisphaerica* (L.) Raddi, *Targionia hypophylla* L., *Timmiella barbuloides* (Brid.) Mönk., *Didymodon insulanus* (De Not.) M. O. Hill, *Didymodon acutus* (Brid.) K. Saito and *Bryum* sp.; 05/01/2008; AYDN 2893 (The voucher specimen is stored in Herbarium of Adnan Menderes University). The locality (Figure 1) belongs to the grid square C 11 according to the system adopted by Henderson (1961).

Plants have different forms; aquatic or terrestrial. While aquatic form often forms thick mats on the surface of the water, terrestrial form, in partial or complete rosettes, anchors itself to the bottom with short rhizoids.

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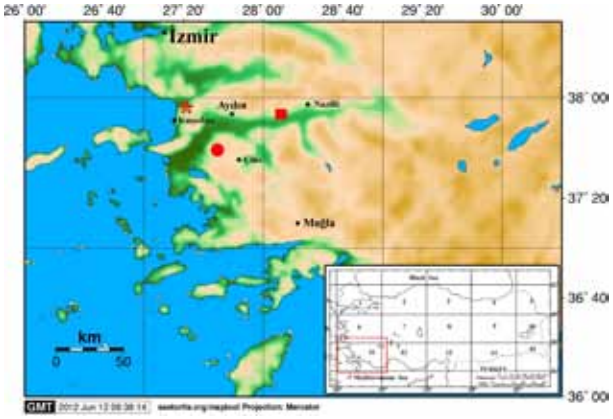


Figure 1: The Grid-Square System of Turkey Bryophyta Flora (Henderson, 1961) and distribution of *Riccia fluitans* (* aquatic form; · terrestrial form) and *R. lamellosa* (¾) in Turkey

Thalli almost bright green or yellowish green, becoming pale brown with age; on terrestrial thalli branches to 1.5 mm, aquatic branches 0.5-1 mm wide (Figure 2). Chlorenchyma with one or two air-chambers layers (Figure 3).

Terrestrial form of *R. fluitans* can be distinguished from the other members (*Riccia canaliculata*, *R. crystallina, R. frostii, R. perennis* and *R. rhenana*) of subgenus *Ricciella* in terms of some features. *R. rhenana* terrestrial thalli are more robust than those of *R. fluitans* with wider areolae, epidermal cells and cells of the ventral scales. Sporophytes of *R. canaliculata* are more frequent and often more numerous than they are in *R. fluitans.* The dorsal surface of dry *R. fluitans* is generally nearly plane, except towards the apices, unlike the dry thalli of *R. canaliculata* which are canaliculated and differ also in the narrowed branch apices covered by conspicuous ventral scales. In *R. canaliculata*, the dorsal surface becomes lacunose with age, whereas in *R. fluitans* the epidermis is continuous except for the cell surrounding the pores, which collapse with age. In *R. crystallina*, the thallus is bluish or glaucous, never yellow-green, more compact, with small perforations. *R. frostii* can be distinguished from the other local species of subgenus *Ricciella* by the difference in size between male and female thalli and by the ornamentation of the spore coat. *R. perennis* can be distinguished from other *Ricciella* sub-genus members by the size (very robust), colour (yellowish tinge), lobes width (more than 1.7 mm wide) and tubers on ventral face of the thallus.

In the present study, terrestrial form was reported for the first time from Aydın, Koçarlı, Mersinbelen. This locality is nearly 50 km. away from aquatic form locality. In Turkey, aquatic form of *Riccia fluitans* is only known from İzmir, Selçuk, Kazangöl by Gökler and Aysel (1998) and the species have not been found again. Kazangöl is a brackish water lake ($Cl^-$ =1,179 mg $ml^{-1}$, $Na^+$= 1540 mg $l^{-1}$, 88 mg $CaCO_3$ / 100 ml water) (Aysel et al., 1998). The species can be seen in wetland with similar properties in Europe. Plant locality has a very narrow water basin. Compared to previous years, there is a marked reduction in *R. fluitans* population. One of the main possible reasons for this decrease is the anthropogenic pressure on this water system.

*2.2. Turkish Material of Riccia lamellosa Raddi*

**Specimen studied:** Turkey, Aydın, Sultanhisar, Nysa Antique City, 37° 54' 12''N; 28° 08' 44''E, 225 m; in grassland, on wet soil. Associated bryophytes are *Sphaerocarpos texanus* Austin, *Lunularia cruciata* (L.) Dumort. ex Lindb., *Riccia sorocarpa* Bisch., *Fossombronia angulosa* (Dicks.) Raddi, *Dicranella varia* (Hedw.) Schimp., *Timmiella barbuloides* (Brid.) Mönk., *Barbula unguiculata* Hedw., *Didymodon acutus* (Brid.) K. Saito, *D. luridus* Spreng., *D. vinealis* (Brid.) R. H. Zander, *Aloina aloides* (Koch ex Schultz) Kindb., *Bryum argenteum* Hedw., *B. caespiticium* Hedw. , 25/01/2011; AYDN 2892 (The herbarium voucher is stored in Adnan Menderes University). The locality (Figure 1) belongs to the grid square C 11 according to the system adopted by Henderson (1961).

Plants usually forming complete or incomplete rosettes, thalli pale green or yellow tinge and 3-4 times branched, lobes 2-2.5 mm wide, obtuse apically; lateral sides of lobes entirely covered with large, pure white scales, rounded apically and passing beyond lobe margins. In thallus sections, lateral edges erect and in upper part spread out; assimilatory layer made up of short, rectangular, thin-walled cells (Figure 4).

In Turkey, 4 of the 23 *Riccia* taxa have been given by Jovet-Ast (1986) from West Anatolia without locality details. These are *R. canaliculata, R. gougetiana* var. *armatissima, R. lamellosa* and *R. papillosa*. None of these have been collected again. Among them, *R. lamellosa* is recorded for the second time from Turkey.

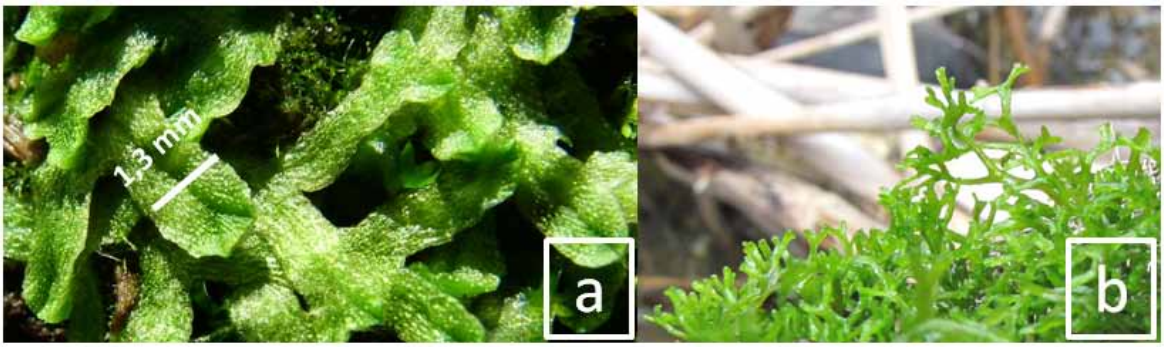


Figure 2: General view of *R. fluitans*, a) terrestrial form, b) aquatic form. Photographs by Kırmacı and Özenoğlu Kiremit

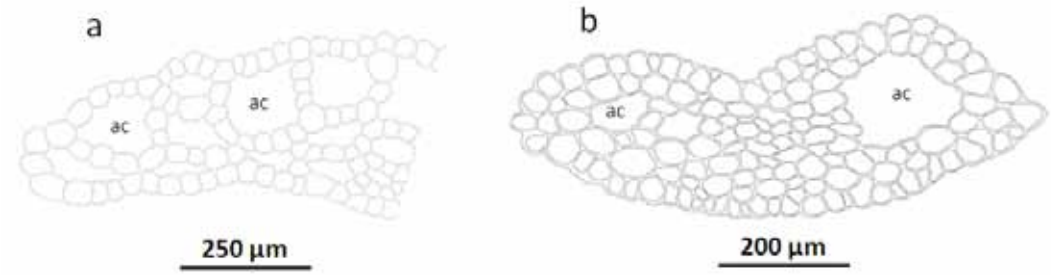


Figure 3: Transverse section of aquatic form (a) and terrestrial form (b); ac: air chamber. Drawn by Kırmacı

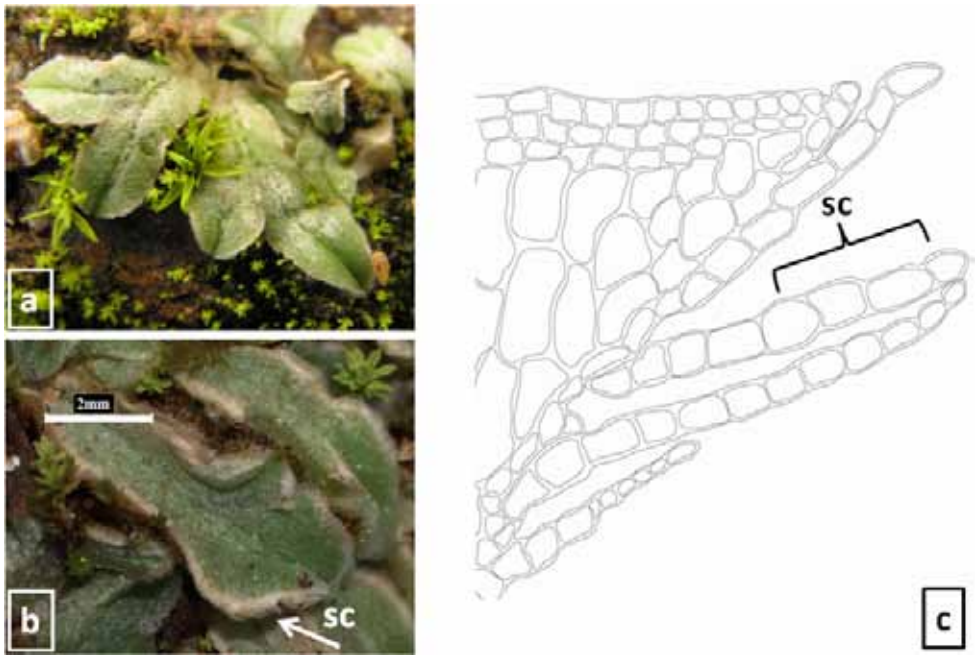


Figure 4: a) General view of *R. lamellosa*; b) a thall of species; c) transverse section of thallus with scales; sc: scale. Photographs and drawn by Kırmacı

It is a very common species in Mediterranean Region, Europe and Southwest Asia (Jovet-Ast, 1986; Ros *et al*., 2007; Özenoğlu Kiremit and Keçeli, 2009; Kürschner and Frey, 2011). It can be distinguished from other members of subgenus *Riccia* by the colour (pale green or bluish) and scales (pure white scales covering the lateral lobe sides and passing beyond the lobe margins).

The genus is in urgent need of a modern revision that would take benefit from molecular methods. A great number of taxa are, in spite of the numerous works of Jovet-Ast, still poorly known both from the taxonomic and distributional points of view.

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