

# CONTRIBUTION TO KNOWLEDGE OF GENUS *AGRIMONIA* L. (ROSACEAE) IN LATVIA

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According to the latest vascular plant taxonomical revision, based on both morphological analysis of plant material and field research, five species of genus *Agrimonia* L. occur in Latvia – three basic species and two hybridogenous species (hybrids): *Agrimonia eupatoria* L., *Agrimonia pilosa* Ledeb., *Agrimonia procera* Wallr., *Agrimonia* × *wirtgenii* Asch. & Graebn. (*A. eupatoria* × *procera*) and *A. eupatoria* × *pilosa*. Both *A. procera* and *Agrimonia* × *wirtgenii* are designated as new species for the flora of Latvia.

Key words: *Agrimonia*, Rosaceae, Latvia, flora, new species.

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## INTRODUCTION

*Agrimonia* L. is a genus of Rosaceae family, and it is represented by 16 species in the Northern Hemisphere (Granica et al. 2015). Species of this genus are perennial herbs; stem erect with three types of hairs, leaves irregularly pinnate, flowers yellow in terminate spike – like inflorescence; fruit – achene (Skalický 1968).

The number of species in genus *Agrimonia* differs within the Baltic States and neighbouring countries. According to the literature data, genus *Agrimonia* is represented in Latvia by two species – *Agrimonia eupatoria* L. and *A. pilosa* Ledeb. (Galenieks 1957, Gavrilova & Šulcs 1999) and one hybrid – *A. eupatoria* × *pilosa* (Galenieks 1957, Krall & Baroniņa 1996).

Another species – *A. procera* Wallr. has been recorded in several regions of Lithuania, mainly – Southern and Eastern parts of the country (Krall & Baroniņa 1996) but has not been found in Latvia and Estonia.

In the official list of vascular plants of Poland three species of *Agrimonia* are listed – *A. eupatoria*, *A. procera* and *A. pilosa* (Mirek et al. 2002) – the same three *Agrimonia* species are known from the Republic of Belarus (Дубовик и др. 2014).

In Estonia *A. pilosa* often occurs together with *A. eupatoria*, and the hybrids between these two taxa are known. At the same time, according to the monitoring data of threatened vascular plants in Finland these two species occur together only in one locality (Ryttäri et al. 2003).

The hybrid is intermediate in morphological features of both parents, but the main diagnostic character for the basic species (different fruit morphology) is of no use while identifying hybrids of *Agrimonia* because no fruit are developing (Stace et al. 2015).

The following species also have different number of chromosomes: *A. pilosa* and *A. eupatoria*  $2n=28$ , and *A. procera*  $2n=56$  (Bojnanský & Fargašová 2007).

## MATERIAL AND METHODS

All collected herbaria material is deposited in the Herbarium of Institute of Life Sciences and Technology, Daugavpils University (DAU) (Evarte-Bundere et al. 2020).

The main morphological differences that distinguish basic species are primarily based on characters of leaves and fruit, and presence or absence of different types of hairs on the stem.

## RESULTS

DAU collection of *Agrimonia* consists of 148 specimen sheets from the period of 1946 – 2020. Morphological revision of plant material indicated that in Latvia there are five taxa of *Agrimonia*: *A. eupatoria*, *A. pilosa*, *A. procera*, *A. × wirtgenii* (*A. eupatoria* × *procera*) and *A. eupatoria* × *pilosa*. Basic species have unique morphological characters (Table 1), but hybrids take an intermediate position between the parent species, often leaning towards one of the parent species.

*Agrimonia eupatoria* L., Sp. Pl. 1: 448. 1753.

Morphology. Perennial, 60 – 100 cm. Stem with three types of hairs – long patent, short flexuous eglandular and short glandular. Plant with leaf rosette. Leaves elliptical or oval, margin is incised-dentate and sometimes serrate. Petals (3 –) 4 – 5 (– 6) mm, golden yellow, obovate-elliptic. Fruit campanulate, 6 – 7 × 3.6 – 4.5 mm,

bristles 1.5 – 2.5 mm, erect. Blooms from June to September.

Most frequently recorded *Agrimonia* species in Latvia. Typical habitats: meadows, shrubs, forest edges and slopes of riverbanks.

*Agrimonia pilosa* Ledeb., Index Seminum Hort. Dorpat., Suppl. 1. 1823.

Morphology. Perennial, 30 – 120 cm. Stem with long eglandular and short glandular hairs, without leaf rosette. Leaves green on both surfaces, with glandular and a few eglandular hairs beneath, obovate, obovate-elliptic, or obovate-lanceolate, with 3 – 8 pairs of teeth, cuneate and entire at base. Petals 2 – 4 mm, pale yellow, oblong. Fruit obconical, 5.5 – 6.5 × 3 – 4 mm, bristles 1 – 2.5 mm, inner and outer converting to disc. Blooms from June to August.

*A. pilosa* is listed in Annex II of the Habitats Directive of the European Union (Council Directive 92/43/EEC of 21 May 1992). According to the monitoring data from 2017 – 2018 (Anonymous 2018), *A. pilosa* in Latvia is distributed very unevenly – mainly present in Central, Northern and Eastern Latvia and is relatively uncommon in the coastal lowlands and Western Latvia (Fig. 2).

Typical habitats – meadows, shrubs, forest edges, often occurs in disturbed habitats – forest clearings, forest roads and lanes.

*Agrimonia procera* Wallr. Erst. Beitr. Fl. Hercyn. 203. 1840; in Linnaea, xiv. (1840) 573 (1840).

New species for the flora of Latvia.

Morphology. Perennial, 40 – 200 cm. Stem ribbed with long eglandular and short glandular hairs, without leaf rosette. Leaves lanceolate, with large toothed margin, coarsely and acutely serrate almost to the base, under side gray-green, covered with glandular hairs. The upper stem leaves are almost as large as the lower ones. Petals 5, 4 – 5 mm long, golden yellow, oblong to obovate, often emarginated. Inflorescence long spike, flowers

Table 1. Main morphological characters for determination of three basic species

Morphological character	Taxon		
	<i>A. pilosa</i>	<i>A. eupatoria</i>	<i>A. procera</i>
Hairiness of the stem	Dispersedly covered by long eglandular and short glandular hairs	Densely covered by long and short eglandular and short glandular hairs	Dispersedly covered by long eglandular and short glandular hairs
Leaves	Obovate, obovate-elliptic, or obovate-lanceolate, with 3 – 8 pairs of teeth, cuneate and entire at base	Elliptical or oval, margin is incised-dentate and sometimes serrate	Lanceolate, margin with large teeth
Fruit	Obconical, 5.5 – 6.5 × 3 – 4 mm	Campanulate, 6 – 7 × 3.6 – 4.5 mm	Cupuliformis, 6.5 – 7.5 × 5.5 – 6.5 mm
Bristles	1 – 2.5 mm, inner and outer converting to disc	1.5 – 2.5 mm, erect	2 – 5 mm, inner erect, outer deflexed

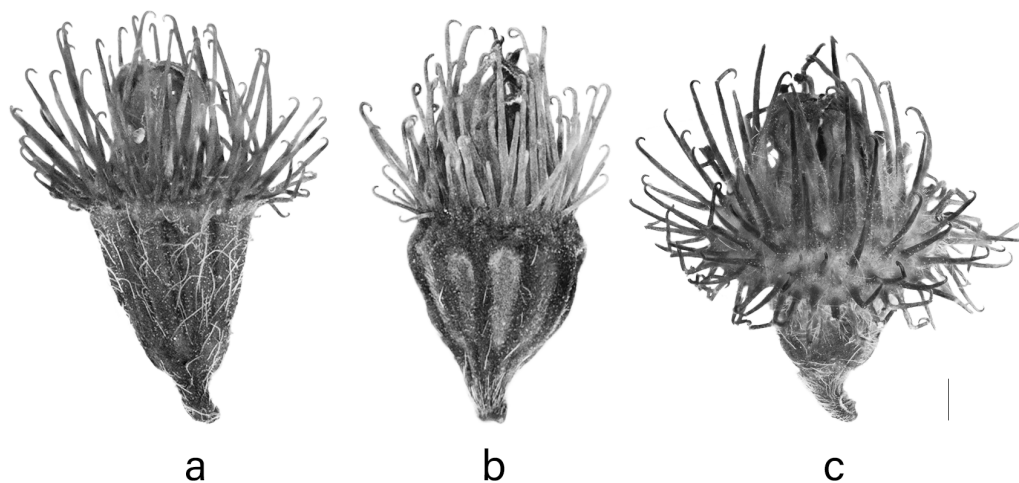


Fig. 1. Seeds of *Agrimonia* L. species: a – *A. eupatoria* L.; b – *A. pilosa* Ledeb.; c – *A. procera* Wallr. (Bar equals 1 mm).

fragrant. Fruit cupuliformis, 6.5 – 7.5 × 5.5 – 6.5 mm, bristles 2 – 5 mm, inner erect, outer deflexed. Blooms from June to September.

Typical habitats – meadows, shrubs, forest edges, roadsides.

First collected herbaria material in Latvia – Ambeļi (Suveizda, 31001022, 03/06/1988). In Latvia is known from four localities – Naukšēni district, Naukšēni rural municipality, ~7,5 km NE of Naukšēni, “Apsītes” (E. Ozola, 100004962,

02/09/2019); Daugavpils district, Demene rural municipality, ~800 m NW of Kovališķi, ~300 m NW of “Tīrumi 1”, (D. Krasnopoļska, 100004649, 18/07/2019); Ilūkste district, Šēdere rural municipality, ~2,3 km N of Rauda, ~400 m NNE of “Osīši”, (D. Krasnopoļska, 100004650, 09/07/2019); Ilūkste district, Šēdere rural municipality, ~1,7 km N of Rauda, ~200 m NW of “Indrāni”, (D. Krasnopoļska, 100004651, 09/07/2019).

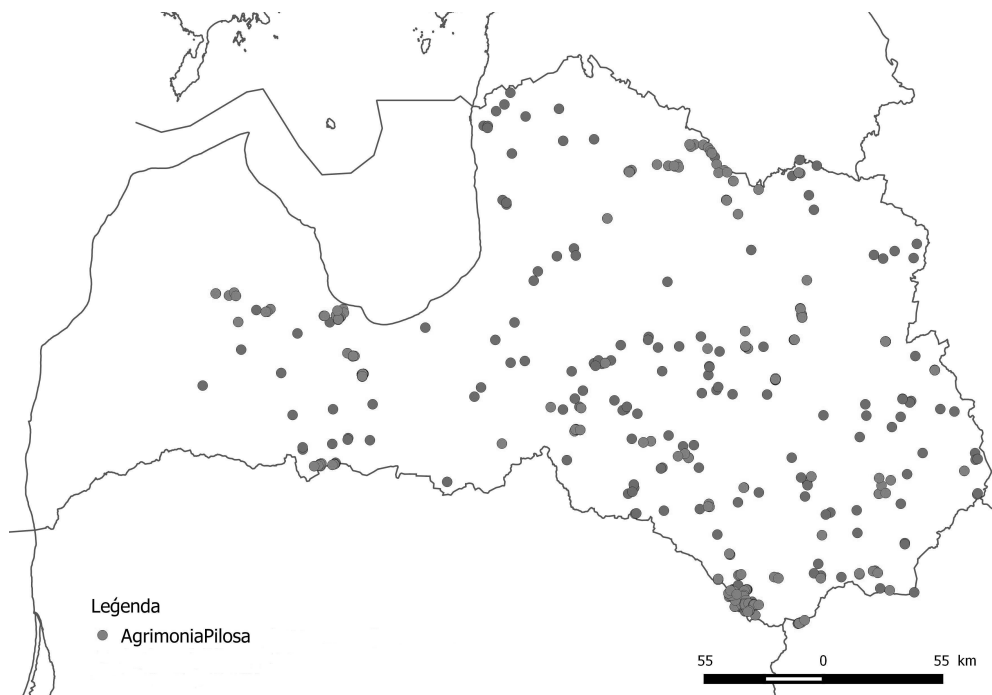


Fig. 2. Distribution of *Agrimonia pilosa* Ledeb. in Latvia (Anonymous 2018).

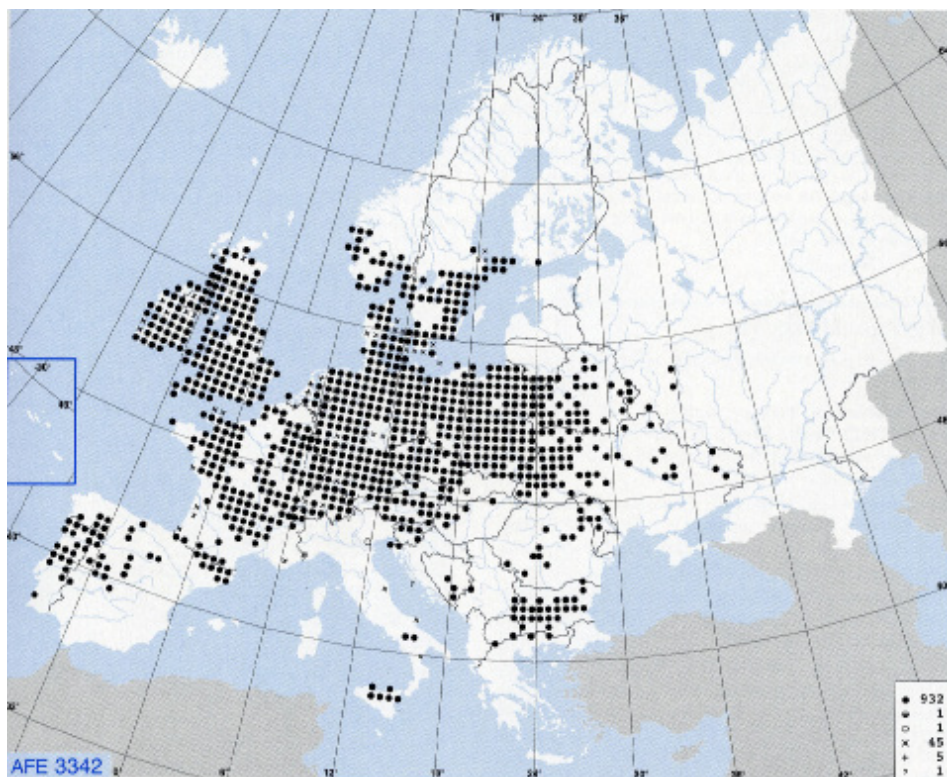


Fig. 3. Distribution of *Agrimonia procera* Wallr. In Europe (Kurtto et al. 2004).

*Agrimonia* × *wirtgenii* Asch. & Graebn. Syn. Mitteleur. Fl. 6(1): 425 (1902).

New hybridogenous species for the flora of Latvia.

Hybrid between *A. eupatoria* and *A. procera*. The main morphological character for distinction from parental species is hairiness of the stem. Both *A. × wirtgenii* and *A. eupatoria* have three types of hairs on stem. The hairiness of the stem of *A. × wirtgenii* varies from dispersedly to densely covered by long eglandular hairs, short eglandular hairs moreover concentrate on the upper part of the stem (singular short eglandular hairs tend to be in the middle and lower part). Morphology of leaves contains features from both parental species.

First time collected in Preiļi district, Preiļi rural municipality, ~6 km S of Preiļi, Beči, ~600 m SEE of “Avenāji” (G. Evarte-Bundere, 100004964, 30/06/2019). Later in 2019 was found in Ilūkste district, Šēdere rural municipality, ~1,7 km N of Rauda (D. Krasnopolska, 100004651, 09/07/2019). Later, in 2020 also was found in two localities.

### *Agrimonia eupatoria* × *pilosa*

Hybridogenous taxon in Latvia is known from two localities. The main morphological character for distinction from parental species is hairiness of the stem, leaf form and number of teeth. *A. eupatoria* × *pilosa* like *A. eupatoria* has three types of hairs of stem. The hairiness of the stem of *A. eupatoria* × *pilosa* varies from dispersedly to densely covered by long eglandular hairs, short eglandular hairs moreover concentrate on the upper part of the stem (singular short eglandular hairs tends to be in the middle and lower part). Morphology of leaves contains features from both parental species but are more similar to *A. pilosa* leaves.

First time collected in Krāslava district, Krāslava rural municipality, nature park “Daugavas loki”, Baltiņi (G. Evarte-Bundere, 100002750, 22/07/2017). In 2019 was found in Daugavpils

district, Demene rural municipality, ~800 m NW of Kovališki (D. Krasnopolska, DAU100262, 18/07/2019).

## DISCUSSION

### MORPHOLOGICAL CHARACTERS

The detection and identification of morphological boundaries of *A. eupatoria* and *A. procera* have led to major confusion. These two species rarely hybridise and are remarkably similar, both can occur together in mixed population. *A. eupatoria* can be distinguished from *A. procera* by the combination of both long and short eglandular hairs on the stem, and more pubescent and more shallowly and bluntly serrate leaflets (Skalický 1962), as well as by fruit morphology – form and mutual location of bristles.

Descriptions of plants collected in Latvia makes it obvious that all typical morphometric features of the species are the same as they are in descriptions of the species from other parts of the range (Skalický 1968, Skalický 1995, Асенов 2003). The specimens have been collected in the localities within various phenological phases, through which it has been stated that the main diagnostic characters of these *Agrimonia* species have not changed significantly.

### HABITATS

Different *Agrimonia* species have a relatively different ecological requirements and correlation with specific habitats. In Latvia *A. eupatoria* is recognized as a common species for dry forest edges and grasslands – habitat 6210 *Semi-natural dry grasslands and scrubland facies on calcareous substrates* (Festuco-Brometalia) (Rūsiņa 2013). However, *A. eupatoria* is usually found in young grasslands, less than 50 years old (Ingrouille 1995). In Central part of European Russia species is encountered as a plant with more non-specific habitat requirements – forests, sandy slopes, dry meadows (xerophyte grasslands) and other grasslands and anthropogenic disturbed sites (Маевский 2006). *A. procera* is a species

with similar ecological requirements – the species belongs to the remarkably similar dry grassland communities on calcareous soils as it can be considered from known localities. In Latvia it was collected in calcareous mesotrophic grasslands with low quality or even completely overgrown with expansive plant species *Calamagrostis arundinacea* (L.) Roth, *Dactylis glomerata* L., *Festuca rubra* L., *Potentilla argentea* L., *Trifolium medium* L. and another species of *Agrimonia* – *A. eupatoria*. The same habitats are typical for the new hybrid species – *Agrimonia* × *wirtgenii*.

Third *Agrimonia* species in Latvia – *A. pilosa* requires significantly different types of habitats and is characteristic for secondary forests with dominance of *Alnus incana* (L.) Moench, as well as forest trails and contact stripes with grasslands (Anonymous 2018).

## DISTRIBUTION

*A. procera* occurs across Central and Eastern Europe, including southern part of British Isles, Southern Scandinavia, Balkan Peninsula, and western part of Russia. Species is also known from Pyrenees and some other regions of Southern Europe as separate points outside of the continuous species range (Fig. 3). At the same time information about the presence of the species in the Baltic States was scarce – it was known from the extreme south of Lithuania (Meusel et al. 1978; Kurtto et al. 2004). Nevertheless, the species was later found and recorded in both Estonia and Lithuania (Krall & Baroniņa 1996, Rytteri et al. 2003). Thus, new findings of this species in Latvia should be regarded as expected and inevitable. At the same time, the findings of this species should not be considered as a natural expansion of the species range due to the climate change, but as a result of botanical research increase.

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