

***OENOTHERA ALBIPERCURVA* – EVENING-PRIMROSE SPECIES NEW TO THE FLORA OF LITHUANIA**
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Abstract

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Oenothera albipercurva Hudziok was reported for the first time in the Lithuanian flora. It is tenth *Oenothera* species noted in Lithuania. It was found in the association *Cladonio-Pinetum* nearby Merkinė town in the southern part of the country in 2005. According to the early stage of development (June), fully-flowering plants were very sparse. *Oenothera albipercurva* is of hybridogenous origin (*O. biennis* L. × *O. ammophila* Focke), discovered and reported by Renner in 1937 from Germany, currently distributed in Central and Eastern Europe. It resembles *O. ammophila* by its narrow leaves and divergent sepal tips, but can be easily distinguished mainly by its clearly larger flowers (petal length 15–26 mm instead of 12–18 mm) and red papillae on the underside of leaves. Some examples of significant mistakes found in the descriptions of this species in literature and main diagnostic characters are given.

Keywords: hybrid origin taxon, Lithuania, *Oenothera albipercurva*, *Onagraceae*, PTH.

Intensive research on the genus *Oenothera* began in 1886, when Hugo de Vries observed phenotypic ratio in *Oenothera lamarckiana* Seringe. Many significant findings, including re-discovery of Mendelian inheritance rules and the mutation theory, were made on *Oenothera*. Since then the genus has become a classical example of partial or complete permanent translocation heterozygosity (PTH), balanced lethal system in plants and much more (RAUWOLF et al., 2008; summarized in CLELAND, 1972 and HARTE, 1994).

Despite all genetic and cytogenetic findings, the taxonomic treatment of this group remains unclear. Within the section *Oenothera*, subsection *Oenothera*, still coexist two so-called taxonomic schools: the American, represented by Munz, Cleland, Dietrich, Wagner and Raven, and the European, represented mainly by Hudziok, Rostański, Jean, Soldano and Jehlík (ROSTAŃSKI et al., 2004). Based on different

species concepts, only 6 and over 100 taxa, respectively, are being distinguished in Europe.

Species concept

The main concern about *Oenothera* taxonomy is the accepted species concept within the genus. Broadly treated species by American taxonomists are splitted into several so-called microspecies by European researchers.

All European *Oenothera* species (section *Oenothera*, subsection *Oenothera*) are permanent translocation heterozygotes. It means that most or even all of chromosomes are joined to each other to form haploid Renner's complexes and those complexes are being transferred to the next generation via female or male gametes. Lethal factors within complexes suppress the development of homozygotes; with the predominance of self-pollination, highly uniform populations are being formed. An occasional

exchange of genetic material by hybridization process between such populations causes the substantial increase of variability. Arisen hybrids are treated as manifestation of variability within species or hybrids without giving a formal grade by the representatives of American school, or as a newly aroused species by European taxonomists. In the present paper, the European concept of species was adopted.

During my staying in Lithuania in June 2005, I found an evening-primrose species, which had not been previously reported – *Oenothera albipercurva* Hudziok. To date, nine species of the genus *Oenothera* L., section *Oenothera*, subsection *Oenothera* have been reported from the country: *O. biennis* L., *O. depressa* Greene, *O. perangusta* Gates, *O. rubricaulis* Kleb., *O. ammophila* Focke, *O. wienii* Rostański (*O. rubricaulis* × *O. depressa*), *O. casimiri* Rostański (*O. biennis* × *O. rubricaulis*) and *O. hoelscheri* Rostański (*O. rubricaulis* × *O. depressa* or *O. biennis* × *O. depressa*) (ROSTAŃSKI et al., 2004; ROSTAŃSKI & GUDŽINSKAS, 2005; ROSTAŃSKI et al., 2010).

Site description

The site is located nearby Merkinė town, in the southern part of the country (Fig. 1.), where previously had also been reported two parental species of this taxon (ROSTAŃSKI et al., 2004). It is noteworthy that the habitat was not disturbed or ruderal field, but the clearance area in the forest stand of the *Cladonio-Pinetum* association. In spite of the early stage of

flourishing (June), fully-developed plants were very sparse.

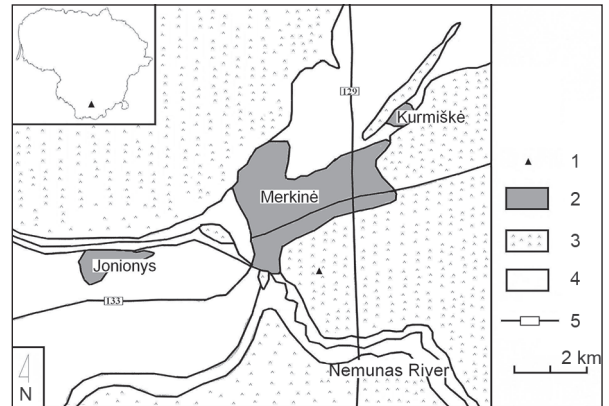


Fig. 1. Locality of the stand of *Oenothera albipercurva* in Lithuania: 1 – new stand; 2 – built-up areas; 3 – woodlands; 4 – other (wastelands, farmlands, riversides, etc.); 5 – main roads. (Map of Lithuania prepared after www.pl.dreamstime.com. [Access: 21. 11. 2014].)

Characteristics of *O. albipercurva*

In some of available publications, I have found several significant mistakes and misinformation conflicting with the protologue or inconsistent each with other (Table 1). That is why I decided to present the most important diagnostic characters of the taxon.

***Oenothera albipercurva* Hudziok**, Verh. Bot. Vereins Prov. Brandenburg 105: 105. 1968. TYPE: Germany. “Brandenburg: Jüterbog, Eisenbahneinschnitt W. Hauschteckslust, 15 VIII 1967”, Hud-

Table 1. The most significant differences and mistakes in available publications concerning *Oenothera albipercurva* Hudziok. Abbreviations ‘Pol.’ and ‘Eng.’ applies to Polish and English descriptions, respectively, presented in the given publication

Character	Source of Information
red pointing of the stem	clearly (RENNER, 1937; ROSTAŃSKI et al., 2010 – Pol.)
	slightly (ROSTAŃSKI et al., 2010 – key)
sepal tips at base	appressed (ROSTAŃSKI et al., 2010 – Pol.)
	divergent (ROSTAŃSKI, 1975; ROSTAŃSKI et al., 2004)
petals	15–26 mm long (HUDZIOK, 1968; ROSTAŃSKI & SZOTKOWSKI, 1973; JEHLÍK & ROSTAŃSKI, 1979)
	12–18 long and broad or slightly narrower (ROSTAŃSKI et al., 2004)
	15–30 × 18–35 mm (ROSTAŃSKI et al., 2010 – Pol.)
	20–25 × 22–30 mm (ROSTAŃSKI & GŁOWACKI, 1977)
predominated measurement of petals	both equal or length predominates (ROSTAŃSKI et al., 2004)
	width predominates (ROSTAŃSKI & GŁOWACKI, 1977; ROSTAŃSKI et al., 2004 – key; ROSTAŃSKI & KARLSSON, 2010; ROSTAŃSKI et al., 2010 – Eng.)
stigma lobes length	5–8 mm (ROSTAŃSKI, 1998; ROSTAŃSKI et al., 2004)
	5–15 mm (ROSTAŃSKI et al., 2010)
shape of corolla-fruit teeth	acuminate (ROSTAŃSKI et al., 2004)
	obtuse or truncate (ROSTAŃSKI & KARLSSON, 2010, ROSTAŃSKI et al., 2010 – Eng.)

ziok s. n. [NEOTYPE (DIETRICH et al., 1997): HAL-075229].

English name: Bend evening primrose.

Diagnostic characters. Stem green or flushed with red, straight, mostly simple, usually clearly red punctulated. Rhachis usually red flushed and punctulated, glandular puberulent, bent at the tip. Cauline leaves lanceolate, light green, usually with white veins and with red papillae at the underside. Inflorescence loose. Flower buds green or red flushed, covered by stiff hairs and usually red papillae. Sepals tips at the base clearly divergent. Hypanthium to 40 mm long. Ovaries red punctulated. Petals yellow, obcordate, 15–26 mm long, 17–28 mm broad. Stigma lobes at the same height as stamens. Capsules covered by glandular and strigillose pubescent, with acuminate teeth.

The species is a biennial plant, flowering from (June) July to September, originated in Europe by a cross: *O. biennis* × *O. ammophila* (RENNER, 1937; ROSTAŃSKI et al., 2010). It is worth paying attention to the fact that a reverse hybrid (*O. ammophila* × *O. biennis*) = × *rubirigida* Renner, *nom. inval.* represents a different phenotype, more similar to *O. biennis*, with straight inflorescence tips, but also having red-coloured papillae (RENNER, 1937).

Number of chromosomes: 2n = 14; base number x = 7 (PRZYWARA & ROSTAŃSKI, 1980; ROSTAŃSKI & KARLSSON, 2010).

Renner's complexes. According to Renner's experiments, *Oenothera albipercurva* possesses two chromosomal complexes: *albicans* and *percurvans* (RENNER, 1937; DIETRICH et al., 1997). The former was inherited from *O. biennis* (♀ *albicans* ♂ *rubens*), the latter from *O. ammophila* (♀ *rigens* ♂ *percurvans*) (RENNER, 1937). The *percurvans* complex contains inter alia dominant alleles Perc and P^{Ppc}, which determine strongly bent stem tip and red coloured papillae on stem and calyx, respectively (RENNER, 1942). That is why *O. albipercurva* is more similar to *O. ammophila*.

Genomes and plastome type. Based on crossing experiments, Stubbe divided all Renner's complexes into three main types (A, B and C) and plastomes (plastid genomes) into five different types: I, II, III, IV and V. According to this partition, thirty plastome-genome combinations are possible, but only seven were observed in nature. One of these is AC-

IV, presents in *O. albipercurva* and also in closely related species: *O. ammophila* and *O. oakesiana* (STUBE, 1959; DIETRICH et al., 1997).

Habitat. Dry, open, sandy places; railway yards; roadsides.

Hybrids. Naturally occurring hybrids were not observed, however, Renner noted some results of artificial crossings (introgressions) made by him: *O. albipercurva* × *O. biennis* = *O. biennis*; *O. biennis* × *O. albipercurva* = *O. albipercurva*; *O. albipercurva* × *O. ammophila* = *O. albipercurva* (RENNER, 1937).

Variability. During his experiments, Renner also observed some individuals, which looked like *O. albipercurva*, but without red spots on stem, sepals and ovaries. He called them *impunctata* or *p-albipercurva* (RENNER, 1937). Their origin is probably connected with the crossing over the process between Renner's complexes, when the recessive allele p (responsible for the lack of red spots) is being transferred from *albicans* to *percurvans* (to create *p-percurvans* instead of 'normal' *P-percurvans*). After self-pollination, *p-percurvans* with 'normal' *p-albicans* would give *p-albipercurva* phenotype. Hudziok distinguished those specimens in the range of variety (HUDZIOK, 1968).

Distribution in Europe. As the first stand, Renner pointed a German isle – Helgoland, where A. Ascherson in 1899 collected the first specimen of the species preserved in Berlin Herbarium (RENNER, 1937). In Germany, it has also been noted later by several authors (HUDZIOK, 1968; GUTTE & ROSTAŃSKI, 1971; ROSTAŃSKI et al., 2010). Besides Germany, it has been observed in the territory of Denmark (ROSTAŃSKI, 2006b; ROSTAŃSKI et al., 2010), Czech Republic (JEHLÍK & ROSTAŃSKI, 1979; ROSTAŃSKI et al., 2010), the Ukraine (ROSTAŃSKI et al., 2010), Belarus (ROSTAŃSKI et al., 2004; ROSTAŃSKI et al., 2010) and Poland (ROSTAŃSKI, 1975; ROSTAŃSKI, 2006a; ROSTAŃSKI & GŁOWACKI, 1977; ROSTAŃSKI & SZOTKOWSKI, 1973; ROSTAŃSKI et al., 1989; ROSTAŃSKI et al., 2010).

Nomenclature and taxonomic status

The name of the taxon was firstly proposed by RENNER (1937), but Latin diagnose and a type indication was lacking (ICN Art. 39.1. & 40.1.). Later HUDZIOK (1968) validated the name according to the rules of International Code of Nomenclature (MCNEILL et al., 2012). Holotype collected on 6 June

1967 (HUDZIOK, 1968) preserved in HAL is considered to be lost, thus Dietrich (DIETRICH et al., 1997) designated another specimen collected by Hudziok from the same locality, but on different day – 15 Aug. 1965 to serve as nomenclatural type.

According to European taxonomists, *O. albipercurva* is treated as hybrid origin species. At first it was assigned to the hybrids of the *Cernuae* Renner group (RENNER, 1937), then to the section *Parviflora* Rostański (HUDZIOK, 1968). Finally, after thorough revision of the genus *Oenothera*, the species was designated by Rostański to the series *Rugglesia* (ROSTAŃSKI, 1985). On the other hand, many authors representing the so-called American school of taxonomy believe that such taxa as *O. albipercurva* should be treated only as local hybrids without a formal grade (DIETRICH et al., 1997).

In my opinion, it is a fine distinguished, hybrid origin taxon (*O. biennis* × *O. ammophila*), more similar to the parental species by narrow leaves, red papillae, curved inflorescence tip and divergent sepal tips (Fig. 2). To *O. biennis*, it refers mainly by its larger flowers. According to DIETRICH et al. (1997), it may represent the same phenotype as *O. ×braunii* Döll. The discussion concerning the taxonomical status of the taxon is planned to be presented in a separate publication.



Fig. 2. *Oenothera albipercurva* Hudziok. Red punctulated rhachis and bractal nerves are clearly visible

The collected specimen of *Oenothera albipercurva* is deposited at the Herbarium of the Institute of Botany of Jagiellonian University in Kraków (KRA).

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OENOTHERA ALBIPERCURVA – NAUJA LIETUVOS FLOROS NAKVIŠŲ RŪŠIS

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Santrauka

Pranešama apie Lietuvos teritorijoje rastą naują rūšį *Oenothera albipercurva* Hudziok. Ji buvo aptikta 2005 metų birželio mėnesį pietinėje šalies dalyje netoli Merkinės. Taksonas yra Europoje atsiradęs hibridas (*O. biennis* × *O. ammophila*), RENNER'io 1937 m. aptiktas Vokietijoje. Jis pana-

šus į tėvinę rūšį lenkta žiedyno viršūne, raudonos spalvos papilomis ir aiškiai lenktomis taurėlapiais viršūnėmis. *O. biennis* ji labiausiai primena stambesniais žiedais. Tai dešimtoji Lietuvoje aptikta *Oenothera* genties (*Oenothera* sekcijos, *Oenothera* posekcijoje) rūšis.