

VACCINIUM MACROCARPON – A NEW ALIEN PLANT SPECIES IN LITHUANIA
Zigmantas GUDŽINSKAS^{1*}, Lukas PETRULAITIS², Lina ARLIKEVIČIŪTĖ²
¹ Nature Research Centre, Institute of Botany, Žaliųjų Ežerų Str. 49, LT-08406 Vilnius, Lithuania;

² Šiauliai University, Faculty of Technology and Natural Sciences, Department of Environmental Research, P. Višinskis Str. 19, LT-77156 Šiauliai, Lithuania

*Corresponding author. E-mail: zigmantas.gudzinskas@botanika.lt

Abstract

Gudzinskas Z., Petrulaitis L., Arlikevičiūtė L., 2014: *Vaccinium macrocarpon* – a new alien plant species in Lithuania [Stambiauogė spanguolė (*Vaccinium macrocarpon*) – nauja svetimžemė rūšis Lietuvoje]. – Bot. Lith., 20(1): 41–45.

Extensive colonies of *V. macrocarpon* Aiton were found in 2013 during the investigations of the flora of Rėkyva wetland complex (Šiauliai district) in a cutover and abandoned Piktmiškis peatbog situated in the environs of Rėkyva village. This species was widely distributed on about 31 ha area and solitary individuals or small patches were recorded in various distance from the dense population in bog woodlands. It is supposed that seeds of this species were dispersed by birds. *V. macrocarpon* should be treated as a naturalized species in Lithuania. Recommendation to use *V. macrocarpon* for re-cultivation of cutover peatbogs should be considered with caution in order to avoid its probable invasions in natural, disturbed and degraded bog habitats. Notes on cranberry nomenclature and taxonomy are also provided.

Keywords: alien species, bogs, cranberry, naturalization, peatland, spread.

INTRODUCTION

Bogs are among the most resistible habitats to alien plant invasions. Mires, especially bogs and fens are least invaded habitats in Europe. Only approximately 10% of alien plant species recorded in Europe occur in these habitats (LAMBTON et al., 2008). In Lithuania, 18 alien plant species were recorded in bog, swamp and fen habitats, and only a few aliens were recorded in bog forests, natural and degraded bogs, e.g. *Aronia melanocarpa*, *Bidens frondosa*, *Epilobium ciliatum*, *Pinus banksiana*, *Pinus mugo*, etc. (GUDŽINSKAS, 1997, 2000 a, b; LAMBTON et al., 2008).

In 2013, a new alien plant species *Vaccinium macrocarpon* Aiton, occurring in degraded bog habitat, was recorded in Lithuania. This berry plant in Lithuania was introduced in 1965 and initially

was cultivated in collections and botanical gardens, later was occasionally planted in cutover peatbogs (LEKAVIČIUS & BUTKUS, 1976). Nowadays *V. macrocarpon* in Lithuania is cultivated increasingly widely in private gardens and small plantations (DAUBARAS et al., 2011). It is also recommended for cultivation in bogs and cutover peatbogs (GRYBAUSKIENĖ, 2008).

Cultivation of *V. macrocarpon* for its edible fruits in North America started in 1816 (ECK, 1931). Currently it is grown as a commercial crop on approximately 16.200 ha across the northern United States and Canada (SONG & HANCOCK, 2011).

In Europe, *V. macrocarpon* was introduced in the 19th century. It was introduced accidentally in the British Isles prior to 1869 and currently is naturalized in a few places (JACQUEMART, 1997). In Switzerland, it is a naturalized alien species (WITTENBERG, 2005). In the Netherlands, this species was first recorded

on Terschelling Island (Wadden Isles). It reached the island by ship-wreck and later was taken into cultivation. Nowadays it plays an important role in wet dune heathland vegetation of the Wadden Isles, but is virtually absent from the mainland coastal dunes (WEEDA, 2010). Escaped from cultivation in the Netherlands, this species was recorded in 1957 in Kalmthout-Boterbergen (VANSTEEVENVOORT, 2002; VERLOOVE, 2002). A small population is more or less naturalized in peaty heathland and was probably introduced by birds. Nowadays in the Netherlands *V. macrocarpon* is considered as invasive species (WEEDA, 2010).

In Latvia and Estonia, *V. macrocarpon* is also cultivated in plantations on peatbogs. In south-western Estonia in 1968, on a part of Kodaja bog (Sookuninga Nature Reserve) testing fields (9.5 ha) of *V. macrocarpon* were established, but no negative influence of this species on native vegetation and its recovery was noted (DUINEN et al., 2006).

In 1990, *V. macrocarpon* was planted for the experiment on Krakulice peatbog in Słowiński National Park (northern Poland). After the experiment, the plants were left unmanaged (BRAUN et al., 2009). Another locality of *V. macrocarpon* in Poland is known in Bielawa Nature Reserve (south of Gdańsk), at the edge of peatbog. At present this species in both localities has no negative influence on native plant species, however, the risk of further spread and invasion to bog habitats of Poland is not excluded (BRAUN et al., 2009).

RESULTS AND DISCUSSION

Escaped *Vaccinium macrocarpon* in Lithuania

Extensive colonies of *V. macrocarpon* were found in 2013 during the investigations on the flora of Rėkyva wetland complex (Šiauliai district) in a harvested and abandoned Piktmiškis peatbog situated in the environs of Rėkyva village.

Vaccinium macrocarpon Aiton, Hort. Kew., 2: 13, plate 7. 1789. – *Oxycoccus macrocarpus* (Aiton) Pers., Syn. pl., 1: 419. 1805; Lekavičius et Butkus in Liet. Fl., 5: 124. 1976, cum auct. comb. Pursh; Gudžinskas in Vasc. Pl. Lithuan.: 104. 1999, cum auct. comb. Pursh.

Subshrubs with flexible, woody, trailing stems of

40–150 (180) cm long and upright, 10–15 (20) cm high shoots, growing from axillary buds. Leaf blades are narrowly elliptic or elliptic, rarely oblong, 5–18 mm long and 2–6 mm wide, with entire, slightly revolute margins. The upper side of leaves is green, the lower side is glaucous. Inflorescences grow from axils of leaf-like bracts at base of current year's shoots. Flowers are born on 2–3 cm long slender, nodding pedicels, with 2 greenish white, leaf-like, 2–4 mm long and 1–2 mm wide bracteoles. Calyx lobes are relatively small, corolla is strongly reflexed at anthesis, white to pink. Stamens 8, their filaments are hairy, anther tubules 1–2 mm long. Berries are dark red, red to pink, 10–20 mm in diameter, smooth.

V. macrocarpon is native to eastern North America, where it grows in bogs, swamps, fens, and wet shores from the sea level to 1400 m above the sea level. This species is also introduced and escaping outside its native range in western regions (British Columbia, Oregon, and Washington) of North America (VANDER KLOET, 2009).

Herbarium specimen: Šiauliai district, environs of Rėkyva village, Piktmiškis bog, drained, cutover and abandoned area of peatbog overgrown by trees and shrubs; abundant; 55° 52' 51" N; 23° 20' 02" E. 6 September 2013. Leg. Z. Gudžinskas (BILAS).

Drainage and peat mining in Piktmiškis bog started at the beginning of the 20th century and continued until 1980s. Plantation of *V. macrocarpon* in the peatbog was established in late 1980s and soon was left unmanaged. Nowadays, in the southern part of Piktmiškis bog, *V. macrocarpon* occupies about 31 ha area, where it covers on average 55% of the ground surface. In some areas, the coverage of this species is over 75%. *V. macrocarpon* is sparsely distributed in the bog woodland communities (ass. *Vaccinio uliginosi-Pinetum sylvestris* De Kleist 1929 em. Matuszkiewicz 1962), which are situated along the southern and western edges of the cutover peatbog. Solitary individuals or small patches of *V. macrocarpon* were recorded in various distance from the dense population. Bog woodlands with sparsely distributed *V. macrocarpon* comprise about 25 ha area. It is supposed that seeds of this species were dispersed by birds. Dispersal of seeds by humans is also possible. In Rėkyva bog, which is situated 4.5 km to the southwest of Piktmiškis bog, on the south-western side

of Lake Rėkyva, *V. macrocarpon* in 2013 was not found, however, its existence in other parts of a large Rėkyva wetland complex is highly probable.

Habitat of *V. macrocarpon* is characterized by sparse second tree layer of *Betula pubescens* and rather dense shrub layer composed by *Pinus sylvestris*, *Betula pubescens* and solitary individuals of *Populus tremula*. Herb layer is dominated by *Vaccinium macrocarpon*, much less abundant are *Molinia caerulea*, *Eriophorum vaginatum*, *Eriophorum angustifolium* and *Calluna vulgaris*, whereas other herb species (e.g. *Calamagrostis stricta*, *Drosera rotundifolia*, *Carex rostrata*, etc.) as well as bryophytes (*Dicranum polysetum*, *Pleurozium schreberi*, *Pohlia nutans*, *Polytrichum strictum*, *Sphagnum magellanicum*, etc.) are sparse in the communities of the recovering peatbog vegetation. Mean coverage of the second tree layer is 15%, shrub layer – 30%, herb layer – 60%, bryophyte layer – 5%.

V. macrocarpon produces long trailing stems and freely spreads over the peatbog. At the beginning of September 2013, the length of trailing stems on the ground ranged from 60 to 170 cm. Mean length of the first year trailing stems was 115 cm and they covered on average 4.5% of the surface (Fig. 1, a). Trailing stems grown in the previous year had upright shoots and they covered from 22% to 27% of the surface (Fig 1, b). Thus, each well-established colony of *V. macrocarpon* increases in size at least in 1 m on each side. In bog woodland habitats, the intensity of spread is much lower; however, further observations on this process should be performed in the future.

In 1970s, *V. macrocarpon* was planted in the peatbog of Baltoji Vokė in Trakai district (LEKAVIČIUS

& BUTKUS, 1976). Present state of this plantation is unknown. Almost all area of the cutover peatbog of Baltoji Vokė is overgrown by dense shrubs and reeds. We were not able to find maps of the peatland with the indication of *V. macrocarpon* plantation. Nevertheless, further search for *V. macrocarpon* on the peatbog is desirable in order to reveal the state of its population.

Considering the present state of population in the abandoned Piktmiškis peatbog and the surrounding bog forests, its putative spread by seeds and intense expansion by trailing stems, *V. macrocarpon* is undoubtedly a naturalized species with potential to become invasive. Its further spread in Rėkyva wetland complex as well as in other bogs and peatbogs is probable. Having in mind that seeds of this species can be dispersed by birds, its spread over considerable area in the nearest future can be expected. Although *V. macrocarpon* is recommended for re-cultivation of excavated peatbogs (VALSTYBĖS ŽINIOS, 1999; GRYBAUSKIENĖ, 2008), this proposal should be considered with caution in order to avoid future problems due to its probable invasions in natural, disturbed and degraded bog habitats.

Identification of cranberry species and remarks on their taxonomy and nomenclature

Formerly widely accepted genus *Oxycoccus* Hill (*Ericaceae*) now is treated to be congeneric with the genus *Vaccinium* L. and is segregated at the rank of section *Vaccinium* sect. *Oxycoccus* (Hill) W.D.J.Koch (SUDA & LYSÁK, 2001; RUIZHENG & STEVENS, 2005; VANDER KLOET, 2009; SONG & HANCOCK, 2011, etc.) or subgenus *Vaccinium* subgen. *Oxycoccus* (Hill)

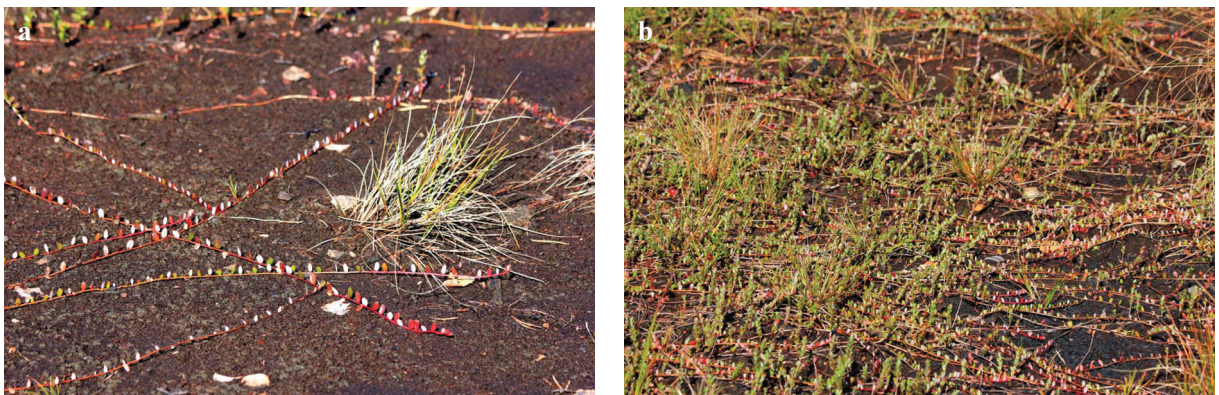


Fig. 1. Spread and establishment of *Vaccinium macrocarpon*: a – first year trailing stems on peat; b – second year stems with upright shoots

A.Gray (RAVANKO, 1990; JACQUEMART, 1997, etc.).

Worldwide this group of plants includes from two to five species according to different taxonomic views (VANDER KLOET, 1983, 2009; RAVANKO, 1990; WENDEROTH & WENDEROTH, 1994; SUDA & LYSÁK, 2001, etc.). East Asian and North American species *V. erythrocarpum* (Michx.) Pers. sometimes is included in the section *Oxycoccus* (or subgen. *Oxycoccus*) or treated as separate section *Oxycoccoides* Benth. et Hook. f. (SONG & HANCOCK, 2011).

In Lithuania, *Vaccinium* sect. *Oxycoccus* (Hill) W.D.J.Koch is represented by two native species – *Vaccinium oxycoccos* L. (*Oxycoccus palustris* Pers.) and *Vaccinium microcarpum* (Turcz. ex Rupr.) Schmalh. (*Oxycoccus microcarpus* Turcz. ex Rupr.). Earlier *Vaccinium macrocarpon* in Lithuania was known in cultivation only (LEKAVIČIUS & BUTKUS, 1976; GUDŽINSKAS, 1999), but now it is reported as escaped and naturalized species.

In vegetative condition *V. macrocarpon* can be distinguished from both native species (*V. oxycoccus* and *V. microcarpum*) by upright, 10–15 (20) cm high shoots, growing from trailing stems. Another reliable feature of *V. macrocarpon* is two greenish white, leaf-like, 2–4 mm long and 1–2 mm wide

bracteoles, which are located in the upper part of the pedicel (Fig. 2). Bracteoles of *V. microcarpum* and *V. oxycoccus* are usually less than 1 mm wide and are situated close to the middle of the pedicel or below its middle.

Separation of the native cranberry species is a little bit more complicated. Leaves of *V. oxycoccus* are 5–11 mm long and 2–5 mm wide, whereas those of *V. microcarpum* are 2–6 mm long and 1–2 mm wide. Pedicels of *V. oxycoccus* are pubescent, especially during anthesis, whereas pedicels of *V. microcarpum* and *V. macrocarpon* are glabrous (Fig. 2). Flowers of *V. microcarpum* are predominantly solitary (very rarely three, never more in inflorescence), whereas flowers of *V. oxycoccus*, least on some shoots, are born in inflorescences with three or more flowers.

REFERENCES

- BRAUN M., ZBLEWSKI R., PAWLACZYK P., 2009: Żurawina wielkoowocowa – *Oxycoccus macrocarpos* (Aiton) Pursh. – In: DAJDOK Z., PAWLACZYK P. (eds), Inwazyjne gatunki roślin ekosystemów mokradłowych Polski: 114–118. – Świebodzin.
- DAUBARAS R., ČESONIENĖ L., VIŠKELIS P., 2011: Stambiauogių spanguolių plantacinio auginimo galimybės ir perspektyvos. – Kaunas.
- DUINEN G.-J. VAN, BROUWER E., NIJSSEN M., ESSELINK H., 2006: LIFE Nature Co-op Project “Dissemination of Ecological Knowledge and Practical Experiences for Sound Planning and Management in Raised Bogs and Sea Dunes”. Report of the Second Workshop. – Nijmegen.
- ECK P., 1931: The American cranberry. – Rutgers.
- GRYBAUSKIENĖ V., 2008: Pažeistos teritorijos ir sąvartynai. – Kaunas.
- GUDŽINSKAS Z., 1997: Conspectus of alien plant species of Lithuania. 4. *Asteraceae*. – Bot. Lith., 3(4): 335–366.
- GUDŽINSKAS Z., 1999: Lietuvos induočiai augalai. – Vilnius.
- GUDŽINSKAS Z., 2000 a: Conspectus of alien plant species of Lithuania. 15. *Azollaceae*, *Pinaceae*, and *Salicaceae*. – Bot. Lith., 6(3): 235–242.
- GUDŽINSKAS Z., 2000 b: Conspectus of alien plant species of Lithuania. 16. *Rosaceae*. – Bot. Lith., 6(4): 345–364.

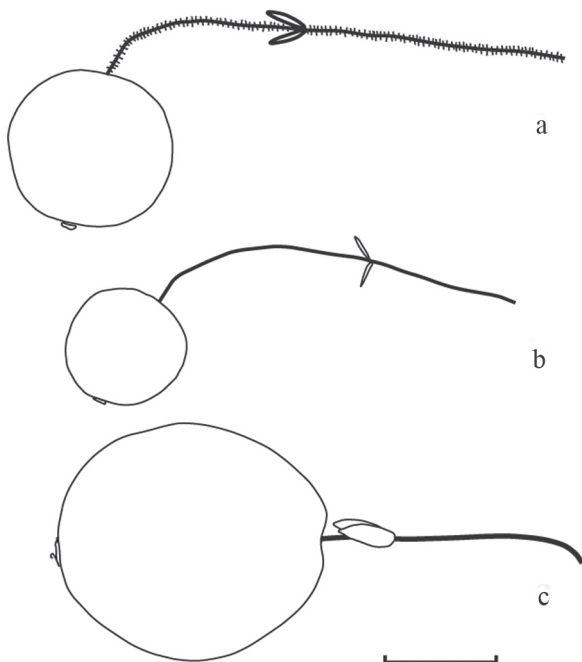


Fig. 2. Fruits with pedicels and bracteoles of cranberry species: a – *Vaccinium oxycoccos*, b – *V. microcarpus*, and c – *V. macrocarpon* (c). Bar – 1 cm

- JACQUEMART A.-L., 1997: Biological flora of the British Isles. *Vaccinium oxycoccus* L. (*Oxycoccus palustris* Pers.) and *Vaccinium microcarpum* (Turcz. ex Rupr.) Schmalh. (*Oxycoccus microcarpus* Turcz. ex Rupr.). – *Journal of Ecology*, 85: 381–396.
- LAMBTON P.W., PYŠEK P., BASNOU C., HEJDA M., ARIANOUTSOU M., ESSL F., JAROŠÍK V., PERGL J., WINTER M., ANASTASIU P., ANDRIOPOULOS P., BAZOS I., BRUNDU G., CELESTI-GRAPOW L., CHASSOT P., DELIPETROU P., JOSEFSSON M., KARK S., KLOTZ S., KOKKORIS Y., KÜHN I., MARCHANTE H., PERGLOVÁ I., PINO J., VILÁ M., ZIKOS A., ROY D., HULME P.E., 2008: Alien flora of Europe: species diversity, temporal trends, geographical patterns and research needs. – *Preslia*, 80: 101–149.
- LEKAVIČIUS A., BUTKUS V., 1976: Spanguolė – *Oxycoccus*. – In: NATKEVIČAITĖ-IVANAUSKIENĖ M. (ed.), Lietuvos TSR flora, 5: 123–128. – Vilnius.
- RAVANKO O., 1990: The taxonomic value of morphological and cytological characteristics in *Oxycoccus* (subgenus of *Vaccinium*, *Ericaceae*) species in Finland. – *Ann. Bot. Fenn.*, 27: 235–239.
- RUIZHENG F., STEVENS P.F., 2005: *Vaccinium*. – In: *Flora of China*, 14: 476–504. – Missouri Botanical Garden.
- SONG G.-Q., HANCOCK J.F., 2011: *Vaccinium*. – In: KOLE C. (ed.), *Wild Crop Relatives: Genomic and Breeding Resources. Temperate Fruits*: 197–221. – Berlin Heidelberg.
- SUDA J., LYSÁK M.A., 2001: A taxonomic study of the *Vaccinium* sect. *Oxycoccus* (Hill) W. D. J. Koch (*Ericaceae*) in the Czech Republic and adjacent territories. – *Folia Geobotanica*, 36: 303–320.
- VALSTYBĖS ŽINIOS, 1999: Metodiniai nurodymai išnaudotiems karjerams, durpynams ir kitaip pažeistai žemei naudoti. – *Valstybės žinios*, Nr. 47–1504.
- VANDER KLOET S.P., 1983: The taxonomy of *Vaccinium* § *Oxycoccus*. – *Rhodora*, 85: 1–43.
- VANDER KLOET S.P., 2009: *Vaccinium*. – In: *Flora of North America North of Mexico. Magnoliophyta: Paeoniaceae to Ericaceae*, 8: 515–535. – New York–Oxford.
- VANSTEENVOORT D., 2002: *Vaccinium macrocarpon*, nog steeds aanwezig in Kalmthout. – *Dumortiera*, 79: 17.
- VERLOOVE F., 2002: Ingeburgerde plantensoorten in Vlaanderen. – In: *Mededeling van het Instituut voor Natuurbehoud*, 20: 1–227.
- WEEDA E.J., 2010: The role of archaeophytes and neophytes in the Dutch coastal dunes. – *Journal of Coastal Conservation*, 14(2): 75–79.
- WENDEROTH C., WENDEROTH K., 1994: Zur Verbreitung karyologisch untersuchter Moosbeeren (*Vaccinium oxycoccus* s. l.) in Teilen Mitteleuropas (Mittel- und Süddeutschland sowie Österreich). – *Berichte der Bayerischen Botanischen Gesellschaft*, 64: 147–155.
- WITTENBERG R. (ed.), 2005: An inventory of alien species and their threat to biodiversity and economy in Switzerland. – *Delémont*.

STAMBIAUOGĖ SPANGUOLĖ (*VACCINIUM MACROCARPON*) – NAUJA SVETIMŽEMĖ RŪŠIS LIETUVOJE

Zigmantas GUDŽINSKAS, Lukas PETRULAITIS, Lina ARLIKEVIČIŪTĖ

Santrauka

Pelkių buveinės yra vienos iš svetimžemių augalų invazijoms atspariausių ekosistemų, tačiau pastaraisiais metais atsiranda vis daugiau svetimžemių rūšių augalų, išsikuriančių įvairių tipų pelkėse. Vykdamas Rėkyvos pelkyno (Šiaulių r.) floros tyrimus, 2013 m. anksčiau eksploatuotame ir apleistame Piktmiškio durpyne aptikti dideli stambiauogės (*Vaccinium macrocarpon* Aiton) spanguolės sąžalynai. Stambiauogė spanguolė plačiai paplitusi maždaug 31 ha plote, o pavieniū šios

rūšies individų aptikta įvairiu atstumu nuo durpyno esančiuose pelkiniuose pušynuose. Manoma, kad stambiauogių spanguolių sėklas į pelkinius miškus išplatino paukščiai. Lietuvoje ši rūšis yra natūralizavusi, todėl yra didelė tikimybė, kad ji gali toliau plisti ir skverbtis į degradavusias, pažeistas ir natūralias pelkių buveines. Straipsnyje aprašyti skirtumai nuo Lietuvoje savaime paplitusių spanguolių rūšių, pateikiama pastabų dėl šių augalų taksonomijos ir nomenklatūros.