

# The section *Phaestoglochin* (*Carex*, Cyperaceae) in the Netherlands

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## Key words

*Carex divulsa*  
*Carex leersii*  
*Carex muricata*  
*Carex pairae*  
*Carex spicata*  
Cyperaceae  
*Phaestoglochin*

**Abstract** – All the material of the section *Phaestoglochin* that is kept in the herbarium of Naturalis Biodiversity Center in Leiden (L), in total 817 collections, has been revised in order to get a better understanding and a more complete overview of the occurrence of the four native species of this section in the Netherlands: *Carex divulsa*, *C. leersii*, *C. pairae* and *C. spicata*. *Carex muricata* s.str. proves to be not native in the Netherlands. A key is provided for the identification of (Dutch) plants belonging to this section.

**Samenvatting** – Al het materiaal van de sectie *Phaestoglochin* in het herbarium van Naturalis Biodiversity Center te Leiden (L), in totaal 817 collecties, is gerevideerd om zo een beter begrip en een completer beeld van het voorkomen van de vier inheemse soorten van deze sectie in Nederland te krijgen: *Carex divulsa*, *C. leersii*, *C. pairae* en *C. spicata*. *Carex muricata* s.str. blijkt niet inheems te zijn in Nederland. Een sleutel is toegevoegd om (Nederlandse) planten van deze sectie te kunnen determineren.

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## INTRODUCTION

The section *Phaestoglochin* Dumort. (*Carex* L., Cyperaceae) is known as notoriously difficult. This is first of all due to the fact that the species are strikingly similar in appearance to each other at first sight. Secondly their nomenclature and taxonomy is extremely confusing. Furthermore, [Molina et al. \(2008a, 2008b\)](#) split the hitherto known European species up into another ten taxa, which caused even more confusion. Finally, most of the species are not very common and therefore poorly known by botanists. The study of herbarium material of this section by the authors revealed numerous misidentifications. This article aims to clarify the situation for the Netherlands.

[Chater \(1980\)](#) recognised three species within the section *Phaestoglochin* for Europe, two of which with two subspecies each: *Carex spicata* Huds., *C. muricata* L. subsp. *muricata*, *C. muricata* subsp. *lamprocarpa* (Wallroth) Čelak., *C. divulsa* Stokes subsp. *divulsa* and *C. divulsa* subsp. *leersii* (F.W. Schultz) W. Koch. This approach has been followed by, e.g., [Jermy et al. \(2007\)](#). [Řepka & Danihelka \(2005\)](#), however, made clear that the type material of *C. muricata* subsp. *lamprocarpa* belongs to *C. muricata* subsp. *muricata*. Therefore, if Chater's *C. muricata* subsp. *lamprocarpa*, which he meant to be *C. pairae*, is treated at the level of subspecies the correct name should be, according to the priority rule, *C. muricata* subsp. *pairae* (F.W. Schultz) Čelak. In his Flora of the Netherlands, [Van der Meijden \(2005\)](#) distinguished the following three species: *C. spicata*, *C. muricata* and *C. divulsa*. He placed *Carex pairae* into the synonymy of *C. muricata*, and *C. leersii* into that of *C. divulsa*.

However, nowadays the aforementioned taxa are considered to be separate species, e.g. [Koopman \(2015\)](#): *C. spicata*, *C. muricata*, *C. pairae* F.W. Schultz, *C. divulsa* and *C. leersii* F.W. Schultz. [Molina et al. \(2008a, 2008b\)](#) made a thorough study of the section *Phaestoglochin* in Europe, nearby Asia and North Africa and concluded that the five above-mentioned species hide another ten species and subspecies, which they subsequently described ([Table 1](#)). Most of these have a rather restricted distribution: *Carex cyprica* Molina Gonz., Acedo & Llamas is endemic to Cyprus and *C. spicata* subsp. *andresii* Molina Gonz., Acedo & Llamas to Spain. *Carex omeyica* Molina Gonz., Acedo & Llamas is restricted to Spain and North Africa and *C. enokii* Molina Gonz., Acedo & Llamas to the Mediterranean Basin. Some taxa occur in mountainous areas: *C. muricata* subsp. *cesanensis* Molina Gonz., Acedo & Llamas (European mountains), *C. muricata* subsp. *ashokae* Molina Gonz., Acedo & Llamas (Eastern European mountains to the Himalayas) and *C. magacis* Molina Gonz., Acedo & Llamas (mountains of France and Spain). *Carex egorovae* Molina Gonz., Acedo & Llamas and *C. otomana* Molina Gonz., Acedo & Llamas occur from Eastern Europe to Central Asia, while *C. nordica* Molina Gonz., Acedo & Llamas is said to occur in Western and Northern Europe, including the Netherlands ([Molina et al. 2008b](#)). *Carex nordica* was reported from the Province of South Limburg based on a collection made by A. de Wever between Oud-Valkenburg and Schin op Geul on July 23, 1932 (*A. de Wever s.n.*, 23-7-1932, K, ex herb. Kern & Reichgelt). Unfortunately, there is no material of this species present in L.

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Table 1. The European taxa within *Carex* L. section *Phaestoglochin* Dumort.; in bold the taxa that were recently described by Molina et al. (2008a, b).

1. <b><i>C. cyprica</i></b>	9. <b><i>C. muricata</i> subsp. <i>cesanensis</i></b>
2. <i>C. divulsa</i>	10. <b><i>C. nordica</i></b>
3. <b><i>C. egorovae</i></b>	11. <b><i>C. omeyica</i></b>
4. <b><i>C. enokii</i></b>	12. <b><i>C. otomana</i></b>
5. <i>C. leersii</i>	13. <i>C. pairae</i>
6. <b><i>C. magacis</i></b>	14. <i>C. spicata</i> subsp. <i>spicata</i>
7. <i>C. muricata</i> subsp. <i>muricata</i>	15. <b><i>C. spicata</i> subsp. <i>andresii</i></b>
8. <b><i>C. muricata</i> subsp. <i>ashokae</i></b>	

## MATERIAL AND METHODS

The authors have studied all the available Dutch collections in L within the section *Phaestoglochin*, 817 in total. The term 'collection' refers here to one or more specimens of the same species that are mounted on the same sheet and were collected from the same place on the same day. Each sheet has a unique registration code, e.g. L.3133178. The label information of each collection, including its unique registration code, has been recorded in a database. In case material from the same plant collected on the same day was mounted on separate sheets, each sheet was considered to be a separate collection, following the definition given above.

The nomenclature of *Carices* follows Koopman (2015). Distribution data for the Netherlands are obtained from the distribution maps provided by the NDFF *Verspreidingsatlas Vaatplanten* (NDFF 2016); in the following referred to as '*Verspreidingsatlas*'.

## RESULTS

### *Carex divulsa* Stokes

There are 111 collections of *Carex divulsa* in L (Table 2), which represents 14% of the 817 collections examined within the section *Phaestoglochin*. Of these 111 collections, 82 (74%) have been correctly labelled. Five collections were misidentified as *C. leersii*, two as *C. muricata* (misidentification probably made having the current *C. spicata* in mind, see below *C. muricata*), four as *C. muricata* × *C. remota* L. (misidentification probably made having the hybrid *C. remota* × *C. spicata* in mind), and five as *C. vulpina* L. The identity of twelve collections, tentatively put here under *C. divulsa*, is still a question mark, e.g.

because the material was badly collected or collected at a very juvenile stage. However, eleven of these were labelled as *C. divulsa*, one as *C. muricata* × *remota*. Finally, of one collection the label was missing.

Of the 111 collections 93 were made in the Province of Limburg (84%), 1 in the Province of Friesland (introduced), 2 in the Province of Overijssel (introduced), 5 in the Province of Gelderland, 6 in the Province of Zuid-Holland, and 2 in the Province of Noord-Brabant (introduced). The collections in Zuid-Holland were made before 1900. The introduced plants are from more recent date and were found on anthropogene places. Therefore, *Carex divulsa* is first of all a species from (the south of) Limburg, which is also shown in the up-to-date distribution map of the '*Verspreidingsatlas*'. We should realise, however, that in the '*Verspreidingsatlas*' *C. divulsa* and *C. leersii* are merged, so the distribution map is actually a distribution map of the *C. divulsa*-*C. leersii* complex.

The oldest reliably dated material of *Carex divulsa* dates from 1853 and is a collection made by an unknown collector "Bij den Plasmolen" in the Province of Limburg. This collection is one of the collections that was misidentified as *C. muricata*.

*Carex divulsa* was described by Stokes (1787). Actually, the name *C. divulsa* has never been subject to debate, but the material of this species has often been confused with the very similar *C. leersii*, mostly due to the fact that the 'old' botanists had only eye for the gaps between the lower spikes of both species. Luckily, there are more discriminating characters, which makes it easier to distinguish these two species; see the key presented below.

*Carex divulsa* can be found in forest borders and forests growing on more or less calcareous soil, preferably in shaded and humid places. Where it occurs, the plants grow often together in groups of many clumps.

Table 2. Numbers (n) of collections in the herbarium of Naturalis Biodiversity Center in Leiden (L), and their corresponding percentages (%), of all five *Carex* species of the section *Phaestoglochin* Dumort. found in the Netherlands, four native species and one adventive / introduced. The abbreviation 'n correct' denotes the number of correctly identified collections.

Species	n	%	n correct	%
<i>Carex divulsa</i>	111	14	82	74
<i>Carex leersii</i>	102	12	66	65
<i>Carex muricata</i> *	7	1	3	43
<i>Carex pairae</i>	105	13	90	86
<i>Carex spicata</i>	492	60	440	89
<b>Total</b>	<b>817</b>	<b>100</b>	<b>681</b>	<b>83</b>

\* not native

### ***Carex leersii* F.W. Schultz**

There are 102 collections of *Carex leersii* in L (Table 2), which represents 12% of the 817 collections examined within the section *Phaestoglochin*. Of these 102 collections, 60 (59%) have been correctly identified; 22 collections were misidentified as *C. divulsa*, five as *C. muricata* (again, probably made having *C. spicata* in mind), one as *C. vulpina*. Two collections were identified as belonging to *Carex*. The identity of nine collections is still a question mark, e.g. because the material was badly collected or collected at a very juvenile stage. Eight of these were labelled as *C. divulsa*, one as *C. leersii*. Finally, of one collection the label was missing.

Of the 102 collections 93 were made in the Province of Limburg (91%), 2 in the Province of Gelderland, 1 in the Province of Utrecht, 3 in the Province of Zuid-Holland, and 2 in the Province of Noord-Brabant. Therefore, *Carex leersii* is first of all a species from (the south of) Limburg, like *C. divulsa*, which can also be seen in the 'Verspreidingsatlas'. However, as already remarked under *C. divulsa*, we should realise that in the 'Verspreidingsatlas' *C. divulsa* and *C. leersii* are merged, so the distribution map presented there is actually a map of the *C. divulsa*-*C. leersii* complex.

The oldest reliably dated material of *Carex leersii* was collected by C.M. van der Sande Lacoste in the Province of Limburg near Beek. He identified the material as *C. vulpina*, although *C. leersii* had already been described by Schultz in 1871. In 1872 the Dutch botanists were apparently still unaware of Schultz's newly described species. Jansen & Wachter tentatively identified Van der Sande Lacoste's collection in 1913 as “?Carex Leersii”.

*Carex leersii* can be found in forest borders and in roadsides, especially on slopes of sunken roads [“holle wegen”], on more or less calcareous soil, preferably in half shaded-half sunny places. It may grow on more exposed (sunnier) places than *C. divulsa*. Where it occurs, the plants grow often together in groups of several clumps

### ***Carex muricata* L.**

The name *Carex muricata* has caused a lot of confusion in history. For a long time it was incorrectly used as the accepted name for a taxon which was formerly also known as *C. contigua* Hoppe, but which is now called *C. spicata*. Nelmes (1947) pointed out that the 'true' *Carex muricata* actually consists of two separate species, viz. *C. pairae* and *C. muricata* s.str. Subsequently, *Carex muricata* s.l. was considered to have two subspecies (e.g. Chater 1980), which again were often lumped, e.g. by Van der Meijden (2005) in his Flora of the Netherlands, who put *C. pairae* into the synonymy of *C. muricata*.

However, as illustrated below, the true *Carex muricata* s.str. does not occur as a native species in the Netherlands and Van der Meijden's (2005) treatment of *C. muricata* actually represents *C. pairae*. The information in the 'Verspreidingsatlas' should be interpreted correctly too: currently it only presents the distribution of *C. pairae* in the Netherlands, not that of *C. muricata* s.str., which is not native to the Netherlands.

However, in L we found seven collections of *C. muricata* s.str. (Table 2). Two collections are from Schokkerhaven (Province of Flevoland), three from Hellevoetsluis (Province of Zuid-Holland) and two from Zeddam (Province of Gelderland). The two from Schokkerhaven were collected by D. Bakker as *C. pairae* on June 15, 1958. The three collections from Hellevoetsluis were collected by P. de Mey in two subsequent years, 1966 and 1967, and have been correctly identified as *C. muricata*. It is beyond

doubt that the collections from Schokkerhaven and Hellevoetsluis concern introduced, adventive material, because they come from a harbour area. The two collections from Zeddam were collected as *C. divulsa* in 1984 and 1991 by Ph. Sollman. The plants were found growing on loamy soil along a thicket and have, according to the collector, very probably been introduced as well, with woodchips from Germany.

In conclusion, since we have not seen any material of *Carex muricata* s.str. from a natural site in the Netherlands, we believe that this species is not native to the Netherlands. The few findings are casuals.

### ***Carex pairae* F.W. Schultz**

There are 105 collections of *Carex pairae* in L (Table 2), which represents 13% of the 817 collections examined within the section *Phaestoglochin*. Of these 105 collections, 90 (86%) have been correctly labelled; 13 collections were initially identified as *C. muricata* (= nowadays: *C. spicata*) and two as *C. divulsa*.

Of the 105 collections 74 were made in the Province of Gelderland (70%), 1 in the Province of Drenthe, 12 in the Province of Utrecht, 1 in the Province of Zuid-Holland (in a garden!), 3 in the Province of Noord-Brabant and 14 in the Province of Limburg (i.e., Noord-Limburg!). Therefore, *Carex pairae* is first of all a species from Gelderland, particularly in the area around Nijmegen, and adjacent northern Limburg, which can be seen in the up-to-date distribution map on 'Verspreidingsatlas' under the name of *C. muricata* (!).

According to 'Atlas van de Drentse Flora' (Werkgroep Florakartering Drenthe 1999), the species does not occur in Drenthe anymore, but the record from Drenthe is a valid one. The collection was made in 1947 and the plant was found near Havelte on loamy soil. According to Kern & Reichgelt (1954), this material has dark brown female glumes and should therefore be reckoned to belong to *C. muricata* s.str. However, we disagree with them and have identified the material as belonging to *C. pairae*.

The oldest reliably dated material of *Carex pairae* is a collection made by J. Wttewaal in 1833 “Bij Doorwerth” in Gelderland, which was initially labelled as “*C. muricata* var. *loliacea* Schkuhr (“1806”)”, a synonym of *C. pairae*. Schultz described this species in 1868, but it was not until 1925 that early twentieth century Dutch botanists were aware that Wttewaal's material belongs to *C. pairae* (Kern & Reichgelt 1932).

*Carex pairae* can be found in forest borders and in roadsides, especially on slopes of sunken roads [“holle wegen”] on more or less loamy soil, preferably in half shaded-half sunny places. Where *C. pairae* occurs, the plants grow often together with several clumps, but sometimes only one or two plants are found.

### ***Carex spicata* Huds.**

Without a doubt *Carex spicata* is far the most common species within section *Phaestoglochin* in the Netherlands, with 492 collections in L (Table 2), which represents 60% of the 817 collections examined within the section *Phaestoglochin*. Of these 492 collections, 440 (89%) have been correctly labelled, i.e. with *C. spicata* or with the older name in use, *C. muricata*. Erroneously used names are: *C. canescens* L. (1 ×), *C. colchica* J. Gay (1), *C. divulsa* (12), *C. echinata* Murray (6), *C. leersii* (7), *C. leporina* L. (1), *C. otrubae* Podp. (6), *C. pairae* (1), *C. pallescens* L. (1), *C. paniculata* L. (1), *C. praecox* Schreb. (1), *C. vulpina* L. (4), *Scirpus*? (1). Six collections are not provided with a name, one is labelled with a question mark and two are only identified as *Carex*.





Fig. 1. Utricles from the abaxial side (upper row on photo) and the adaxial side (lower row), all photos a–e, from left to right: a: *Carex pairae* F.W. Schultz; b: *C. muricata* L.; c: *C. spicata* Huds.; d: *C. leersii* F.W. Schultz; e: *C. divulsa* Stokes. Photo: B. Kurnicki.

*Carex spicata* is widespread in the Netherlands and occurs in all provinces, although according to the 'Verspreidingsatlas' it is less common in some parts of Pleistocene sand areas and even absent in other parts of these areas.

The oldest reliably dated material is a collection made in 1829, at Voorst, Province of Gelderland, by H.J. Kok Ankersmit, and was incorrectly identified as *C. muricata* (see above under the latter species for an explanation of the incorrect use of this name).

*Carex spicata* prefers richer soils, for instance clay. On such soils, it grows often together with *C. otrubae*, with which *C. spicata* can hybridise. *Carex spicata* may grow in roadsides, in more or less shaded places, but it may also occur in open and more or less wet grassland. It is usually absent from poor, sandy soils. Where *C. spicata* occurs, the plants grow often together with several clumps, but sometimes only one or two plants are found.

### Hybrids

Koopman (2015) mentions 19 hybrids of members of the section *Phaestoglochin* for Europe, but only four of them are intra-sectional, i.e. between two species within the same section. These four, rather dubious hybrids are: *Carex divulsa* × *C. muricata*, *C. divulsa* × *C. pairae*, *C. divulsa* × *C. spicata*, and *C. muricata* × *C. spicata*.

All the other 15 hybrids are inter-sectional hybrids, i.e. between two species belonging to different sections. The involved species from other sections are: *C. brizoides* L. (1 ×), *C. disticha* Huds. (1), *C. echinata* (1), *C. leporina* (3), *C. otrubae* (2), *C. praecox* (1), *C. remota* (3), and *C. vulpina* (3). These species are said to form five hybrids with *C. divulsa*, four with *C. spicata*, and two with *C. leersii*, *C. muricata* as well as *C. pairae*. Some of these hybrids are probably doubtful, too.

In the material from L, there are four collections originally labelled as *Carex muricata* × *C. remota* (i.e. *C. remota* × *C. spicata*). Three collections were made in 1929 in Ryckholt, Province of Limburg (Zuid-Limburg), the other one was made in 1833 in Wassenaar, Province of Zuid-Holland. However, in all four cases we believe that the material concerns young plants of *C. divulsa* instead and we agree with Kern & Reichgelt's identification of the material.

According to David (1976), who thoroughly studied the section *Phaestoglochin*, the majority of the hybrids within this section, if not all, are probably atypical plants of one of the putative parents. The only hybrid he is sure of to have seen in the field is *Carex divulsa* × *C. otrubae*. This hybrid is only known from the United Kingdom.

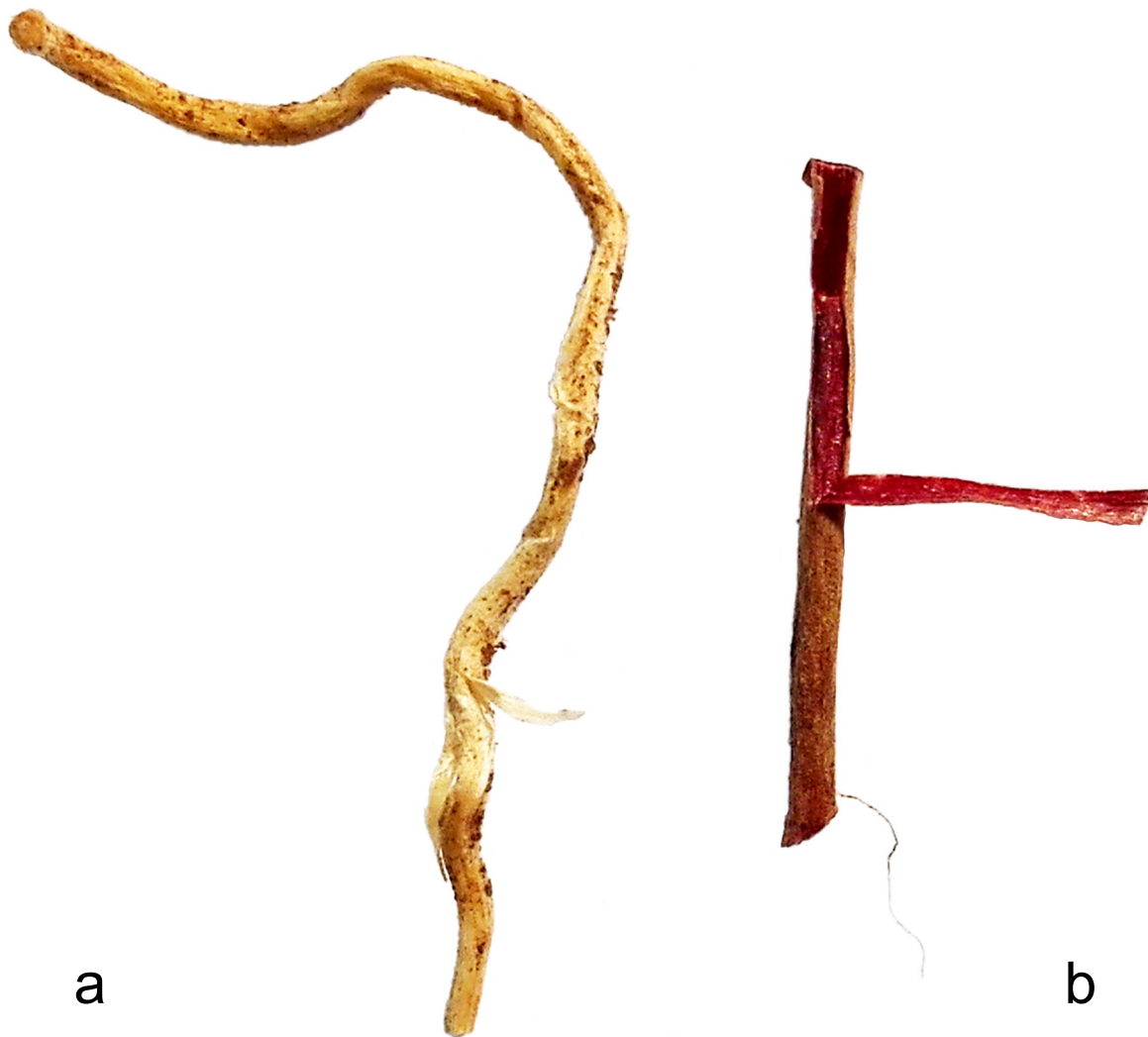


Fig. 2. Roots: a. *Carex pairae* F.W. Schultz; b: *C. spicata* Huds. Photo: B. Kurnicki.

### Diagnostic features

Of the five aforementioned species, *Carex spicata* is the only one with an acute ligule, i.e. the ligule is much longer than wide. Besides it is also the only species in this section with dark purple roots; the other four species have brownish or whitish roots. Under the binoculars this can easily be seen by scratching away a bit of the outer layer of a small root with a sharp knife: the scratch appears wine red in *C. spicata*, but is whitish in the other four species.

Nelmes (1947) was the first botanist who came up with the feature of the dark violet-purple roots: "The vinaceous colouring on sheaths bracts, and scale is a certain distinguishing character because it is never found in any of the allied species, though it has not been used in this way before." This description was badly understood by the Dutch botanists of the previous century, Kern & Reichgelt (1954), who wrote: "Volgens Nelmes ... kan *C. spicata* steeds van alle verwante soorten worden onderscheiden door de wijnrode vlekken op de onderste bladscheden, op de kafjesachtige schutbladen en op enkele kafjes der vrouwelijke bloemen." [According to Nelmes ... *C. spicata* can always be distinguished from its allies by the wine-red spots on the lower leaf sheaths, on the glume like bracts and on the female glumes.]. The easiest way, however, is to look at the roots. If they are wine-red, we are dealing with *Carex spicata*.

Finally *Carex spicata* has relatively long tapering utricles, while the female glumes are pale and equally long as the utricles. Based on this combination of features, *C. spicata* is always relatively easy to recognise. Many Floras also give the feature of a spongy or corky tissue at the utricle's base. However, this feature is often difficult to see; the aforementioned ones are more reliable.

The other four species of section *Phaestoglochin*, all with a rounded ligule, can be split into two couples. The first pair consists of *Carex muricata* and *C. pairae* and is characterised by a short, compact inflorescence of 2–4.5 cm long. The second couple consists of *C. divulsa* and *C. leersii* and is characterised by an elongated, interrupted inflorescence of 4–15 cm long, with at least in the basal part remote spikes. In addition, the members of the first couple have short, rounded utricles, which are abruptly contracted into the beak. Those of the second pair have rather tapering utricles.

*Carex muricata* has very characteristic dark brown female glumes, which are half as long as the ripe utricles and are rather blunt, whereas *C. pairae* has pale female glumes, which are as long as the utricles and which are more acute than those of *C. muricata*. Generally, *C. muricata* is flowering earlier, at the end of May, than *C. pairae*, which flowers in June.

*Carex divulsa* forms green, weak, fragile plants with overhanging leaves and inflorescences. The inflorescence is elongated

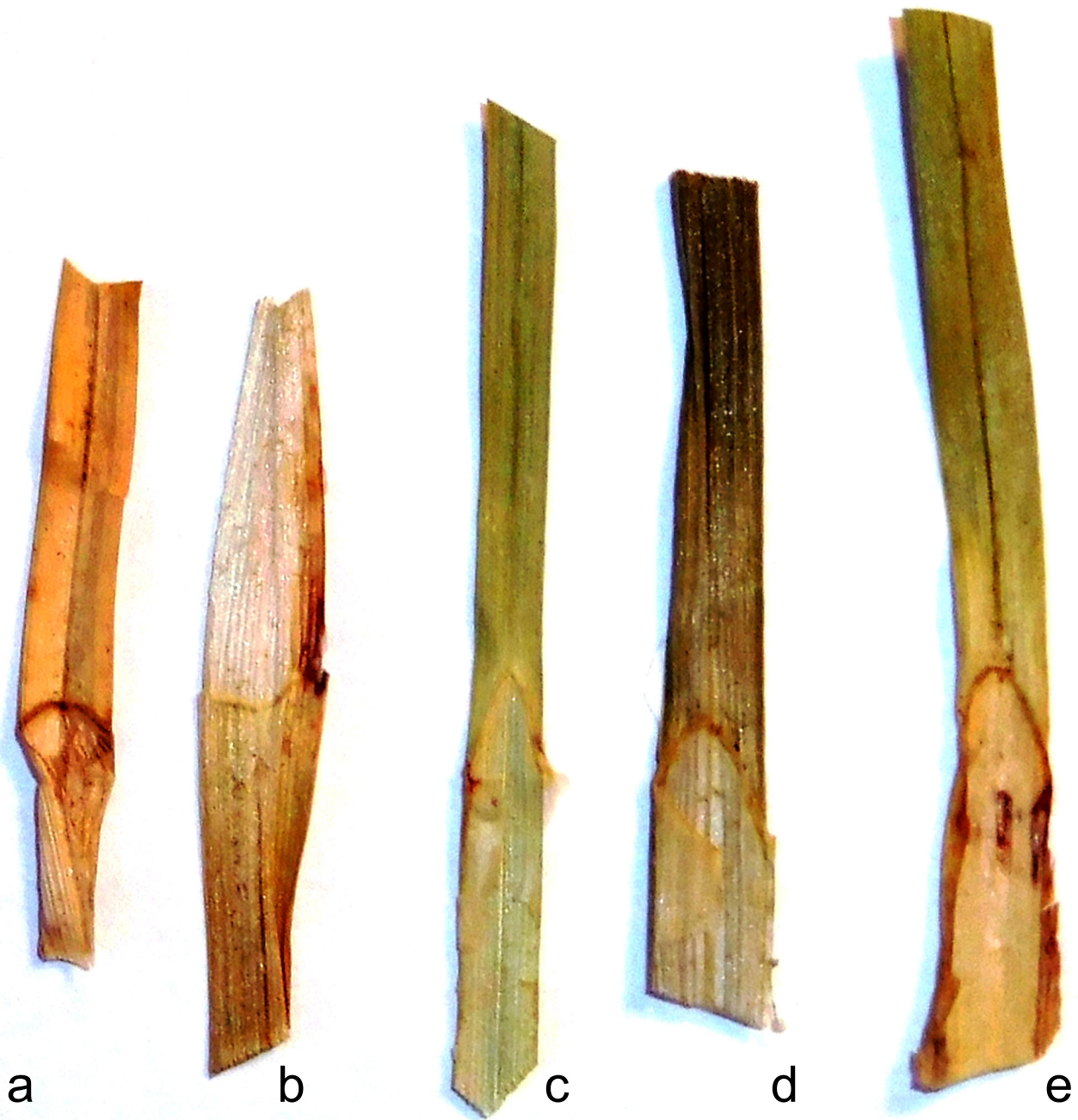


Fig. 3. Ligules: a: *Carex pairae* F.W. Schultz; b: *C. muricata* L.; c: *C. spicata* Huds.; d: *C. leersii* F.W. Schultz; e: *C. divulsa* Stokes. Photo: B. Kurnicki.

and interrupted and up to 15 cm long; the lowest spikes are remote. The distance between these lowest spikes is much larger than the length of the spikes themselves. Besides, the spikes are relatively small and few flowered when compared to those of *C. leersii*. The latter has taller, more rigid and more upright growing, often yellowish plants. The inflorescence is elongated and interrupted and 4–8 cm long, so shorter than those of *C. divulsa*, while the lowest spikes are less remote. The distance between the lowest spikes equals approximately the length of the spikes. The spikes bear more flowers than those of *C. divulsa* and the utricles are bigger and long tapering, like those of *C. spicata*.

#### IDENTIFICATION KEY FOR THE SPECIES WITHIN *CAREX* SECTION *PHAESTOGLOCHIN* IN THE NETHERLANDS

*Carex* subgenus *Vignea* (P. Beauv. ex T. Lestib.) Heer

Inflorescence with 2 or more spikes; spikes (almost) similar in appearance; terminal spike (mostly) at least partly female; stigmas 2.

Section *Phaestoglochin* Dumort.

Plants caespitose, without creeping rhizomes, 20–100 cm. Spikes with male flowers at top. Utricles veinless or with faint veins at base (Fig. 1).





Fig. 4. Inflorescences; a: *Carex pairae* F.W. Schultz; b: *C. muricata* L.; c: *C. spicata* Huds.; d: *C. leersii* F.W. Schultz; e: *C. divulsa* Stokes. Photo: B. Kurnicki.

1. Roots and often basal sheaths and stem base dark purplish tinged, wine red (Fig. 2); ligule distinctly longer than wide, acute (Fig. 3); utricles more or less corky and thickened at base . . . . . *Carex spicata* Huds.
1. Roots, basal sheaths and stem base brownish or whitish (Fig. 2); ligule not longer than wide, rounded (Fig. 3); utricles not or slightly corky and thickened at base . . . . . 2
2. Inflorescence 2–4.5 cm long, with spikes contiguous, only the lowest two more or less separated (Fig. 4) . . . . . 3
2. Inflorescence 4–15 cm long, elongated and interrupted, with more than two spikes separated (Fig. 4) . . . . . 4
3. Female glumes pale, acute, (almost) as long as the (ripe) utricles (Fig. 5) . . . . . *Carex pairae* F.W. Schultz
3. Female glumes dark brown, blunt, half as long as the (ripe) utricles (Fig. 5) . . . . . *Carex muricata* L.

4. Inflorescence 5–15 cm long; lowest 3–4 spikes or branches separated from each other by a gap of much longer than their own length; utricles 3.5–4.25 mm . . . . . *C. divulsa* Stokes
4. Inflorescence 4–8 cm long; lowest spikes separated from each other by a gap of at the most their own length; utricles 4.25–6 mm . . . . . *C. leersii* F.W. Schultz

## CONCLUSIONS AND DISCUSSION

The study of all the available Dutch material of the section *Phaestoglochin* in L reveals that the following four species are native to the Netherlands: *Carex divulsa*, *C. leersii*, *C. pairae*, and *C. spicata*. A fifth species, *C. muricata*, has only been found as being introduced or adventive and is therefore not native

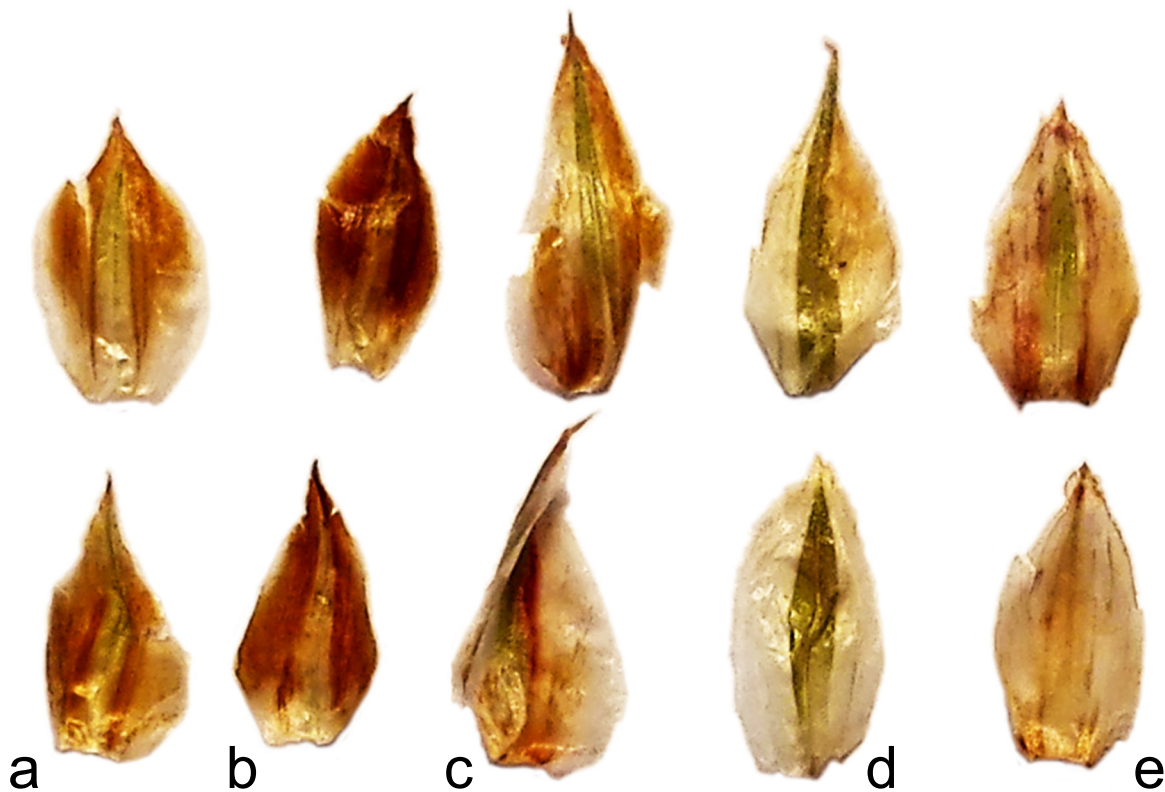


Fig. 5. Female glumes; a: *Carex pairae* F.W. Schultz; b: *C. muricata* L.; c: *C. spicata* Huds.; d: *C. leersii* F.W. Schultz; e: *C. divulsa* Stokes. Photo: B. Kurnicki.

to the Netherlands. To avoid (nomenclatural) confusion it is recommended to omit the name *C. muricata* in the next edition of 'Heukels' Flora van Nederland', because for the taxon that is of concern here the name *C. pairae* should be used instead. Furthermore, *C. divulsa* and *C. leersii* are to be treated as two separate species.

Of *Carex nordica*, one of the recently described species by Molina et al. (2008b), only one single old collection from the Netherlands is present in K (not seen); in L there is no material of this species. Therefore, the current occurrence of *C. nordica* in the Netherlands is at least doubtful and needs further research. According to Molina et al. (2008b) *C. nordica* differs from *C. leersii* in having winged utricles and light to dark brown female glumes.

Of the four native species, *Carex spicata* is the most common and most widespread species in the Netherlands. It is a species of richer soils, especially occurring on clay, and avoids the poor, sandy Pleistocene part of the country.

The other three species are rare and have a restricted distribution. In general, *Carex divulsa* is a species that mainly occurs in Zuid-Limburg, the southern part of the Province of Limburg. Hence it is remarkable that Hermans & Spreuwenberg (2015) have completely ignored this species in their book 'Zeggen in Limburg' (Sedges in Limburg), in which they also included *Carex* species from neighbouring Belgium and Germany, where *C. divulsa* occurs as well. And even if Hermans & Spreuwenberg are of the opinion – although erroneously – that all the material belongs to *C. leersii*, they should have clearly said so.

*Carex leersii* is, just like *C. divulsa*, mainly restricted to Zuid-Limburg. Despite the fact that a few more collections of *C. divulsa* were made in the Netherlands than collections of *C. leersii*,

the latter appears to be more common in Zuid-Limburg than *C. divulsa* nowadays (own observation).

*Carex pairae* is a species that predominantly occurs in the area around Nijmegen, Province of Gelderland, and in northern Limburg, but it occurs also in other places with loamy soil, like the Havelterberg near Havelte (Province of Drenthe).

Five species within the section *Phaestoglochin* means that there are theoretically ten possible hybrids:  $5 \times 4/2 = 10$ ; with four there are six:  $4 \times 3/2 = 6$ . However, we could not find any of these possible hybrids in the material that is preserved in L, nor have we ever seen any such hybrid in the field. Obviously, hybrids within the section *Phaestoglochin* are rare, although the species are rather similar in appearance to each other, which may suggest a close affinity. Actually, the first author has only seen a single, inter-sectional, hybrid of a *Phaestoglochin* member in the Netherlands, namely *C. × senayana* Soó [*C. otrubae* × *C. spicata*], near Ressen (Province of Gelderland), on June 14, 2012 [specimen preserved in private herbarium Jac. Koopman]. This hybrid was growing along a ditch together with both parents, which were abundantly present. So in conclusion, hybrids of *Phaestoglochin* species are rare and even some of the supposed hybrids are probably not really hybrids, but represent most likely aberrant material of one of the two putative parents; see also David (1976). Further research on this topic, especially of the type material of these, so-called, hybrids, is needed, as well as genetic research.

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