

Carex × parentii hybr. nov. (= *C. colchica* × *C. pseudobrizoides*; Cyperaceae), new for the Netherlands since 1954

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Key words

Ammoglochin
Carex curvata
Carex × hanseniana
Carex × ohmuelleriana
Amerongen
Utrecht
Netherlands

Abstract – In 1954 a particular *Carex* was found near Amerongen (Province of Utrecht, the Netherlands). According to herbarium labels in Leiden (L), the botanists of those days thought it to be *Carex curvata*, new for the Netherlands, but they did not publish anything about this find. A recent search could confirm the still existing population. Further research has revealed that it is *C. colchica* × *C. pseudobrizoides*, not *C. curvata*. The inflorescences are clearly longer than those of *C. curvata*. Besides, the utricles, if developed, look more similar to the ones of *C. colchica*. However, the material differs from *C. colchica* by the many leaves; this foliage resembles that of *C. curvata*, *C. brizoides*, and *C. pseudobrizoides*. The *Carex* from Amerongen is not *C. brizoides* × *C. colchica* either, as stated by Parent in 1974. However, because Parent was the first to realise that we are dealing here with a *C. colchica* hybrid, we therefore provide this hybrid with the name *Carex × parentii*, and a type specimen is chosen here.

Samenvatting – In 1954 werd een bijzondere *Carex* gevonden bij Amerongen (Utrecht). Volgens de herbarium-labels in Leiden vermoedden de botanici van destijds dat het *Carex curvata* betrof, nieuw voor Nederland, maar er is door hen nooit iets over gepubliceerd. Een speurtocht kort geleden kon bevestigen dat de populatie nog steeds bestaat. Nader onderzoek heeft uitgewezen dat het *C. colchica* × *C. pseudobrizoides* betreft en niet *C. curvata*. De bloeiwijzen zijn duidelijk langer dan die van *C. curvata*. Bovendien lijken de urmpjes, indien ontwikkeld, meer op die van *C. colchica*. Het materiaal verschilt evenwel van *C. colchica* door het vele loof, hetgeen meer doet denken aan *C. curvata*, *C. brizoides* en *C. pseudobrizoides*. Het is evenmin *C. brizoides* × *C. colchica*, zoals in 1974 aangegeven door Parent. Daar Parent als eerste begreep dat we hier te maken hebben met een *C. colchica* hybride, voorzien wij deze hybride van de naam *Carex × parentii*, en is hier een type exemplaar gekozen.

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INTRODUCTION

The genus *Carex* comprises around 2000 species worldwide (Govaerts et al., continuously updated), of which 235 occur in Europe (Koopman 2022) and around 60 in the Netherlands (Duistermaat 2020). Besides, Koopman (2022) mentioned for Europe 295 *Carex* hybrids. Kern & Reichgelt (1954) mentioned 15 hybrids for the Netherlands, Koopman (2010) 28 and currently 33 *Carex* hybrids are known in the Netherlands (Koopman 2022).

Systematic floristic research by FLORON since 1988, waar-neming.nl, and an overview article of all the *Carex* hybrids in the Netherlands (Koopman 2010) have resulted in several new hybrids added to the list in the last ten years. Also the articles about three notoriously difficult sections, *Ammoglochin* Dumort. (Koopman & Więclaw 2016), *Phaestoglochin* Dumort. (Koopman & Więclaw 2017), and *Ceratocystis* Dumort. (Koopman & Więclaw 2019) may have contributed to a better eye for *Carex* hybrids. In these three articles the authors reviewed all the available material of each mentioned section in the herbarium of Naturalis in Leiden (L).

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The section *Ammoglochin* counts in Europe seven species: *C. arenaria* L., *C. brizoides* L., *C. colchica* J.Gay, *C. curvata* Knaf, *C. praecox* Schreb., *C. pseudobrizoides* Clavaud, and *C. repens* Bellardi (Koopman 2018). Five of them are native to the Netherlands: *C. arenaria*, *C. brizoides*, *C. colchica*, *C. praecox*, and *C. pseudobrizoides* (Duistermaat 2020). Only *C. arenaria* is common in the Netherlands, the other four are more or less rare. Koopman et al. (2013) gave an overview of the occurrence of *C. colchica* in the Netherlands.

Hybrids of species within the section *Ammoglochin* seem to be extremely rare, although the species are closely related and most of them have the same chromosome number, $2n = 58$ (e.g. Roalson 2008, Rotreklová et al. 2011, Więclaw et al. 2020). Koopman (2018) could find in Poland only two hybrids within *Ammoglochin*: *C. × hanseniana* Junge [*C. colchica* × *C. praecox*] and *C. × ohmuelleriana* O.Lang [*C. brizoides* × *C. remota* L.]. The hybrid *C. brizoides* × *C. colchica* is mentioned for Germany, by Figert (1903). Figert just mentioned this hybrid, together with some others within the section *Ammoglochin*, and promised to get back to them later, but unfortunately he never did.

So far no hybrids of species within *Ammoglochin* were known from the Netherlands.

The nomenclature follows Duistermaat (2020).

THE CAREX OF AMERONGEN

Koopman & Więclaw (2016) mentioned the so-called “*Carex* of Amerongen”. It concerns material of an initially unknown *Carex* taxon, found near Amerongen (Province of Utrecht) in 1954, obviously belonging to the section *Ammoglochin*. There are several collections of this *Carex* in L, all, sometimes tentatively, provided with the name *Carex curvata* (see Appendix). The botanists of those days were obviously not 100 % sure about this identification, as they never published anything about it, although they were very active with publishing about new finds. Their hesitation can be understood, since *C. curvata*, being an endemic of central and eastern Europe, is not very obvious to be found in the Netherlands. The Belgian botanist Parent (1974) saw the material of Amerongen in L and thought it to be the hybrid *Carex brizoides* × *C. colchica*. He did not get much, if any, support and it lasted till the revision of the section *Ammoglochin*, when Koopman & Więclaw (2016) supposed too, that it was a hybrid, but as the material did not have any, more or less, developed utricles, it was hard to say which one. They hoped that the population might still be, at least partly, existing near Amerongen, for further research.

The second author, F. van Beusekom, who is living close to the site near Amerongen, did manage to find the rather large population, still in good condition, in 2016 (Fig. 1). Unfortunately, well developed utricles were missing, like in 1954. The three authors (we) visited the site with a few other Dutch botanists around 1 May, 2017; the plants had just started blooming then. Their conclusion was: it resembles *Carex curvata*, especially in general habitus, but it is somewhat different. Van Beusekom took some material for his garden, where it, surprisingly, produced many dozens of well-developed utricles in the next years, though the inflorescences showed, nevertheless, a much reduced fertility. These utricles did not show the typical *C. curvata* characters, with a narrow body gradually tapering into the beak; hence this species could be excluded without any doubt. The utricles appeared to look much more like those of *C. colchica*, being much broader than the ones of *C. curvata* and having distinct wings and nerves. Moreover, the material, especially in early spring, shows a striking resemblance to *C. colchica* in several other characters. For some time we were even tempted to con-

sider the material to belong to a form of this species. However, because of the much reduced fertility the Amerongen taxon is without a doubt a true F1-hybrid and *C. colchica* is, therefore, very likely to be one of the parents. From the other potential parent species in the section *Ammoglochin*, we exclude *C. arenaria* and *C. praecox* for the following reasons. *Carex arenaria* differs from all other members of this section by the sexual dimorphism of its spikes, the basal ones having only female, the higher placed ones (except the top spike) only male flowers. A hybrid with *C. arenaria* as a parent would therefore not have such consequent bisexual spikes as has the hybrid, which is, by the way, a constant character of all other species within the section *Ammoglochin*. Also in general habit the hybrid does not show any relationship with *C. arenaria*. Its thin, narrow, light green leaves, straight and overhanging, have a slender, elegant aspect, quite different from the stiffer, broader and darker, often curling leaves of the latter. As to *C. praecox*, this species can also safely be excluded as a possible parent; none of its typical characters can be traced in the hybrid. Moreover, *C. praecox* is extremely rare in the Netherlands. Besides, the hybrid of *C. colchica* and *C. praecox*, *C. × hanseniana*, we happen to know from Poland (Koopman 2018) and is obviously different from the Amerongen hybrid, with much less foliage. Having thus eliminated *C. curvata*, *C. arenaria*, and *C. praecox* as possible parental species, we shall take a closer look at the hybrid, in comparison with *C. colchica*, *C. pseudobrizoides*, and *C. brizoides*.

COMPARISON OF THE HYBRID WITH CAREX COLCHICA, C. PSEUDOBRIZOIDES, AND C. BRIZOIDES

We have compared 23 characters of the hybrid with those of the possible parent species *Carex colchica*, *C. pseudobrizoides* and *C. brizoides* (Table 1). The supposed status of *C. colchica* as one of the two parents is well supported by these characters, which for the other parent leaves the choice between *C. pseudobrizoides* and *C. brizoides*. In judging the similarities between the hybrid and *C. pseudobrizoides* and *C. brizoides* respectively, there appears to be much more distance in characters with the latter than with the former. Measures in *C. brizoides* are generally much smaller, notably of the inflorescence, the spikes, the utricles, and the nuts. This, and in addition, the lanceolate, weakly ribbed utricle, as well as the quasi-absence of bristle-like bracts does not make *C. brizoides* a convincing match with the hybrid. *Carex pseudobrizoides*, on the other hand, just as *C. colchica*, appears to be almost a model of a parent species for it. In all respects the hybrid takes an intermediate position between *C. colchica* and *C. pseudobrizoides*. This can be illustrated with the following examples.

- a. *Carex colchica* normally has widely ovate utricles, whereas those in *C. pseudobrizoides* are very narrowly ovate; in the hybrid the utricles are also ovate, but neither wide nor narrow, thus taking an intermediate position between *C. colchica* and *C. pseudobrizoides* (Fig. 2).
- b. In the hybrid the proportionally long beak, taking about $\frac{1}{3}$ of the utricle length, is rather constant and is opposed to $\frac{1}{4}$ in *Carex colchica*, and $\frac{1}{2}$ in *C. pseudobrizoides*, thus being neatly in between of these species (Fig. 2).
- c. The glumes in *Carex* section *Ammoglochin* are all essentially of the same type: (elongate-)ovate, brownish, with a green midrib and white, hyaline margins. In *C. colchica* this margin is very narrow, whereas in *C. pseudobrizoides* it is very wide, leaving only a narrow pale brownish zone along the midrib, and, finally, in *C. brizoides* the entire glume,



Fig. 1. The general aspect of *Carex x parentii* Jac.Koopman, Beusekom & Więclaw, subpopulation nr. 3, Amerongen (Province of Utrecht, the Netherlands), June 2019. Photo: Frits van Beusekom.

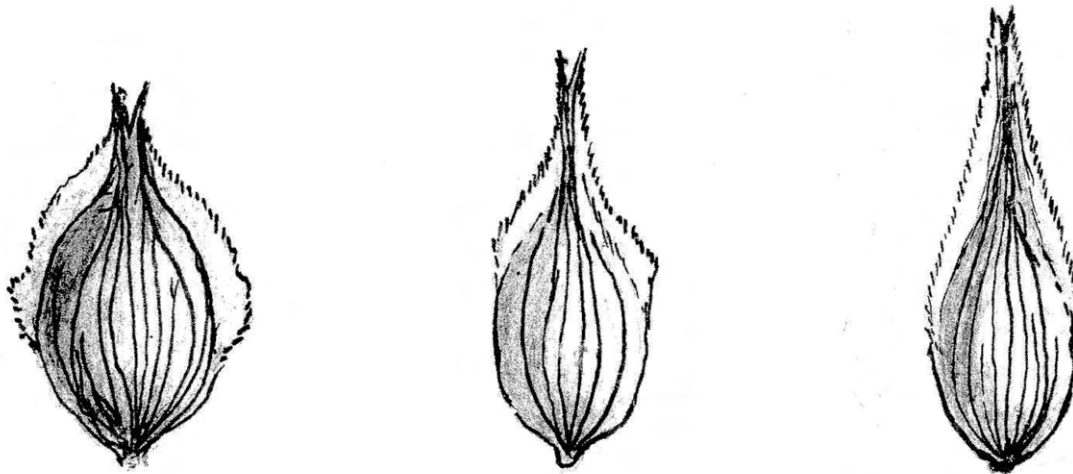


Fig. 2. Characteristic utricles of, from left to right, *Carex colchica* J.Gay, *Carex ×parentii* Jac.Koopman, Beusekom & Więclaw, and *C. pseudobrizoides* Clavaud showing a range in shape, beak length, and size of the wings. Illustrations: F. van Beusekom.

Table 1. Comparison of *Carex ×parentii* Jac.Koopman, Beusekom & Więclaw characters with those of putative parental species.

Characters	<i>Carex ×parentii</i>	<i>Carex colchica</i>	<i>Carex pseudobrizoides</i>	<i>Carex brizoides</i>
1 Plant forming foliage mats	open to moderately dense	not or open	very dense	extremely dense
2 Leaf width	1–2.5 mm	1.5–2 mm	2.5–3 mm	2 mm
3 Leaf length	up to 1 (1.5) metre	up to 0.8 metre	up to 1.5 metre	up to 1.5 metre
4 Inflorescence length	(1)1.5–4(5) cm	2–5(6) cm	2.5–4.5 cm	1.5–3 cm
5 Inflorescence colour when young	pale greenish brown	warm brown	pale green	whitish/pale green
6 Spike number	(3)4–7(–15)	4–8(–13)	5–12(13)	4–8(–12)
7 Lower spikes composed	sometimes	often	never	never
8 Some spikes curved outward	sometimes	regularly	always	always
9 Female glume length	exceeds utricle	exceeds utricle	shorter than utricle	shorter than utricle
10 Hyaline margin on female glume	wide	(very)narrow	very wide	very wide
11 Female glume apex	acute, tip pointed	acute, tip pointed	acute	mostly blunt
12 Lower bract bristle-like	often	often	often	rarely
13 Utricle shape	narrowly ovate to ovate	widely ovate to ovate	elongate–ovate	lanceolate
14 Utricle length (beak included)	4 mm	3,5–4 mm	4,6–5,6 mm	3(–4) mm
15 Relative length of utricle beak (about)	1/3 length utricle	1/4 length utricle	1/2 length utricle	1/2 length utricle
16 Utricle length/width ratio	l/w 2.5	l/w 1.5–2	l/w 3	l/w 3–3.5
17 Utricle ribbed	strongly	strongly	strongly	weakly
18 Wing width	medium	wide	narrow	narrow
19 Nut shape	obovate	(round)obovate	elongate-obovate	obovate to obovate-lanceolate
20 Nut length	1.7–1.9 mm	1.7–1.8 mm	1.7–2.0	1.2–1.8
Ecology				
21 Light	half shade	full sun	half shade	half to full shade
22 Soil humidity	slight	low	slight	considerable
23 Soil texture	loamy sand	sand, not loamy	(loamy) sand	(sandy) loam



Fig. 3. Inflorescences of *Carex colchica* J.Gay (left) and *C. x parentii* Jac.Koopman, Beusekom & Więclaw (right) in flower, early May 2021, all from the vicinity of Amerongen (Province of Utrecht, the Netherlands). Photo: Frits van Beusekom.

the green midrib excepted, is white hyaline. In the hybrid the wideness of this margin lies in between of those of *C. colchica* and *C. pseudobrizoides*. Even the colour brown of the glumes in the hybrid is intermediate (Fig. 3).

Additional support for *Carex colchica* and *C. pseudobrizoides* as parent species of the hybrid results from their distribution. *Carex colchica* is locally widespread along the eastern valley of the River Rhine in the Province of Gelderland, from the village of Elst up to the town of Arnhem, the nearest site being nowadays at 2 km southeast of the locality of the hybrid. Of *C. pseudobrizoides* two sites are known, both with large populations, near the village of Leersum and near the village of Doorn, at 7 km and 13 km northwest of Amerongen, respectively; both localities are situated in the Province of Utrecht. All of them are bordering, as does the hybrid, the ancient main road between the towns of Utrecht and Arnhem (nowadays Provinciale weg N225). Therefore, the possibility of the populations having interacted in the past with each other is not unrealistic.

All the evidence as presented above leads us to the conclusion that the *Carex* of Amerongen is the hybrid of *C. colchica* with *C. pseudobrizoides*.

DESCRIPTION OF THE HYBRID

We name the *Carex* hybrid of Amerongen, *Carex colchica* × *C. pseudobrizoides*, here:

Carex x parentii Jac.Koopman, Beusekom & Więclaw, hybr. nov. [*C. colchica* J.Gay × *C. pseudobrizoides* Clavaud] — Fig. 4.

Type — Netherlands, Province of Utrecht, E of Amerongen, along the River Nederrijn (Lower Rhine); Dutch atlas-square 39.25; border of high river bank; leg. *Th. J. Reichgelt* & *P. Zonderwijk s.n.*; 26 June 1954; as *C. cf. curvata* (holotype: L, sheet [L.3114182](#), isotype: L, sheet [L.3114183](#)).

Plant glabrous, with creeping rhizomes. Leaves 15–25 cm × 0.7–2 mm, flat or canaliculated, flaccid, leaves of sterile shoots become later in the season 60–100(–150) cm long; stomata on the back side; ligule rounded, conical, cream-coloured. Flowering stems initially around 1 May, 20–30 cm long and straight, later longer, up to 40–50 cm and overhanging. Inflorescence 3–4(–5) cm long, with 7–10(–15) spikes; female glumes 3–4 × 1.1–1.6 mm, brown, with a lighter midrib, almost as long as the utricles when developed. Utricles 3.2–4.2 × 1.2–1.5 mm, ribbed, in the upper half winged, wings 1–2 × 0.1–0.3 mm; gradually tapering into a bifid, 1.2–2 mm long beak, beak teeth 0.2–2.5 mm long. Nut not or very rarely developed; stigmas 2. Flowering time May.



Carex curvata Knaf
 H. Więclaw & Jac. Koopman
 Szczecin (PL), February 2017

HERB. LUGD. BAT. No. 955, 76 . 844

HUC PERTINET: No. 965. 44. 908.

Holo-
 Lect-
 Syn-
TYPE
Carex x parentii
 Jac. Koopman, Beusekom
 Więclaw

Type: *Carex x parentii* Jac. Koopman, Beusekom & Więclaw
 [*C. colchica* J. Gay × *C. pseudobrizoides* Clavaud]
 H. Więclaw & Jac. Koopman
 Szczecin, May 2022

L3114182 



Carex ————— (ligures?)
 Rand v.o. hoge oever aan de Rijk
 bij Amerongen. Drieduizend kleine
 stengels, maar alle volkomen
 steriel. Om 1 ex. enkele steriele ontwik-
 kelde vruchtbl. Koffie is zeer klein, om-
 kleur, mogelijk verroest. door steriele?
 In cultuur nemen om te zien, of steri-
 liteit deze kenmerkige vruchtbl. heeft.
 26 Juni 1954. leg. Th. J. Reichgelt

HERBARIUM KERN & REICHGELT

No.
Carex cf. curvata

Amerongen, rand van de hoge oever aan de Rijk

26 Juni 1954 ⁵⁴ Leg. Th. J. Reichgelt

CAREX BRIZOIDES × *LIGERICA*

Non est *C. curvata* Knaf
 f. *C. ligera* Gay × *C. brizoides* L.
 Determinavit J. H. Parent 1978

8-0020



Fig. 4. Holotype of *Carex x parentii* Jac. Koopman, Beusekom & Więclaw (Th. J. Reichgelt & P. Zonderwijk s.n.; 26 June 1954, sheet 1, L [L.3114182]). Photo: Naturalis Biodiversity Center, Leiden, the Netherlands.

Habitat — *Carex ×parentii* grows in open forests and forest margins bordering the valley of the River Rhine.

Global distribution — So far, only known from the locus classicus in the Netherlands, near Amerongen (Province of Utrecht).

Etymology — In honour of the late Professor Georges Henri Parent (1937–2014), a Belgian botanist, who was the first to realise that we are dealing here with a *Carex colchica* hybrid, and not with a specimen of *C. curvata*.

FULL DESCRIPTION OF CAREX × PARENTII

Plant perennial, monoecious, rhizomatous, forming loose mats, glabrous. Rhizomes far creeping, 0.7–2 mm thick, brown, rhizome unity 4–5 cm, with 4 nodes, on every 4th of them 1–4(–8) sprouts, nodes with soon withering scale leaves. Stems sharply triangular, rough to the top, thin, < 1 mm in diameter, 20–60 cm long, growing longer after flowering, finally arched and bending downward. Leaves grass green, more or less keeled, the margins and the upper side ribs rough, those of the stems flat, 2–4, crowded within 10 cm or less from the stem base, up to 2(–2.5) mm wide, short, up to 10 cm long, soon decaying, those of the vegetative shoots flat to channelled, 1.5–2.5 mm wide, 5–40 cm long, higher up V-shaped, gradually narrowing, plicate and becoming filiform, growing continuously until autumn, up to 100(–150) cm, finally overhanging to prostrate, stomata on the back side. Leaf sheath extended a little above the base of the leaf blade, membrane emarginate, hardly to somewhat thickened at the margin, whitish, ligule arcuate, short, up to as long as wide.

Inflorescence pale greenish brown when young, spicate, (1–)1.5–4(–5) cm, sometimes composed near the base, spikes (3–)4–8(–15), all bisexual, with female flowers at the top and male flowers at the base, elongate-ovate to lanceolate when flowering, ovate when in fruit, ascending, some of the middle and upper ones sometimes curved outwards, bract of the basal spike sometimes shortly elongated bristle-like. Female glumes brown with green keel, the lower ones usually with a wide hyaline margin, ovate-elongate, acute with pointed tip, about as long as the utricles. Utricles mostly abortive or sterile, sometimes fertile, narrow ovate to ovate, 3.2–4.2 mm long, gradually narrowed in a bifid beak about 1/3 of the utricle length, in the upper half with medium wide, finely toothed wings. Nuts rarely developed, obovate, 1.7–1.9 mm long.

CHARACTERISTICS OF THE LOCALITY AND THE ECOLOGY OF THE HYBRID

The locality of the hybrid is part of the nature reserve Amerongse Bos, property of the Foundation Utrechts Landschap. It extends over four Dutch km-squares east of the village of Amerongen (39.15.51, 39.15.52, 39.25.12, and 39.25.24). The hybrid occurs fragmented in six subpopulations, five south of the main road, one on the northside, in size varying from 5 to 250 m². The plants of these subpopulations are all completely identical in characters, and there can be no doubt that they all belong to the same clone. The fact that the first find of *Carex ×parentii* was in 1954, the size of the population at that time being already significant, shows that this hybrid grows near Amerongen for at least 67 and certainly many more years. All subpopulations border the ancient main road, now partly a footpath, connecting the towns of Utrecht and Arnhem. This “Via Regia” is of early medieval origin and possibly even older (van den Oosterkamp 2017). One of the subpopulations is divided in two parts by a cut-off of this route

that was effectuated before 1850, which suggests that this subpopulation already was there at that time, hence older than 170 years. There are other examples of *Ammoglochin* taxa of very old age, for instance *Carex brizoides*, first found with certainty in the Netherlands near Vaals (Province of Limburg) in 1896 (Koopman & Więclaw 2016); this population still exists today, which means that it is more than 125 years old. *Carex curvata* was described by Knaf (1847) from near Chomutov, Bohemia (Czech Republic); it still grows there abundantly, as witnessed by all three authors. Therefore the age of this population is more than 170 years. Obviously, these clonal populations of *Ammoglochin* species and hybrids can become very old, doubtless hundreds of years. In fact, such clones are potentially immortal (Jäger 2017, p. 22).

All subpopulations occur in or are bordering a former oak coppice on the lower slope of the Utrechtse Heuvelrug – a push moraine formed during the Saalien glaciation (238.000 to 126.000 years ago) – where the Utrechtse Heuvelrug meets the Rhine valley (Fig. 5). The sandy soil, slightly loamy, rather dry but locally with some ground water influence, is an undisturbed so-called holtpodzol, with Oak-Beech forest (Fago-Quercetum) as its natural vegetation. The soil is exhausted nowadays and the forest degraded as a result of ages of exploitation by man. One subpopulation, however, grows under more base-rich conditions (relevé 3, Table 2; Fig. 1). As to the production of flowering stems in the hybrid, it is clear that this is limited by a lack of sunlight. In shaded places it stays almost 100% vegetative. This phenomenon is not uncommon in section *Ammoglochin*. It is known to occur in *Carex repens* by both the authors living in Poland: *Carex repens* forms hardly any inflorescences in forests, in the forest border, when exposed to more sunlight, inflorescences are much better developed. The same can be seen, too, in *C. pseudobrizoides*, also in the Netherlands. This phenomenon supports the idea of *C. pseudobrizoides* (with 50% *C. arenaria* 'blood' (affinity), see Final Remarks) as second parent against *C. brizoides*, the latter being much more a forest plant, while *C. arenaria* prefers full sun. *Carex colchica* grows mostly on open, dry and sandy, sunny places, while *C. pseudobrizoides* is predominantly a species from half-shaded forest margins on dry to slightly humid soil. This preference of the parental species for quite different habitats could be the reason that this hybrid is seldom formed and that it is to date only known from the Netherlands. There is only one other region in the Netherlands, where both species and their habitats come in close contact and where the hybrid might be expected to occur: the region of the River Oude IJssel around the town of Doetinchem (Province of Gelderland).

Phytosociological relevés were made in four subpopulations (Table 2). In relevés 1 and 2 the floristic composition is characteristic for Oak-Beech forest, with species such as *Polygonatum multiflorum* (L.) All., *Teucrium scorodonia* L., *Lonicera periclymenum* L., and *Stellaria holostea* L. Relevé number 3 has been taken in the forest border where it meets the river valley (Fig. 1 & 5). The influence of the water table is evident for this locality as shown by the presence of *Deschampsia caespitosa* (L.) P.Beauv., *Equisetum palustre* L., *Persicaria amphibia* (L.) Delarbre, and *Juncus effusus* L., while typical Oak-Beech forest species are lacking there. Also, *Crataegus monogyna* Jacq., *Euonymus europaeus* L., and *Rosa canina* L. indicate a more base-rich soil. On the whole, this vegetation has a clear Alno-Padion character. Finally, relevé 4 is atypical in representing a grassland vegetation, now partly in the forest margin, originally a river dune vegetation (Medicagini-Avenetum). Hence it is therefore understandable that *Carex ×parentii* was initially mistaken for *C. colchica*. Nowadays, unfortunately, the soil has become eutrophicated and the vegetation consists almost exclusively of trivial species. Here *C. ×parentii* is codominant with *Agrostis capillaris*. Its vitality is reduced, possibly as a result



Fig. 5. The Utrechtse Heuvelrug, a push moraine formed during the Saalien glaciation, at Amerongen (Utrecht), where it borders the valley of the River Rhine, June 2019. Photo: Frits van Beusekom.

Table 2. Phytosociological relevés with *Carex xparentii* Jac.Koopman, Beusekom & Więclaw; species mentioned between round brackets are present in the direct neighbourhood of the relevés.

Relevé number	1	2	3	4
Date	21.6.2017	23.6.2017	21.6.2017	19.6.2021
Size (m)	4 × 25	2,5 × 7	2,5 × 3	4 × 8
Total cover (%)	80	60	70	80
Cover tree layer	70	60	70	0
Cover shrub layer	2	5	1	0
Cover herb layer	30	40	40	80
Cover moss layer	0	0	0	0
Cover litter layer	100	90	100	0
Slope at SW (%)	0	10	10	10
Total number of species	25	19	22	13
Tree layer:				
<i>Quercus robur</i>	3	4	4	
<i>Betula pendula</i>	2b	1		
Shrub layer:				
<i>Quercus robur</i>		+	r	
<i>Sorbus aucuparia</i>	+			
<i>Prunus serotina</i>	+	+		
<i>Rubus fruticosus</i>	+	+		
<i>Amelanchier lamarckii</i>	+	r		
<i>Fraxinus excelsior</i>	+	r	r	
<i>Ilex aquifolium</i>	+			
<i>Ulmus minor</i>	r			
<i>Frangula alnus</i>	r	+		
<i>Lonicera periclymenum</i>		r		
<i>Acer pseudoplatanus</i>			r	
<i>Crataegus monogyna</i>			+	
<i>Rosa canina</i>			r	
<i>Euonymus europaeus</i>			r	
<i>Rubus caesius</i>			+	
Herb layer:				
<i>Carex xparentii</i>	3	2m	3	3
<i>Quercus robur</i> seedling	2m	+	r	
<i>Betula pendula</i> seedling	+			
<i>Fagus sylvatica</i> seedling	+			
<i>Ilex aquifolium</i> seedling	+			
<i>Crataegus monogyna</i> seedling	r		+	r
<i>Fraxinus excelsior</i> seedling	+			
<i>Carpinus betulus</i> seedling	r			
<i>Corylus avellana</i> seedling	r			
<i>Euonymus europaeus</i> seedling			r	
<i>Hedera helix</i> seedling	r			
<i>Holcus mollis</i>		2a		

Relevé number	1	2	3	4
<i>Agrostis capillaris</i>	+	1	1	3
<i>Polygonatum multiflorum</i>	+			
<i>Lonicera periclymenum</i>	r	3		
<i>Teucrium scorodonia</i>	r	+		
<i>Stellaria holostea</i>		+		
<i>Poa nemoralis</i>			2a	
<i>Deschampsia flexuosa</i>		+		
<i>Dryopteris dilatata</i>	+			
<i>Dryopteris carthusiana</i>	r			
<i>Ceratocarpus claviculata</i>	r	+		
<i>Arrhenatherum elatius</i>	r	r	+	+
<i>Acer platanoides</i> seedling			+	
<i>Festuca rubra</i>		+		
<i>Galeopsis tetrahit</i>	+	+		
<i>Rumex acetosa</i>		r		r
<i>Carex hirta</i>			1	
<i>Juncus effusus</i>			+	
<i>Alopecurus pratensis</i>			r	
<i>Deschampsia caespitosa</i>			r	
<i>Equisetum palustre</i>			+	
<i>Persicaria amphibia</i>			r	
<i>Urtica dioica</i>			r	
<i>Dactylis glomerata</i>				2a
<i>Poa pratensis</i>				+
<i>Hypochaeris radicata</i>				+
<i>Cynodon dactylon</i>				r
<i>Ranunculus bulbosus</i>				+
<i>Veronica arvensis</i>				2m
<i>Plantago lanceolata</i>				+
<i>Convolvulus arvensis</i>				+
(<i>Origanum vulgare</i>)				+
(<i>Eryngium campestre</i>)				+

of the extreme exposition to sunlight. All subpopulations are found in situations with direct access of sunlight, even when under forest conditions; relevés 1 and 2 have been taken in an old clearing and on a roadside bank, respectively. There is one subpopulation, of which no relevé has been made, abundantly present along the road pavement. This habitat reminds of the roadside behaviour of *C. colchica*, as described by [Koopman et al. \(2013\)](#). Evidently, as is the case in the parent species, the hybrid is capable of proliferating, a phenomenon also evident in the second author's garden, where the hybrid now already covers more than 6 m². Summarising, the hybrid appears to prefer a sandy soil that is slightly loamy, moderately dry, and moderately acid to neutral. Hence it appears to have an intermediate position between the parental species in its habitat preference as well.

At first sight, it seems peculiar, that the plants of *Carex × parentii* at all known localities, even with sufficient sunlight, do not produce any well-developed utricles, while the planted material in

the second author's garden does. This could be due to a better supply of base cations in the author's garden. It must be said, however, that even in the garden, the soil fertility is very limited.

FINAL REMARKS

According to [Koopman \(2018\)](#), *Carex colchica* as well as *C. pseudobrizoides* are stabilised hybrids, of *C. arenaria* with *C. praecox* and of *C. arenaria* with *C. brizoides* resp. ([Fig. 6](#)). So, genetically, *C. colchica* consists of 50% *C. arenaria* and 50% *C. praecox*, *C. pseudobrizoides* of 50% *C. arenaria* and 50% *C. brizoides*. Therefore, the hybrid of *C. colchica* with *C. pseudobrizoides* consists of 50% *C. arenaria*, 25% *C. brizoides*, and 25% *C. praecox*. In case this hybrid would have resulted from a crossing of *C. brizoides* with *C. colchica*, the picture would have been: 25% *C. arenaria*, 50% *C. brizoides*, and 25% *C. praecox*.

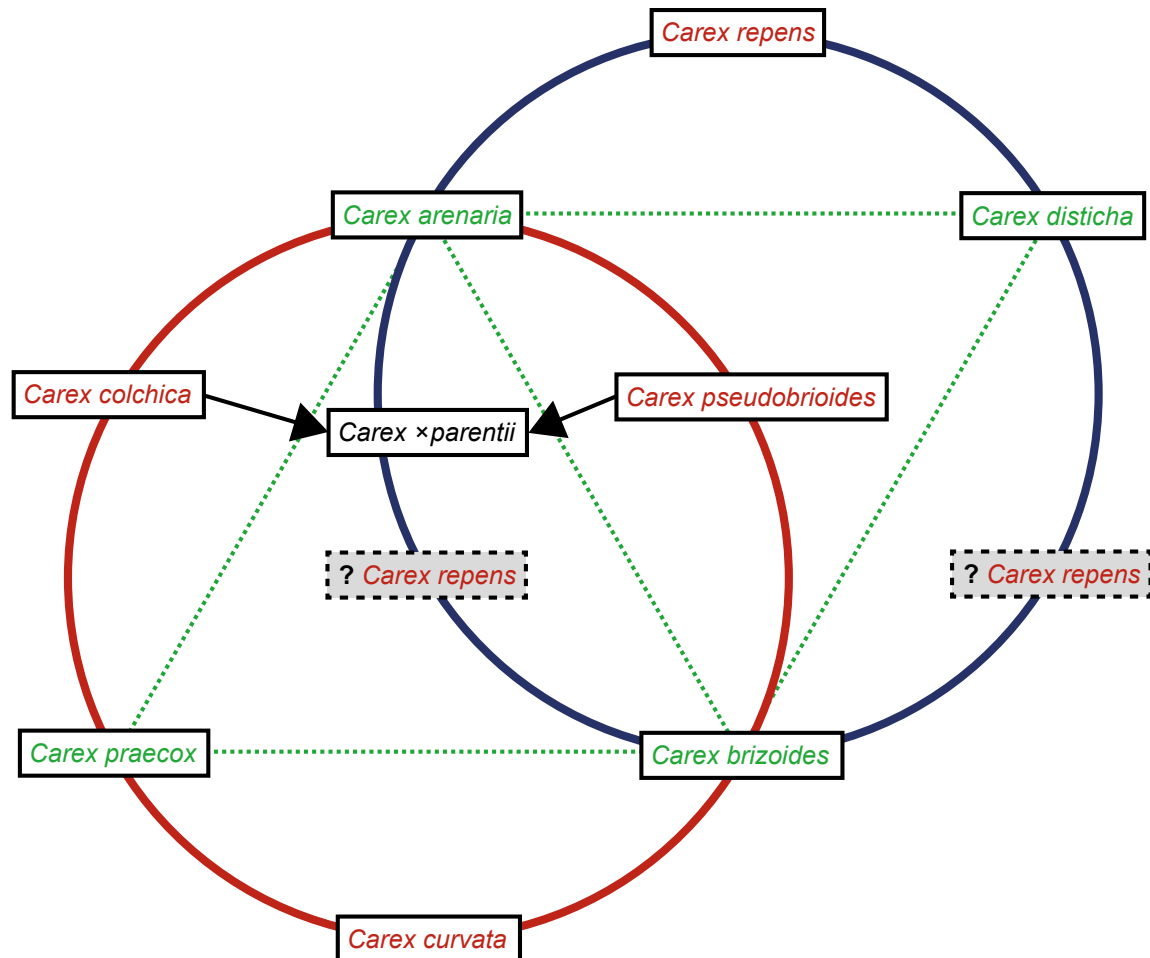


Fig. 6. Hypothetical relationships within *Carex* section *Ammoglochin*; modified, after Parent (1974) and Koopman (2018).

Key: Names in green – parental species; names in red – putative stabilised hybrids; black: F1 hybrid between *C. colchica* J.Gay and *C. pseudobrioides* Clavaud, i.e. *Carex ×parentii* Jac.Koopman, Beusekom & Więclaw.

The text '? *Carex repens*', placed in two grey boxes, indicates the hypotheses of *Carex repens* Bellardi being a stabilised hybrid of, respectively, *C. arenaria* L. with *C. brizoides* L. or *C. brizoides* with *C. disticha* Huds., as suggested by several previous authors. However, Koopman (2018) has clearly shown that *C. repens* is the stabilised hybrid of *C. arenaria* and *C. disticha*.

Hence, it might be a challenge for further genetic research to reveal the second parent of the hybrid next to *C. colchica*: *Carex brizoides* or *C. pseudobrioides*. However, as the morphology of the hybrid has a closer resemblance with *C. arenaria* than with *C. brizoides*, among which similarity in size, shape, and other characters of the utricles, we are convinced that the second parent is *C. pseudobrioides*, not *C. brizoides*. Besides, both putative parental species, *C. colchica* as well as *C. pseudobrioides*, grow in the neighbourhood of the localities of the *Carex* of Amerongen, although nowadays their populations are not in direct contact. In view of the longevity of the clones, however, the origin of the hybrid might have very well been in the distant past.

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APPENDIX

Nederlandse beschrijving

Plant overblijvend, eenhuizig, los zodevormend, kaal. Wortelstok ver kruipend, 0.7–2 mm dik, bruin, wortelstokeenheid 4–5 cm, met 4 knopen, op elke vierde daarvan 1–4(–8) spruiten, knopen met spoedig verwerend schubbladen. Bloeistengels scherp driekantig, bovenaan ruw, dun, < 1 mm, 20–60 cm lang, na de bloei uitgroeiend en tenslotte boogvormig overhangend. Bladen grasgroen, min of meer gekield, ruw aan de randen en op de nerven van de bovenzijde, die van de bloeistengels vlak, tot 2(–2.5) mm breed, kort, tot 10 cm, 2 tot 4 bijeen binnen 10 cm vanaf de stengelvoet, die van de vegetatieve spruiten aan de voet vlak tot zwak V-vormig, 1.5–2.5 mm breed, 5–40 cm lang, hogerop V-vormig, 1–2 mm breed, 40–100(–150) cm lang, geleidelijk tot draaddun versmallend en samengevouwen, tenslotte overhangend tot liggend. Bladschede tot iets boven de voet van de bladschijf verlengd, schedevlies min of meer boogvormig uitgerand, nauwelijks tot enigszins verdikt aan de rand, witachtig, tongetje boogvormig, kort, tot even lang als breed.

Bloeiwijze aarvormig, bruin, (1–)1.5–4(–5) cm, aartjes (3–)4–8(–15), alle tweeslachtig, met de vrouwelijke bloemen hoger en de mannelijke lager geplaatst, langwerpige-ovormig tot lancetvormig in de bloeifase, eivormig wanneer in vrucht, meestal in twee etages of alleen de bovenste geclusterd, schutblad onderste aartje soms kort priemvormig verlengd. Vrouwelijke kafjes bruin met groene kiel, de lager geplaatste gewoonlijk met een brede hyaliene rand, langwerpige-ovormig, spits, met stekelpunt, ongeveer even lang als de urtjes. Urtjes gewoonlijk slecht ontwikkeld en steriel, zelden fertiel, eivormig tot langwerpige-ovormig, 3.2–4.2 mm lang, geleidelijk versmald in een vrij lange tweetandige snavel die 1/5 van de lengte van het urtje in beslag neemt, in de bovenste helft met een middelmatig brede, fijn getande vleugel. Nootjes zelden gevormd, omgekeerd eivormig, 1.7–1.9 mm lang. Bloei in mei.

Herbarium specimens of *Carex × parentii* in the Netherlands

- Netherlands, Province of Utrecht, E of Amerongen, along the River Nederrijn; atlas-square 39.25; border of high river bank; leg. *Th. J. Reichgelt & P. Zonderwijk s.n.*; as *C. cf. curvata*; 26 June 1954 (L.3114182: holotype; isotype: L.3114183; see above and Fig. 4).
- Netherlands, Province of Utrecht, along the road between Amerongen en Elst; atlas-square 39.25; on sandy soil in *Quercus* forest; leg. *S. J. van Ooststroom s.n.*; as *C. curvata*; 10 August 1955 (L.3114179, L.3114180, L.3114181).
- Netherlands, Province of Utrecht, Amerongen; atlas-square 39.25; leg. *S. E. de Jongh Jr. s.n.*; as *C. × curvata* Knaf; 23 June 1957 (L.3113427).
- Netherlands, Province of Utrecht, Amerongen; atlas-square 39.25; forest bordering to floodplain; leg. *C. F. van Beusekom s.n.*; 15 August 2018 (private herbarium Jac. Koopman).
- Netherlands, Province of Utrecht, Amerongen, S of road N225; atlas-square 39.25; forest border along old Rhine arm; leg. *C. F. van Beusekom, H. Więclaw & Jac. Koopman s.n.*; 30 April 2018 (private herbarium Jac. Koopman).
- Netherlands, Province of Utrecht, Amerongen; atlas-square 39.25; dry broad-leaved forest on old river dunes; leg. *C. F. van Beusekom s.n.*; 15 June 2018 (private herbarium Jac. Koopman).
- Netherlands, Province of Utrecht, Rhenen; atlas-square 39.26; planted material from subpopulation 1 in forest garden; leg. *C. F. van Beusekom, nr. 1307*; 18 June 2020 (private herbarium C. F. van Beusekom).