Delimitation and nomenclature of *Agrostis*, *Polypogon* and related grasses (Poaceae subfamily Pooideae)

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Abstract: Röser, M. & Tkach, N. 2024: Delimitation and nomenclature of *Agrostis*, *Polypogon* and related grasses (Poaceae subfamily Pooideae). Schlechtendalia **41**: 63–67.

Recent descriptions of new genera and revised genus delimitations have resulted in numerous changes in the taxonomy of the grass subtribe Agrostidinae. Among the remaining unresolved questions is the distinction between the genera *Agrostis* and *Polypogon*. Molecular phylogenetic data suggest that *Polypogon* is embedded in *Agrostis* and both genera should be unified. To implement the necessary nomenclatural changes, several new combinations are made and some new names are introduced.

Zusammenfassung: Röser, M. & Tkach, N. 2024: Umgrenzung und Nomenklatur von *Agrostis*, *Polypogon* und verwandten Gräsern (Poaceae Unterfamilie Pooideae). Schlechtendalia **41**: 63–67.

Beschreibungen neuer Gattungen und revidierte Gattungsabgrenzungen haben in letzter Zeit zu zahlreichen Änderungen in der Taxonomie der Gräser-Subtribus Agrostidinae geführt. Zu den noch ungelösten Fragen gehört die Unterscheidung zwischen den Gattungen *Agrostis* und *Polypogon*. Molekularphylogenetische Daten deuten darauf hin, dass *Polypogon* in *Agrostis* eingebettet ist und beide Gattungen vereinigt werden sollten. Um die notwendigen nomenklatorischen Änderungen vorzunehmen, werden mehrere neue Kombinationen gebildet und einige neue Namen eingeführt.

Key words: Agrostidinae, *Alpagrostis*, Aveneae, *Bromidium*, *Calamagrostis*, new combination, *Podagrostis*, Poeae, replacement name, taxonomy.

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How many Agrostidinae genera?

The grass subtribe Agrostidinae is characterized by usually single-flowered spikelets, sometimes with a rachilla extension or a rudimentary additional floret, the spikelets usually disarticulating above the glumes, and the lemmas often with a well-developed, sometimes geniculate awn. The Agrostidinae include some large and taxonomically notoriously difficult grass genera, such as *Agrostis* L., *Calamagrostis* Adans., and many others, whose insufficiently resolved delimitations and infrageneric divisions have led to many different taxonomic concepts in the past, reviewed in previous studies (e.g., Brown 2013, 2015; Saarela & al. 2017; Peterson & al. 2019, 2020). The classification within this complex is further complicated by the frequent occurrence of (allo)polyploidy, hybrid formation and, especially in *Calamagrostis*, widespread apomixis, i.e., the replacement of sexual reproduction by vegetative reproduction and agamospermy, which allows the persistence of sterile hybrid taxa (Stenar 1935; Nygren 1946, 1962; Greene 1984; Schiebold & al. 2009).

Influenced by molecular phylogenetic studies and a broader taxonomic coverage of the nearly worldwide distributed subtribe Agrostidinae, several major generic realignments have been proposed in recent years, such as the splitting of traditional *Calamagrostis* into several genera, including *Cinnagrostis* Griseb., the transfer of several *Calamagrostis* species to other genera such as *Deschampsia* P.Beauv., the description of the new genera *Greeneochloa* P.M.Peterson, Soreng, Romasch. & Barberá, *Laegaardia* P.M.Peterson, Soreng, Romasch. & Barberá, and *Paramochloa* P.M.Peterson, Soreng, Romasch. & Barberá, furthermore the reduction of *Deyeuxia* Clarion ex P.Beauv. and *Ammophila* Host to synonymy with *Calamagrostis*, and the description of new genera separated from *Agrostis*, e.g., *Agrostula* P.M.Peterson, Romasch., Soreng & Sylvester and *Alpagrostis* P.M.Peterson, Romasch., Soreng & Sylvester. However, *Alpagrostis* is sister to *Agrostis* L. s.str. and therefore not necessarily to be considered a separate genus. Some of these new or taxonomically reorganized genera are now no longer treated in the subtribe Agrostidinae, but have been shown to belong to other subtribes such as Aveninae, Echinopogoninae, or the new Paramochloinae (Saarela & al. 2017; Peterson & al. 2019, 2020, 2022; Tkach & al. 2020; da Silva & al. 2022; Soreng & al. 2022).

A number of taxonomic questions still remain regarding the delimitation of the large genus *Agrostis* used in most studies. Molecular phylogenetic data showed a highly supported clade of traditional

Agrostis species, including also (1) *A. alopecuroides* Lam. (= *Polypogon monspeliensis* (L.) Desf.), the type of *Polypogon* Desf., (2) *A. avenacea* J.F.Gmel. (= *Lachnagrostis filifomis* (G.Forst.) Trin., the type of *Lachnagrostis* Trin., (3) *A. subspicata* (Willd.) Raspail (as *A. linkii* Banfi, Galasso & Bartolucci = *Chaetopogon fasciculatus* (Link) Hayek), the type of *Chaetopogon* Janch., and (4) *A. ramboi* Parodi as representative of *Bromidium* Nees & Meyen in the plastid DNA tree of Tkach & al. (2020: Fig. 4). This clade is close to other genera of the subtribe Agrostidinae, such as the monophyletic *Gastridium* P.Beauv., including *Triplachne* Link, the monophyletic *Podagrostis* (Griseb.) Scribn. & Merr., several species of *Calamagrostis* and representatives of the more distantly related subtribes Calothecinae and Echinopogoninae. The nuclear ITS/ETS tree showed *A. alopecuroides* as sister of *A. avenacea* in a fully supported clade in a polytomy with the strongly supported rest of *Agrostis* species, including *A subspicata* (= *A. linkii*) and additional genera of the Agrostidinae such as *Calamagrostis*, the monophyletic *Gastridium*, incl. *Triplachne*, *Podagrostis*, and the subtribes Calothecinae and Echinopogoninae (Tkach & al. 2020: Fig. 5).

In addition, the genus *Triplachne* was merged with the morphologically similar *Gastridium* because (5) *G. nitens* (Guss.) Coss. & Durieu (= *T. nitens* (Guss.) Link), the type of *Triplachne*, (6) *G. ventricosum* (Gouan) Schinz & Thell., the type of *Gastridium*, and *G. phleoides* (Nees & Meyen) C.E.Hubb. have different sister group relationships in the nuclear and the plastid DNA trees (Tkach & al. 2020). This suggests interspecific hybridization that was not evident in the dataset used by Peterson & al. (2020), possibly due to the fact that all *Gastridum* accessions used in this study were synanthropic occurrences and may not reflect the full range of variation found in the native range, including diploids and polyploids (Scoppola & al. 2020; CCDB 2024).

Aiming for monophyletic genera

The molecular phylogenetic data therefore appear to support an extended genus *Agrostis*, including *Chaetopogon*, *Lachnagrostis*, and *Polypogon* as synonyms, while *Podagrostis* is supported as a separate genus as also found by other studies (Peterson & al. 2020; Sylvester & al. 2020). However, the species of the former *Chaetopogon* and *Polypogon*, differ morphologically from the traditionally circumscribed *Agrostis* in that their spikelets are falling entire and are shed with a basal stipe, whereas the typical *Agrostis* species have spikelets that disarticulate above the glumes (Clayton & Renvoize 1986; Watson & al. 1992 onwards). However, this character does not necessarily justify a generic separation.

Following this consideration, *Polypogon* and other previously accepted genera would be part of a monophyletic genus *Agrostis*, possibly as sections or subgenera. The alternative taxonomic solution to this conundrum would be to further subdivide the genus *Agrostis*. A more complete molecular phylogenetic study of *Agrostis*, which comprises approximately 198 species (Soreng & al. 2022), and its neighboring and segregate genera, and a better backbone resolution of the trees, would enable to clarify which approach being preferable. Based on the current state of knowledge, we consider the inclusion of *Polypogon* in *Agrostis* to be the most reasonable approach. This is also supported by the fact that species of both hybridize easily with each other in nature (×*Agropogon* P.Fourn.), which is another argument for considering them to be one genus. Such supposed intergeneric hybridization has also been shown in many other cases of grasses to be actual infrageneric hybridization between species of the same genus, for example (*a*) ×*Ammocalamagrostis* P. Fourn. or ×*Calammophila* Brand as hybrids of *Ammophila* × *Calamagrostis* species, now mostly accepted as *Calamagrostis*; (*b*) ×*Festulolium* Aschers. & Graebn. as hybrids of *Festuca* Tourn. ex L. × *Lolium* L. species, now mostly accepted as *Lolium*; (*c*) ×*Festulpia* Melderis ex Stace & R.Cotton: *Festuca* × *Vulpia* C.C.Gmel., now mostly accepted as *Festuca*; or (*d*) ×*Trisetokoeleria* Tzvelev: *Koeleria* Pers. × *Trisetum* Pers., which has recently been shown to belong to *Koeleria* (e.g., Barberá & al. 2019; Saarela & al. 2017; Tkach & al. 2020).

New combinations and new names in *Agrostis*

Agrostis annua Röser & Tkach, **nom. nov.**
≡ *Polypogon tenuis* Brongn., Voy. Monde, Phan.: 22, 1829, non *Agrostis tenuis* Sibth., Fl. Oxon.: 36, 1794.
Etymology: referring to the annual life form of this species.

Agrostis austroandina Röser & Tkach, **nom. nov.**
≡ *Polypogon australis* Brongn., Voy. Monde, Phan.: 21, 1829, non *Agrostis australis* L., Mant. Pl.: 30, 1767.
Etymology: referring to the distribution mainly in the countries in the southern Andes.

Agrostis austroamericana Röser & Tkach, **nom. nov.**
≡ *Chaetotropis chilensis* Kunth, Révis. Gramin. **1**: 72, 1829, non *Agrostis chilensis* Trin., Linnaea **10**: 302, 1836.
Etymology: referring to the distribution in large parts of South America.

Agrostis elongatiligulata Röser & Tkach, **nom. nov.**
≡ *Polypogon elongatus* Kunth, Nov. Gen. Sp. **1**: 134, 1816, non *Agrostis elongata* Lam., Tabl. Encycl. **1**: 162, 1791.
Etymology: referring to the long ligules of this species.

Agrostis fugax (Nees ex Steud.) Röser & Tkach, **comb. nov.**
Basionym: *Polypogon fugax* Nees ex Steud., Syn. Pl. Glumac. **1**: 184, 1854.

Agrostis nowodworskyi Röser & Tkach, **nom. nov.**
≡ *Nowodworskya imberbis* Phil., Anales Univ. Chile **43**: 562, 1873, non *Agrostis imberbis* Phil., Anales Univ. Chile **94**: 11, 1896.
Etymology: in honour to Johann Nowodworsky (1873–1811), Bohemian botanist.

Agrostis* ×*italica Röser & Tkach, **nom. nov.**
≡ *Polypogon* ×*adscendens* Guss., Fl. Ital. **2**: 777, 1836, non *Agrostis adscendens* Lange, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn **1860**: 33, 1860.
Etymology: referring to Italy, where this nototaxon was first discovered.

Agrostis ivanovae (Tzvelev) Röser & Tkach, **comb. nov.**
Basionym: *Polypogon ivanovae* Tzvelev, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Rast. Tsentral. Azii **4**: 7, 1968.

Agrostis mediterranea Röser & Tkach, **nom. nov.**
≡ *Polypogon maritimus* Willd., Neue Schriften Ges. Naturf. Freunde Berlin **3**: 442, 1801, non *Agrostis maritima* Lam., Encycl. **1**: 61, 1783.
Etymology: referring to the distribution mainly in the Mediterranean region.

Agrostis mollis (Thouars) Röser & Tkach, **comb. nov.**
Basionym: *Phalaris mollis* Thouars, Fl. Tristan d'Acugna: 37, 1808.

Agrostis nilgirica (Kabeer & V.J.Nair) Röser & Tkach, **comb. nov.**
Basionym: *Polypogon nilgiricus* Kabeer & V.J.Nair, Nordic J. Bot. **25**: 9, 2007 [publ. 2008].

Agrostis pacifica Röser & Tkach, **nom. nov.**
≡ *Polypogon linearis* Trin., Linnaea **10**: 301, 1836, non *Agrostis linearis* Retz., Observ. Bot. **4**: 19, 1786.
Etymology: referring to the distribution in the countries of the South American Pacific coast.

Agrostis pygmea (Tzvelev) Röser & Tkach, **comb. nov.**
Basionym: *Polypogon pygmeus* Tzvelev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s., **80**(6): 84, 1975.

Agrostis subspathacea (Req.) Röser & Tkach, **comb. nov.**
Basionym: *Polypogon subspathaceus* Req., Ann. Sci. Nat. (Paris) **5**: 386, 1825.

Agrostis subtilis Röser & Tkach, **nom. nov.**
≡ *Polypogon tenellus* R.Br., Prodr. Fl. Nov. Holland.: 173, 1810, non *Agrostis tenella* Hoffm., Deutschl. Fl. Bot. Taschenb. **3**: 36, 1800.
Etymology: from the Latin *subtilis*, delicate, in keeping with R. Brown's epithet *tenellus*

Agrostis subverticillata Röser & Tkach, **nom. nov.**
≡ *Polypogon interruptus* Kunth, Nov. Gen. Sp. **1**: 134, 1816, non *Agrostis interrupta* L., Syst. Nat., ed. 10., **2**: 872, 1759.

Etymology: from the Latin *subverticillatus*, denoting the nearly whorled panicle branches, one of the descriptive characters of Kunth's protologue.

Agrostis uruguayensis Röser & Tkach, **nom. nov.**
≡ *Polypogon parvulus* Roseng., B.R.Arrill. & Izag., Gram. Urug.: 33, 1970, non *Agrostis parvula* Schult., Oestr. Fl., ed. 2, **1**: 182, 1814.
Etymology: referring to the distribution mainly in Uruguay.

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