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GERALD PAROLLY & HILDEMAR SCHOLZ

***Oreopoa* gen. novum, two other new grasses and further remarkable records from Turkey**

Abstract

Parolly, G. & Scholz, H.: *Oreopoa* gen. novum, two other new grasses and further remarkable records from Turkey. – Willdenowia 34: 145-158. – ISSN 0511-9618; © 2004 BGBM Berlin-Dahlem.

Three S Anatolian *Poaceae* species, *Oreopoa anatolica*, *Secale leptorhachis* and *Stipa cacuminis* are described as new to science, illustrated and mapped. To accommodate the first, perennial species, a new genus, *Oreopoa*, with unsettled affinities within the *Poeae*, is established. The synecology, distribution patterns and relationships of all species are outlined. In addition, considerable range extensions of five grasses, *Bromopsis tomentella* subsp. *nivalis*, *Festuca cataonica*, *F. karsiana*, *F. punctoria* and *Koeleria brevis*, towards the S Anatolian Taurus Mts are reported.

Introduction

Despite the achievements of the recent decades (Davis & al. 1985, 1988, Güner & al. 2000), many groups of the *Poaceae* are fairly under-recorded in Turkey and remain poorly understood. Due to the substantial taxonomic difficulties they often provide and the sometimes cryptic characters that have to be used in the field, many local floristic inventories seem to be rather incomplete in their coverage of the grasses. Interesting discoveries and additions to the *Poaceae* flora of Turkey are thus to be expected from nearly everywhere, and all the more from, at least partly, remote mountain areas.

The present contribution is based on the 1999 and 2000 gatherings of the PONTAURUS project run by the first author and funded by the Deutsche Forschungsgemeinschaft (DFG). The project and forerunning studies focused, on a phytosociological basis, on the species differentiation and vegetational subdivision in the Anatolian Taurus and Pontus mountain chains (e.g., Eren & al. 2004, Parolly 2000, 2004, Parolly & Hein 2000, Parolly & Nordt 2001, Parolly & al. 2002). Establishing phytosociological relevés again proved to be an appropriate mean in detecting novelties that are otherwise easily overlooked in pure floristic studies.

We describe here three species new to science; one of them has such an isolated taxonomic position that it requires a new unispecific genus, *Oreopoa*, rising the number of endemic Turkish genera to 17 (Güner & al. 2000). Additionally, we report range extensions of five taxa of *Bromopsis* Fourr., *Festuca* L. and *Koeleria* Pers.

Oreopoa* H. Scholz & Parolly, gen. novum**[non *Oreopoa* Gand., Fl. Eur. 26: 186. 1891, nomen nudum = *Poa alpina* L.]Type: *Oreopoa anatolica* H. Scholz & ParollyOreopoa anatolica* H. Scholz & Parolly, sp. nova**

Holotype: Turkey, C2 Antalya, Beydağları, Kızlar sivrisi, glacially sculptured range between the main summit and the Aktepe, 36°35'76"N, 30°06'97"E, 2650-2700 m, limestone, wind-swept cushion community (Drabo-Androsacetalia), 3.7.1999, M. Döring, G. Parolly & D. Tolimir P6358 (B; isotypes: E, ISTE, herb. Parolly) – Fig. 1.

Gramen perenne dense caespitosum. *Culmi* humiles, usque ad 15 cm alti, glabri laevesque. *Foliorum laminae* lineares, (10-)15-30(-45) × 0.5-1 mm, convolutae rigidiusculaeque, apice acuminatae; *ligulae* 0.2-0.6 mm longae, dentatae. *Panicula* erecta pyramidata, 3-6 × 2-6 cm ramis 1-3 cm longis, 1-2(-3)-natis, late patentibus 1-2-spiculatis, inferne nudis, laevibus. *Spiculae* purpureae 3-5(-6)-florae, 4-8 mm longae, glabrae. *Glumae* elliptico-acutae; gluma inferior 2-2.5 mm longa, oblongo-acuta, 1(-3)-nervata, superior 2.5-3.5 mm longa, 3-nervata. *Lemmata* fere dorso rotundata (vix carinata) 2.5-3.5 mm longa, 5(-7)-nervata, acuto-apiculata, margine indistincte hyalina. *Palea* in ½ superiore nervis scabris. *Lodiculae* 2, c. 1.5 mm longae, bilobae. *Antherae* c. 1.5 mm longa. *Ovarii* apex glabra.

Densely tufted, caespitose perennial. *Culms* more or less erect, 9-13(-15) cm high and 0.5-0.8 mm in diam. at base, distinctly striate, completely glabrous, shining pale greyish green; nodes fairly inconspicuous. *Leaves* predominantly basal, stem leaves (0-)1-2, of about the same dimension as the basal ones; *leaf blades* narrowly linear, (10-)15-30(-45) × 0.5-1 mm, convolute, rigid, (pale) greyish green, apex acuminate; *ligule* 0.2-0.6 mm, broadly hyaline-margined, dentate; *leaf sheath* 0.4-0.8 mm, basal-most ones somewhat inflated, shining whitish, older ones turning pale brownish and weathering to a weak but distinct tunic. *Inflorescence* a lax, erect pyramidal panicle, 3-6 × 2-5 cm. *Branches* single, in pairs or rarely in whorls of three (especially in the lower half of inflorescence), 1-2.5 cm long, spreading to erecto-patent, slender, flexuous, angled, glabrous, scabrid below the spikelets. *Spikelets* (4-)5-7(-8) mm long, all alike, with 3-5(-6) florets, glabrous, loosely spaced, 1-3 per branch, dark purple. *Glumes* elliptic-acute, unequal, greenish, partly with purple markings, margins hyaline, very finely denticulate in upper half; lower glume 2-2.5 mm long, oblong-acute, 1(-3)-veined, upper glume 2.5-3.5 mm long, oblong-acute, 3-veined. *Lemmas* awnless, dorsally rounded (weakly keeled) 2.5-3.5 mm long, acute-apiculate, 5(-7)-veined, purple, with indistinct hyaline to yellowish white margins, denticulate above. *Palea* with veins scabrid in upper half. *Lodicules* 2, c. 1.5 mm long, bilobed. *Stamens* 3, anthers c. 1.5 × 0.4 mm, yellowish. *Ovary* obconical, c. 1.2 mm, shining brownish, apex glabrous, stigma lobes about as 2 times as long as ovary. *Caryopsis* unknown.

Relationship. – This grass, undoubtedly belonging to the tribe *Poeae* (sensu Clayton & Renvoize 1986), could not be identified with any known genus, even its relationship is difficult to determine. Creating a new, unispecific genus to accommodate our species, accords with the narrower generic concepts in this group established in recent studies (Scholz 2003, Tzvelev 1989, Watson & Dallwitz 1994) on account that *Poa* L., as circumscribed in earlier works, actually is a conglomerate of fairly distantly related groups.

The convolute leaf blades in combination with the nearly rounded lemma back in *Oreopoa* contradicts a closer relationship to *Poa* s. str., which is well characterised by leaf blades folded along the mid-nerve, at least in young shoots (i.e. vernalis conduplicate, never convolute; see, among others, Tzvelev 1976, Dore & McNeill 1980, Soreng 1998) and the more or less prominent lemma keel-nerve.

Likewise distantly related are the following four high altitude Old World genera comprising perennial species (see Tzvelev 1976): *Colpodium* Trin. (incl. *Keniochloa* Meld.; Tzvelev 1989), *Catabrossella* (Tzvel.) Tzvel. (*C. variegata* (Boiss.) Tzvel. with fairly long and patent panicle

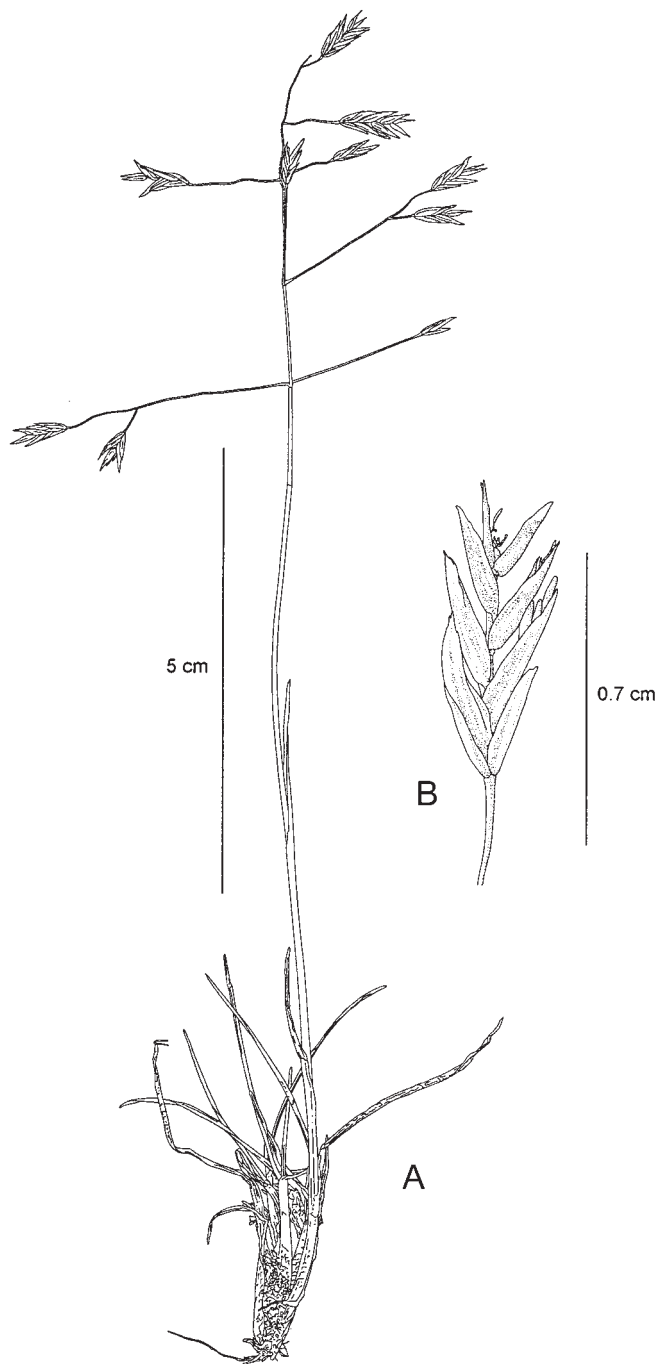


Fig. 1. *Oreopoa anatolica* – A: habit; B: spikelet. – From the holotype (B); drawings by Horst Lünser.
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branches), *Hyalopoa* (Tzvel.) Tzvel. and *Paracolpodium* (Tzvel.) Tzvel. They were all lumped by Clayton & Renvoize (1986) under the name *Colpodium*, but kept separate by other authors (e.g., Edmondson 1985, Mill 1985a-d, Watson & Dallwitz 1994). They show affinities to *Poa* L. (in which the segregated *Eremopoa* was included formerly), especially to the *P. alpina* L. group, but clearly differ in fewer florets, thinner lemmas and the non-scabrid palea keels (Clayton & Renvoize 1986). Members of *Poa* sect. [or subg.] *Ochlopoa* (Asch. & Graebn.) Hylander constitute a genus of their own, *Ochlopoa* (Asch. & Graebn.) H. Scholz, for their soft-hairy or smooth palea keels and other peculiarities (Scholz 2003).

Our new species shows considerable resemblance in spikelet configuration with the Old World genus *Eremopoa* Roshev., but this genus is quite different from *Oreopoa* in many other features (those of *Oreopoa* in brackets): annual (perennial); culms solitary or loosely tufted (densely tufted); panicle with many florets (few florets); panicle branches whorled on nodes (branches 1-2, rarely 3); many evenly spaced spikelets (few spikelets and naked below); leaf blades flat or weakly convolute (strongly convolute), usually >1 mm wide (expanded 0.5-1 mm wide); walls of intercostal long-cells of the abaxial side “straight or only gently” undulate (strongly undulate; see Watson & Dallwitz 1994) and, finally, ligule 0.8-4 mm long (0.2-0.5 mm).

Oreopoa, with its densely caespitose, low-statured habit and xerophytic leaf structure, fits neatly into the morphological syndromes found in species of alpine, wind-swept places. It may be a relic genus.

Distribution. – Sampling more than 200 plots of subalpine to subnival cushion community vegetation in all of the Western and Central Taurus, *Oreopoa anatolica* was recorded only from the Kızlar sivrisi (3086 m), which is the highest summit area of both the Beydağları massif and the Western Taurus, at altitudes of about 2670-2700 m. It obviously represents a local endemic of the Western Taurus.

Site conditions and synecology. – *Oreopoa anatolica* is an alpine species. The records come from the glacially sculptured area additionally subjected to karstic weathering between the Kızlar sivrisi main summit and the Aktepe. The landscape between steep scree slopes and towering rock walls is a patchwork of roche moutonnée, rocky flats, moraines, mounds, fine-soil rich depressions, dolines and meltwater runnels. It is notable that there are no observations higher up from the Kızlar sivrisi and the Aktepe summits proper.

At all wind-exposed sites, the zonal alpine to subnival Drabo-Androsacetalia Quézel 1973 vegetation, in the Western Taurus belonging to the Paronychion lycicae Quézel 1973 alliance establishes itself. *Oreopoa anatolica* is associated to this low-covering vegetation type (10-40 %), generally composed of a mixture of low, often pulvinate chamaephytes and caespitose hemi-cornophytes. Cushion plants, especially the tragacanthic thorn-cushion species *Onobrychis cornuta* (L.) Desv., *Acantholimon ulicinum* (Schult.) Boiss. and *Astragalus angustifolius* Lam. var. *angustifolius*, predominate. *O. anatolica* inhabits wind-swept, moderately inclined and rather damp boulder rich slopes chiefly in E and SE exposures. It is found strictly on limestone, together with, in particular, *Alopecurus lanatus* Sm., *Alyssum condensatum* Boiss. & Hausskn., *Astragalus pinetorum* Boiss., *Bromopsis tomentella* (Boiss.) Holub, *Centaurea drabifolia* subsp. *austro-occidentalis* Wagenitz, *Draba heterocoma* (Fenzl) Coode & Cullen subsp. *heterocoma*, *Euphorbia pestalozzae* Boiss., *Festuca pinifolia* (Hackel ex Boiss.) Bornm., *Koeleria brevis* Stev., *Linum obtusatum* (Boiss.) Stapf, *Marrubium bourgaei* Boiss., *Minuartia leucocephala* (Boiss.) Mattf., *Ornithogalum alpigenum* Stapf, *Paronychia chionaea* Boiss., *Pedicularis cadmea* Boiss. and *Veronica caespitosa* Boiss. var. *caespitosa*.

Recommended IUCN threat category. – Although there appears to be a healthy population with more than 200 mature individuals and abundant seedlings and young plants, its extremely narrow range and the grazing pressure by goats constitutes a clear risk of extinction. Hence, *Oreopoa anatolica* should be classified as “Critically endangered (CR)” according to criterion D of the IUCN Red List Categories (2001).

***Secale leptorhachis* H. Scholz & Parolly, sp. nova**

Holotype: Turkey, C3 Antalya, Bakırlı Dağı, Saklıkent, thorn-cushion community, 1820 m, 14.7.1999, M. Döring, G. Parolly & D. Tolimir T 591 (B; isotype: herb. Parolly) – Fig. 2.

A *Secale vavilovii* Grossh. foliorum laminis et spicae internodiis angustioribus, c. 2 mm resp. 1 mm latis, differt.

Biennial(?). Stems tufted, erect, 60-70 × 0.1-0.2 cm, smooth and glabrous throughout. Leaf blades 1-2(-3) mm wide; sheaths and blades of lower leaves hirsute to shortly tomentose, those of upper leaves glabrous. Spike erect, 5-6 × 0.5(-0.7) cm. Rhachis semi-fragile, joints (rhachis segments) 0.9-1 mm wide. Spikelets 2-flowered. Glumes subequal, 7-9 mm, keels minutely scabrid, awn short, 1-2 mm. Lemmas 10-12 mm, smooth, awn 7-30 mm. Palea c. 10 mm. Anthers 5-6 mm, yellow. Caryopsis 6-7 mm.

Relationship. – Klaus Hammer (Witzenhausen) remarks on the two sheets of the plants here named *Secale leptorhachis* (in lit., 29.11.2000): “Eine solche Sippe [habe ich] bisher noch nicht gesehen” [such a taxon I have never seen before]; see also Hammer & al. (1987).

The unique set of characters tells *Secale leptorhachis* readily apart from all other *Secale* species and relegates it into a somewhat isolated position. From no other taxon such narrow leaf blades and only 0.9-1 mm broad rhachis segments are known. Usually the rhachis segments in *Secale* are 1.3-1.5 mm wide (Tan 1985). A special study on the morphological variation in *Secale* taxa, mainly of spikes and spikelets, was published by Frederiksen & Petersen (1997); width measurements of rhachis segments are missing therein, apparently no variation was found.

Secale leptorhachis is to all appearance a biannual, which forms dense tussocks in the second year, somewhat resembling those of true perennials such as *S. strictum* (C. Presl) C. Presl s.lat. (*S. montanum* Guss.).

Distribution. – Hitherto only known from the type locality, the Bakırlı Dağı, a summit area in the eastern Beydağları in the Western Taurus (Fig. 4; for a monograph of this mountain range see Eren & al. 2004).

Site conditions and synecology. – *Secale leptorhachis* was recorded only once at elevations of c. 1800 m in a gappy, secondary thorn-cushion community with abundant *Acantholimon lycanicum* Boiss. & Heldr. and *Astragalus angustifolius* Lam. var. *angustifolius*, replacing the vanishing, very localised and strongly cleared to degraded oreale needle-leaved mountain forests. The limestone grasslands and thorn-cushion communities, whether primary or secondary, are classified within the Tanacetion praeteriti Quézel 1973 alliance (Quézel 1973, Parolly 2004). The stands on the lower slopes of the Bakırlı Dağı are rich in *Poaceae* such as *Bromopsis cappadocica* (Boiss. & Bal.) Holub, *Elytrigia divaricata* (Boiss. & Bal.) Nevski, *Festuca elwendiana* Markgr.-Dann., *Koeleria macrantha* (Ledeb.) Schult. and *Secale anatolicum* Boiss., and moderately disturbed due to the situation above the skiing resort of Saklıkent. Other important associated species include, among many others, *Alyssum erosulum* Clementi, *Dianthus anatolicus* Boiss., *Anthemis cretica* subsp. *anatolica* (Boiss.) Grierson, *Cruciata taurica* (Pall. ex Willd.) Ehrend., *Cyanus bourgaei* (Boiss.) Wagenitz & Greuter, *Cynoglossum lithospermifolium* subsp. *cariense* (Boiss.) Greuter & Burdet, *Euphorbia kotschyana* Fenzl, *Marrubium bourgaei*, *Minuartia pestalozzae* (Boiss.) Bornm., *Papaver pilosum* Sm. subsp. *pilosum*, *Salvia pisidica* Benth., *Thymus sipyleus* var. *davisanus* Ronniger and var. *sipyleus* Boiss., and especially *Tanacetum praeteritum* (Horw.) Heywood subsp. *praeteritum*.

Recommended IUCN threat category. – There are no reliable field observations available; however, *Secale leptorhachis* seems to appear only very locally and with scattered individuals. All other *Secale* records from that mountain range between 1750 and 2550 m represent *S. anatolicum* Boiss. (Eren & al. 2004). This constitutes a serious risk of extinction. Hence, it should preliminarily be classified as “Critically Endangered (CR)” according to criterion D of the IUCN Red List Categories (2001).

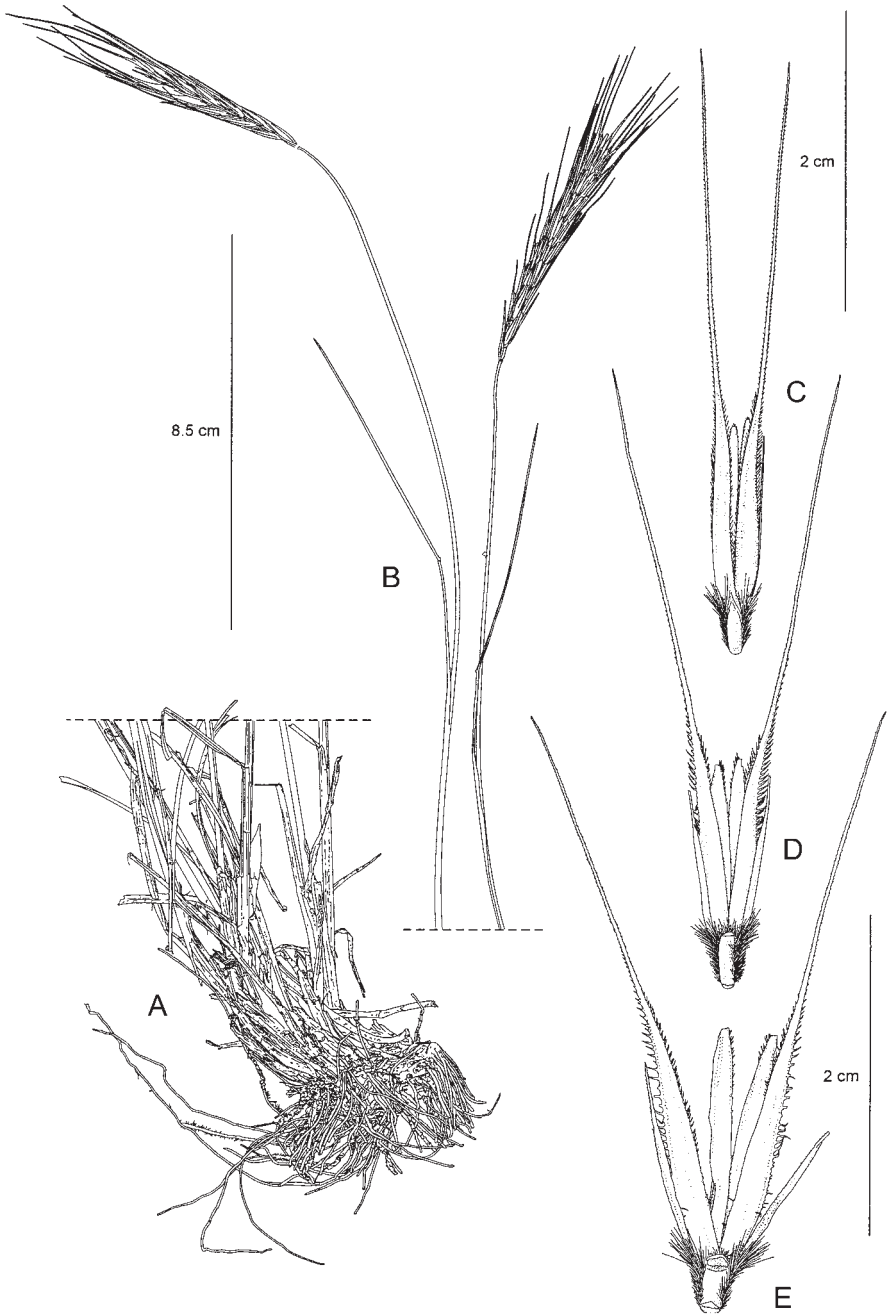


Fig. 2. *Secale leptorhachis* (A-D) and *S. anatolicum* (E) – A: basal part; B: upper part, culms and inflorescence; C: spikelet, dorsal view; D: spikelet, ventral view; E: spikelet of *S. anatolicum*, ventral view. – A-D from the holotype (B), E from Döring, Parolly & Tolimir T 639; drawings by Horst Lünser.
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Stipa cacuminis H. Scholz & Parolly, **sp. nova**

Holotype: Turkey, C2 Muğla, Sandras Dağı, Altınsivri, 2100 m, dwarf-shrub community, peridotite, 20.6.1999, *M. Döring, G. Parolly & D. Tolimir T 76a* (B; isotype: herb. Parolly) – Fig. 3.

Differt a *Stipa hohenackeriana* Trin. & Rupr. arista indistincte bigeniculata, columna aristae laevi, pilis setae longioribus usque ad 5 mm (nec 2 mm) longis et apice lemmatis coronula destituta.

Tufted perennial. *Stems* 30–40 cm tall. *Leaf blades* setaceous, c. 0.5 mm in diam., grey-green, scabridulous beneath (sometimes with additional single, short and stiff hairs), hairy above. *Leaf sheaths* glabrous to puberulent, ligule to 6 mm long. *Inflorescence* a contracted panicle, at least lower part enveloped by upper sheath. *Glumes* subequal, long-acuminate, up to 40 mm long. *Lemma* with naked callus, c. 15 mm, uniformly hairy below, above middle with a row of hairs not reaching apex, apically (at base of awn) without a ring of hairs. *Awn* c. 18 cm, indistinctly unigeniculate, column smooth and glabrous, bristle weakly arcuate, plumose, hairs c. 5 mm long.

Relationship. – To all appearance, *Stipa cacuminis* links *S. sect. Barbatae* Junge with *S. sect. Smirnovia* Tzvel., which according to Freitag (1985) does not represent a monophyletic taxon. At present, about six species of *S. sect. Barbatae* are known from Turkey (Freitag 1985, Scholz 1985, 2000), including *S. hohenackeriana* Trin. & Rupr. as the closest relative of *S. cacuminis*, but no members of *S. sect. Smirnovia*. *S. cacuminis*, rather unique within the genus, combines the absence of a ring of short hairs (coronula) at the top of the lemma with the weakly geniculate or unigeniculate awn with a long (4–5 mm) plumose seta (only up to 2.5 mm in *S. sect. Barbatae*). It thus somewhat approaches *S. (sect. Smirnovia) caucasica* Schmalh. s. str. with a distribution range from the Caucasus to Afghanistan (Freitag 1985).

Additional specimens seen. – TURKEY: C2 MUĞLA: Sandras Dağı, Çiçekbaba Tepe, 2000 m, dwarf-shrub community, peridotite, together with *Stipa holosericea*, 21.6.1999, *M. Döring, G. Parolly & D. Tolimir D 113* (B, herb. Parolly). — C3 KONYA: Junction of Manavgat - Beyşehir road NE Çamlık, 1340 m, steep serpentine slope, 12.6.2002, *R. Ulrich 2/25* (herb. Parolly).

Distribution. – The two occurrences of *Stipa cacuminis* presently known open a rather wide range between the Sandras Dağı (records from two different summits) in the SW edge of the Western Taurus and the Çamlık area in the western Central Taurus (Fig. 4). There is much evidence to assume that *S. cacuminis* is a hitherto overlooked serpentinophyte with a much wider distribution in the Taurus range and even occurrences outside Turkey.

The following specimen from N Iran, first reported as *S. pennata* L. β . *minor* Boiss. (Bornmüller & Gauba 1939), then identified as *S. hohenackeriana* and later as *S. (sect. Stipa) turkestanica* Hack. (Freitag 1985) comes close to our species and may belong to *S. cacuminis*: Persia borealis, Hes[s]arband [bei Haasnak Dar], 3000 m, 24.8.1935, *Gauba 1234* (B).

Site conditions and synecology. – With the exception of the ultramafic soils obviously required, the site conditions deviate considerably at the two localities. On Sandras Dağı it grows on diorite and peridotite in the subalpine belt well about 2000–2100 m as a member of a dwarf-scrub community with few thorn-cushions (*Acantholimon ulicinum* var. *purpurascens* (Bokhari) Bokhari & J. R. Edm.). The habitats are rock-strewn, exposed summit plateaux and slopes with a low-growing, but rather dense vegetation in various exposure. Associated species include widespread, substrate-vague thorn-cushion vegetation elements such as *Asperula stricta* subsp. *monticola* Ehrend., *Bromopsis tomentella*, *Chamaecytisus pygmaeus* (Willd.) Rothm., *Cyanus reuterianus* (Boiss.) Holub, *Cynoglossum lithospermifolium* subsp. *cariense*, *Koeleria macrantha*, *Poa bulbosa* L., *Scorzonera szowitzii* DC., *Sedum ursii* t'Hart, *Stipa holosericea* Trin., and the endemic serpentinophytes *Aethionema speciosum* subsp. *compactum* P. Hartvig & A. Strid, *Alyssum masmenaeum* Boiss., *Alyssum propinquum* Baumg., *Cytisopsis pseudocytisus* subsp. *reeseana* (Guyot) Lassen, *Ebenus pisidica* Hub.-Mor. & Reese, *Ferulago sandrasica* Peşmen & Quézel, *Genista sandrasica* P. Hartvig & A. Strid, *Linum boissieri* Boiss., *Prometheum serpentinicum*



Fig. 3. *Stipa cacuminis* – A: habit; B: caryopsis. – From the holotype (B); drawings by Horst Lünser.
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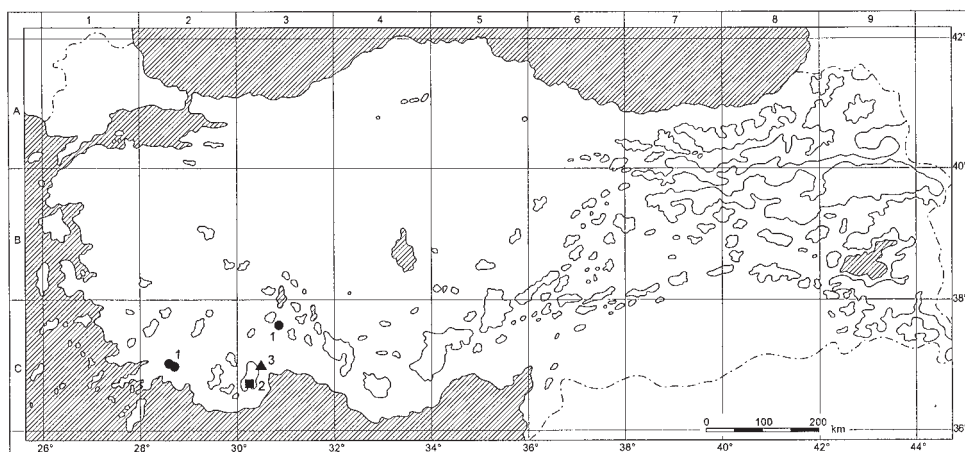


Fig. 4. Distribution of *Stipa cacuminis* (1), *Oreopoa anatolica* (2) and *Secale leptorhachis* (3).

(Werderm.) t'Hart, *Verbascum cariense* Hub.-Mor. and *Viola sandrasea* Melchior. Phytosociologically, these stands can be placed in the western race of the serpentinophytic *Thuryon capitatae* Quézel 1973 alliance of the *Astragalo-Brometalia* Quézel 1973 (Parolly 2004).

The record near Çamlık comes from a distinctly lower elevation (1340 m), where *Stipa cacuminis* colonises W-exposed serpentine slopes covered by rather open black pine forests with an unusually dense, but species-poor herb layer. Robert Ulrich (in lit.) noted besides the abundant *Stipa* the following few associates: *Cochlearia sempervivum* Boiss. & Heldr., *Eryngium palmito* Boiss. & Heldr., *Ferulago* sp. and *Thlaspi* aff. *cariense* Carlström. A phytosociological classification of these stands is presently not possible.

Recommended IUCN threat category. – There are no reliable data about the population size of *Stipa cacuminis*. Nevertheless, a preliminary classification as “Vulnerable (VU)” according to criterion D of the IUCN Red List Categories (2001) seems justified.

Additional remarkable records

Bromopsis tomentella subsp. *nivalis* (Bornm.) H. Scholz

Hitherto known to occur in Iran and very locally in the NE edge of Anatolia (Scholz & Byfield 2000, as *Bromus tomentellus* subsp. *nivalis* H. Scholz & A. Byfield). The taxon has obviously a surprisingly wide distribution in the Taurus Mts as revealed by our gatherings. In NE Anatolia, it occurs in dry acidophytic alpine pasture grassland. In the Taurus Mts it grows mainly on limestone and dolomite. Typical substrates in the Bolkar Dağları include moraine talus partly with considerable proportions of ultramafic gravel. The sites in the high subalpine to subnival belts are often damp, sometimes close to damp screes or snow-fields. Phytosociologically it is linked to the Drabo-Androsacetalia vegetation.

TURKEY: C3 ANTALYA: Beydağları, Bakırlı Dağı above Saklıkent, summit region, 36°49'60"N, 30°20'22"E, 2350-2550 m, rocky slopes, limestone, wind-swept cushion community on rocky flats and along ridges, 11.7.1999, M. Döring, G. Parolly & D. Tolimir P 6519 (B, herb. Parolly). — C3 ISPARTA: Davras Dağları, Büyük Davras Dağı, N-facing cirque and summit region above Kır Yayla, 37°45'77"N, 30°44'64"E [cirque], 2150-2550 m, limestone and dolomite, wind-swept cushion communities (Drabo-Androsacetalia) on damp moraines and along the rocky summit ridge, 28.6.2000, Ö. Eren & G. Parolly P 7635b (AKDU, B, herb. Parolly). — C3 ISPARTA/KONYA: Dedegöl Dağları, Dipoyraz (Dedegöl) Dağı (ascent from Yenişarbademli village), area

around the large cirque below the main summit facing Beyşehir Gölü, 37°42'N, 31°19'E, 2300-2650 m, chiefly limestone and dolomite with some outcrops of ophiolite, schist and conglomerate, ridges and rocky slopes outside the cirque, wind-swept cushion community, 15.7.1999, *M. Döring, G. Parolly & D. Tolimir P 6626* (B, herb. Parolly). — C5 NIĞDE: D. Ulukişla, Bolkar Dağları above Meydan, cirque system around tarn Karagöl, ridge facing Gököl, 37°23' 98"N, 034°34'80"E, 2700-2900 m, rocky, scree-rich slopes with wind-swept cushion communities (Drabo-Androsacetalia), dolomite and marble, 28.7.1999, *M. Döring, G. Parolly & D. Tolimir P 6920* (B, herb. Parolly). — C5 NIĞDE/İÇEL: D. Ulukişla, Bolkar Dağları above Meydan, Karagöl area, cirques between Tahtakaya and Egerkaya, 37°23'N, 34°34'E, 2900-3000 m, rocky, scree-rich slopes, chiefly with scree communities and steep *Sesleria alba* swards, dolomite and marble, 1.8.1999, *M. Döring, G. Parolly & D. Tolimir P 7015* (B, herb. Parolly).

Festuca cataonica (Hackel ex Boiss.) Markgr.-Dannenb.

So far known only from the Cataonian and Cilician Taurus westward to the Pozantı area (Markgraf-Dannenberg 1985), the following record extends the range considerably to the west. The species is an important component of the limestone swards on raw soil along the summit crest of Honaz Dağı.

TURKEY: C2 DENİZLİ: Honaz Dağı, summit region (main ridge and saddle between the two major peaks), 37°03'18"N, 30°09'45"E, 2550 m, rocky slopes, limestone and dolomite, steep, scree-rich limestone swards, 20.6.2000, *Ö. Eren & G. Parolly P 7497* (AKDU, B, herb. Parolly).

Festuca karsiana E. Alexeev

In Turkey, this Euxine taxon has been only known from the type (A9; cf. Markgraf-Dannenberg 1985).

TURKEY: A8 ARTVIN (ÇORUH): Doğu Karadeniz Dağları, central Kaçkar Dağları near Yaylalar (Hevek), Büyük Çay valley 0.6-2 km above Olgunlar, 40°50'94"N, 41°13'85"E, 2150-2250 m, granite, flushes, low-sedge fens, and hygrophytic vegetation along small tributary creeks of the Büyük Çay, N-exp., 20.8.1999, *M. Döring, G. Parolly & D. Tolimir P 7205* (B, herb. Parolly).

Festuca punctoria Sm.

Believed to be endemic to the NW Anatolian Ulu Dağı, where it is known from many gatherings (Markgraf-Dannenberg 1985). This remarkable range extension towards the S Anatolian Honaz Dağı spotlights a highly unusual distributional pattern previously restricted to vicarious taxa such as *Galium olympicum* Boiss. (Ulu Dağı) and *G. aretioides* Boiss. (Honaz Dağı and neighbouring mountains).

TURKEY: C2 DENİZLİ: Honaz Dağı, summit region (main ridge and saddle between the two major peaks), 37°03'18"N, 30°09'45"E, 2530 m, rocky slopes, limestone and dolomite, wind-swept cushion communities (Drabo-Androsacetalia), 19.6.2000, *Ö. Eren & G. Parolly P 7473* (AKDU, B, herb. Parolly); *ibid.*, 2550 m, steep, scree-rich limestone swards on raw soil, 20.6.2000, *Ö. Eren & G. Parolly P 7498* (AKDU, B, herb. Parolly).

Koeleria brevis Stev.

Given in Flora of Turkey (Doğan 1985) only from Turkey-in Europe and central W Anatolia from "dry calcareous places, s.l.-1000 m", the new localities of this putative Euxine species in the western half of the Taurus range are somewhat surprising. All records come from low subalpine to alpine elevations, often from wind-swept sites, and although limestone rock predominates, from nearly all substrates occurring there, including ophiolites and mica schist.

TURKEY: B3 AFYON: Sultan Dağları, ascent from Yakasinek, range between the two main summits, 38°28'62"N, 31°09'29"E, c. 1900-2100 m, micaceous schist, wind-swept, open thorn-cushion communities, 3.7.2000, *Ö. Eren & G. Parolly P 7723* (AKDU, B, herb. Parolly). — C2 MUĞLA: Sandras Dağı above Ağla, Altınsivri summit, 37°03'N, 28°48'E, 1950-2024 m, summit plateau and gently sloping rocky inclines, boulder-rich, ophiolitic soils, dwarf-shrub communi-

ties, 20.6.1999, *M. Döring, G. Parolly & D. Tolimir P 6063* (B, herb. Parolly); Lycian Akdağları above Gömbe, Akdağ, ridges and hilltops SE Uçarsu, 1950-2070 m, limestone, wind-swept cushion communities (Drabo-Androsacetalia), 28.6.1999, *M. Döring, G. Parolly & D. Tolimir P 6282* (B, herb. Parolly); *ibid.* slope below the E-facing cirque of the Uyluk Tepesi, 2300-2400 m, rocky slopes, limestone, wind-swept cushion communities at hill-tops, E-exp., 29.6.1999, *M. Döring, G. Parolly & D. Tolimir P 6318* (B, herb. Parolly). — C3 ANTALYA: Beydağları, Bakırlı Dağı above Saklıkent, 2350-2550 m, rocky slopes, limestone, wind-swept cushion community on rocky flats and along ridges, 25.7.1999, *Ö. Eren 6539* (AKDU, B, herb. Parolly). — C3 ISPARTA: Davras Dağları, Büyük Davras Dağı, N-facing cirque and summit region above Kır Yayla, 37°45'77"N, 30°44'64"E [cirque], 2150-2550 m, limestone and dolomite, wind-swept cushion communities (Drabo-Androsacetalia) on damp moraines and along the rocky summit ridge, 28.6.2000, *Ö. Eren & G. Parolly P 7634* (AKDU, B, herb. Parolly).

Concluding remarks

A good deal of the new taxa and records come from well botanized mountain ranges, often already with a local florula available, such as Honaz Dağı (Tuzlazı 1983, Huber-Morath 1947), Sandras Dağı (Özhatay 1981, 1987, Hartvig & Strid 1987) and Bakırlı Dağı (Eren & al. 2004), underlining the introductory statement.

Stipa cacuminis belongs to a complex of closely related Irano-Anatolian taxa. This S Anatolian endemic (but see above) stands out as the first Anatolian *Stipa* obviously confined to ultramafic soils, but with a wider range to be expected. It was found growing together with the substrate-vague *S. holosericea*.

By contrast, the other two species described new to science, *Secale leptorhachis* and *Oreopoa anatolica*, seem to be taxonomically isolated and show an extremely localised distribution. While the never glaciated eastern Beydağları (with the Bakırlı Dağı at its northern end) are well-known for its paleo-endemics especially concentrated in the coastal foot-hills, but occasionally also dwelling in the subalpine belt (Davis 1971, Eren & al. 2004, Parolly & Hein 2000, Parolly & Nordt 2001), the situation deviates in the western, high inland part of that chain (Kızlar sivrisi). The single locality of *O. anatolica* is a formerly glaciated area, with a block glacier in the Aktepe cirque still present. A permanent in-situ-overlast since the Pleistocene is not conceivable, but a shift to lower elevations easily possible. An adaptation to cold upland climates provided, an immigration during pluvial times from the N and NE and a subsequent dramatic shrinking of its range in warmer periods is a likely assumption. The penetration of Euro-Siberian elements especially along the Anatolian Diagonal (Davis 1971, Kürschner 1982) to the Taurus Mts is today widely accepted; many of these plants of Euro-Siberian origin possess today relic occurrences in the E Mediterranean and Irano-Anatolian areas of Turkey. The situation of *O. anatolica* seems paralleled by *Poa akmanii* Soreng & al., with three scattered occurrences in the western Taurus from high mountain sites, preferably close to snow fields (see Soreng & al. 1997 and for its ecology and new localities, especially Eren & al. 2004).

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References

- Böhling, N. & Scholz, H. 2003: The *Gramineae* (*Poaceae*) flora of the Southern Aegean islands (Greece). Checklist, new records, internal distribution. – Ber. Inst. Landschafts-Pflanzenökol. Univ. Hohenheim, Beih. **16**.
- Bormmüller, J. & Gauba, D. E. 1939: Florulae keredjensis fundamenta XIII. (Planta Gaubaeanae iranicae IV). – Feddes Repert. **47**: 121-137.
- Brunn, J. H., Dumont, J. F., Graciansky, P. C., Gutnic, M., Juteau, T., Marcoux, J., Monod, O. & Poisson, A. 1971: Outline of geology of the Western Taurids. – Pp. 225-255 in: Campbell, A. S. (ed.), Geology and history of Turkey. – Tripoli.
- Clayton, W. D. & Renvoize, S. A. 1986: Genera graminum. Grasses of the World. – London.
- Davis, P. H. 1971: Distribution patterns in Anatolia with particular reference to endemism. – Pp. 15-27 in: Davis, P. H., Harper, P. C. & Hedge, I. C. (ed.), Plant life of South-West Asia. – Edinburgh.
- , Mill, R. R. & Tan, K. (ed.) 1985: Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- , — & — 1988: Flora of Turkey and the East Aegean Islands **10** [Suppl. 1]. – Edinburgh.
- Doğan, M. 1985: *Koeleria* Pers. – Pp. 329-333 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Dore, W. G. & McNeill, J. 1980: Grasses of Ontario. – Monogr. Biosyst. Res. Inst. Ottawa **26**.
- Edmondson, J. R. 1985: *Poa* L. – Pp. 470-486 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Eren, Ö., Gökçeoğlu, M. & Parolly, G. 2004: The flora and vegetation of the Bakırlı Dağı (Western Taurus Mts, Turkey), including annotations on critical taxa of the Taurus range. – Willdenowia **34** [in press]. [[CrossRef](#)]
- Frederiksen, S. & Petersen, G. 1997: Morphometrical analyses of *Secale* (*Triticeae*, *Poaceae*). – Nordic J. Bot. **17**: 185-198.
- Freitag, H. 1985: The genus *Stipa* (*Gramineae*) in Southwest and South Asia. – Notes Roy. Bot. Gard. Edinburgh **42**: 355-489.
- Güner, A., Özhatay, N., Ekim, T. & Başer, K. H. C. (ed.) 2000: Flora of Turkey and the East Aegean Islands **11** [Suppl. 2]. – Edinburgh.
- Hammer, K., Skolimowska, E. & Knüpfer, H. 1987: Vorarbeiten zur monographischen Darstellung von Wildpflanzensortimenten: *Secale* L. – Kulturpflanze **35**: 135-177. [[CrossRef](#)]
- Hartvig, P. & Strid, A. 1987: New taxa and new records from the mountains of SW and SC Turkey. – Bot. Jahrb. Syst. **108**: 301-341.
- Hein, P., Kürschner, H. & Parolly, G. 1998: Phytosociological studies on high mountain plant communities of the Taurus mountains (Turkey). 2. Rock communities. – [Phytocoenologia](#) **28**: 465-563.
- Huber-Morath, A. 1946: Honaz Dag, 2571 m, in Südwestanatolien. – Pp. 634-642 in: Rikli, M., Das Pflanzenkleid der Mittelmeerländer **2**. – Bern.
- IUCN 2001: IUCN Red List Categories: Version 3.1. Prepared by the IUCN Species Survival Commission. – Gland & Cambridge.
- Kürschner, H. 1982: Vegetation und Flora der Hochregionen der Aladaglari und Erciyes Dagi, Türkei. – Beih. Tübinger Atlas Vorderer Orient (TAVO), Reihe A (Naturwiss.) **10**.
- , Parolly, G. & Raab-Straube, E. von 1998: Phytosociological studies on high mountain plant communities of the Taurus Mountains (Turkey). 3. Snow-patch and meltwater communities. – Feddes Repert. **109**: 581-616.
- Markgraf-Dannenber, I. 1985: *Festuca* L. – Pp. 400-442 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Mill, R. R. 1985a: *Eremopoa* Roshev. – Pp. 486-492 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.

- 1985b: *Colpodium* Trin. – Pp. 497 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- 1985c: *Hyalopoa* (Tzevelev) Tzevelev. – Pp. 497-498 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- 1985d: *Catabrosa* P. Beauv. – Pp. 498-500 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Özhatay, E. 1981: Sandras Dağı'nın (Muğla) Florası ve bazı endemik türleri üzerinde palinolojik ve sitolojik araştırmalar. – İstanbul (Doçentlik tezi).
- 1987: Studia ad floram turcicam: New floristic records from Sandras Dağı (C₂ Muğla). – İstanbul Üniv. Fen. Fak. Mec. **B 49**: 47-67.
- Parolly, G. 1995: Die Steinschuttfluren (Heldreichietea) des Westlichen und Mittleren Taurus (Türkei). Pflanzensoziologische, floristische und ökologische Untersuchungen. – Diss. Bot. **247**.
- 1995b: New taxa and noteworthy records from the Western and Middle Taurus Range, Turkey. – Willdenowia **25**: 239-252.
- 1998: Phytosociological studies on high mountain plant communities of the South Anatolian Taurus mountains. 1. Scree plant communities (*Heldreichietea*): A synopsis. – Phytocoenologia **28**: 233-284.
- 2000: Notes on two neglected Turkish *Asyneuma* taxa (*Campanulaceae*). – Willdenowia **30**: 67-75.
- 2004: The high mountain vegetation of Turkey. A state of the art report, including a first annotated conspectus of the major syntaxa. – Turk. J. Bot. **28**: 39-63.
- & Hein, P. 2000: *Arabis lycia* (*Cruciferae*), a new chasmophytic species from Turkey. – Willdenowia **30**: 293-304.
- & Nordt, B. 2001: *Seseli hartvigii* (*Apiaceae*) – a new name for *S. ramosissimum* Hartvig & Strid, and carpological and ecological notes on this species. – Willdenowia **31**: 87-93.
- , Eren, Ö. & Scholz, H. 2002: *Poa densa* Troitsky. [In: Greuter, W. & Raus, T. (ed.), Med-Checklist Notulae, 21]. – Willdenowia **32**: 206-207.
- Quézel, P. 1973: Contribution à l'étude phytosociologique du massif du Taurus. – Phytocoenologia **1**: 131-222.
- & Pamukçuoğlu, A. 1970: Végétation des hautes montagnes d'Anatolie nord-occidentale. – Israel J. Bot. **19**: 348-400.
- Scholz, H. 1985: *Stipa* L. – Pp. 541-553 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- 2000: *Stipa* L. – P. 316 in: Güner, A., Özhatay, N., Ekim, T. & Başer, K. H. C. (ed.): Flora of Turkey and the East Aegean Islands **11** [Suppl. 2]. – Edinburgh.
- & Byfield, A. J. 2000: Three grasses new to Turkey. – Turk. J. Bot. **24**: 263-267.
- 2003: *Ochlopoa*. – Pp. 58-59. [In: Böhling, N. & Scholz, H., The *Gramineae* (*Poaceae*) flora of the Southern Aegean islands (Greece). Checklist, new records, internal distribution]. – Ber. Inst. Landschafts- Pflanzenökol. Univ. Hohenheim, Beih. **16**.
- Smith, P. M. 1985: *Bromus* L. – Pp. 272-302 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Soreng, R. J. 1998: An infrageneric classification for *Poa* in North America, and other notes on sections, species, and subspecies of *Poa*, *Puccinellia*, and *Dissanthelium* (*Poaceae*). – Novon **8**: 187-202. [[CrossRef](#)]
- , Hein, P. & Scholz, H. 1997: *Poa akmanii* (*Poaceae*), a new species from Turkey. – Willdenowia **27**: 195-198.
- Tan, K. 1985: *Secale* L. – Pp. 255-258 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **9**. – Edinburgh.
- Tuzlazı, E. 1983: A supplementary list to the flora of Honaz Dağı. – İstanbul Ecz. Fak. Mec. **19**: 41-46.
- Tzvelev, N. N. 1976: Zlaki SSSR (*Poaceae* URSS). – Leningrad.

- 1989: The system of grasses (*Poaceae*) and their evolution. – Bot. Rev. **55**: 141-204.
Watson, L. & Dallwitz, M. J. 1994: The grass genera of the World, ed. 2. – Wallingford.
Zohary, M. 1973: Geobotanical foundations of the Middle East **1-2**. – Stuttgart.

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