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# Systematic revision of the *Poa sphondylodes* Trin. complex (Poaceae)

Marina V. Oloнова & Wen Li Chen

## Abstract

OLONOVA, M. V. & W. L. CHEN (2010). Systematic revision of the *Poa sphondylodes* Trin. complex (Poaceae). *Candollea* 65: 135-141. In English, English and French abstracts.

The taxonomic status of the *Poa sphondylodes* Trin. complex (*Poa* sect. *Stenopoa* Dumort., *Poaceae*) is discussed. Two subspecies are recognized: *Poa sphondylodes* subsp. *kelungensis* Ohwi, restricted to Taiwan and *Poa sphondylodes* subsp. *sphondylodes*, with a wide distribution in the eastern part of China, Korea, Japan, and the Far East of Russia. This latter includes 5 varieties, *Poa sphondylodes* var. *sphondylodes*, *Poa sphondylodes* var. *erikssonii* Melderis, *Poa sphondylodes* var. *subtrivialis* Ohwi, *Poa sphondylodes* var. *macerrima* Keng, and *Poa sphondylodes* var. *plurifolia* (Keng) Oloнова & W. L. Chen, which is validated. A lectotype is designated for the name *Poa sphondylodes*. Identification keys are given.

## Key-words

POACEAE – *Poa sphondylodes* complex – Eastern Asia – Systematics – Taxonomy – Typification

## Résumé

OLONOVA, M. V. & W. L. CHEN (2010). Révision systématique du complexe *Poa sphondylodes* Trin. (Poaceae). *Candollea* 65: 135-141. In English, English and French abstracts.

Le statut taxonomique du complexe *Poa sphondylodes* Trin. (*Poa* sect. *Stenopoa* Dumort., *Poaceae*) est discuté. Ce taxon comprend 2 sous-espèces, *Poa sphondylodes* subsp. *kelungensis* Ohwi, endémique de Taiwan et *Poa sphondylodes* subsp. *sphondylodes*, ayant une distribution large allant de l'est de la Chine à la Corée, au Japon et l'extrême orient russe. Ce dernier taxon comprend 5 variétés, *Poa sphondylodes* var. *sphondylodes*, *Poa sphondylodes* var. *erikssonii* Melderis, *Poa sphondylodes* var. *subtrivialis* Ohwi, *Poa sphondylodes* var. *macerrima* Keng et *Poa sphondylodes* var. *plurifolia* (Keng) Oloнова & W. L. Chen, nouvelle combinaison. Un lectotype est désigné pour le nom *Poa sphondylodes*. Des clés d'identification sont données.

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## Introduction

*Poa sphondylodes* Trin. is a member of *Poa* sect. *Stenopoa* Dumort. It is an eastern Asian taxon whose treatment has varied substantially over the years, some taxonomists having treated it as a distinct species, others having recognized it as an infraspecific taxon whereas others have not.

*Poa sphondylodes* is commonly treated as a synonym of *P. versicolor* subsp. *ochotensis* (Trin.) Tzvelev (TZVELEV, 1976), sometimes recognized as *P. ochotensis* Trin. (PROBATOVA, 1985). In Japan, the name *P. viridula* Palab. is misapplied to this latter taxon (KOBAYASHI & TATEOKA, 1991) and *P. sphondylodes* is recognized as a distinct species. *Poa sphondylodes* differs from *P. ochotensis* as follows (KOBAYASHI & TATEOKA, 1991; ZHU & al., 2006):

### *Poa sphondylodes*

- Ligules (3-)4-7(-9) mm;
- peduncle and internodes scabrous;
- ratio of length of sheath to internode (0.5-)0.7-1.3(-1.9);
- most culm nodes pale.

### *Poa ochotensis*

- Ligules (0.3-)1-3.5(-5) mm;
- peduncle and internodes smooth or sometimes sparingly to evidently scabrous;
- ratio of length of sheath to internode (0.25-)0.3-0.7(-1);
- most culm nodes commonly black.

In addition, several other species of *Poa* sect. *Stenopoa* have been described from eastern Asia, some of which seem scarcely distinct from *P. sphondylodes*. In preparing the treatment of *Poa* for the “Flora of China” (ZHU & al., 2006), it was necessary to evaluate the alternative treatments of *P. sphondylodes* and its putative relatives. In this paper, we present and explain our treatment of *P. sphondylodes*. Here we accept two additional infraspecific taxa, which were treated as synonyms in ZHU & al. (2006). In preparing this revision, we examined a wide range of specimens from eastern Asia, including most of the type specimens involved. Our goal was to determine the appropriate treatment of all names that have been associated with *P. sphondylodes*, particularly those that have been applied to plants from Russia and China.

## Material and methods

This study is based on field work by the authors in Siberia and China and examination of approximately 1500 specimens from BM, C, K, KYO, LE, MHA, MO, MW, NAS, PE, TK, US and VLAD and the personal collections of Dr R. J. Soreng from China (PE, US) and Dr. G. and S. Miede (Faculty of Geography, University of Marburg, Germany) from the western provinces of China and Mongolia. Field study helped us appreciate which features were most likely to be modified by environmental conditions. Examination of specimens from

throughout the range of the complex made it possible to identify geographic patterns in the observed variation. The need to complete the treatment for the “Flora of China” in a timely manner precluded our undertaking formal numerical analyses of the observed variation.

## Results and discussion

In developing our taxonomic treatment of the *P. sphondylodes* complex, we accepted the point of view that individual species can show considerable variability. We also recognized that species in *Poa* sect. *Stenopoa* can hybridize with each other and that, because all the species are perennial and many are apomictic, such hybrids may persist for many years, possibly spreading beyond the site of the initial hybridization event. We agree with SKVORTZOV (1971) that, in well studied taxa, it is generally inappropriate to give taxonomic recognition to variants that occur sporadically within the range of other variants from which they differ in only one characteristic. The subspecies we recognize grow over a significant area and are geographically distinct. Some of the subspecies may have a hybrid origin, but they are morphologically close to one of their parents, possibly as a result of introgression.

We have also recognized some varieties on the basis of one or two characteristics because many of the taxa in the *P. sphondylodes* complex come from areas that are, as yet, poorly represented in herbaria. This makes it difficult to assess their taxonomic significance. Drawing attention to their existence facilitates the mapping of biodiversity and invites further study more effectively than burying them completely in another taxon.

After examining all the specimens available to us, we concluded that *P. sphondylodes* is a relatively constant species with a wide distribution in the eastern part of China, Korea, and Japan. Here we recognize two subspecies, one restricted to Taiwan, and the typical one widely distributed outside of Taiwan with five varieties. The key below distinguishes the infraspecific taxa that we recognize. The key is preceded by a formal presentation of the recognized taxa, including a discussion of their synonyms.

### Key to the subspecies of *Poa sphondylodes*

1. Quite firm plants with uppermost node in lower 1/3 of stem. Sheaths exceed their leaf blades. [Plants of extratropical part of Eastern Asia]..... **1. subsp. *sphondylodes***
- 1a. Soft plants with uppermost nodes about the middle of the stem. Leaf blades exceed their sheaths. [Plants of Taiwan] ..... **2. subsp. *kelungensis***

1. *Poa sphondylodes* Trin. subsp. *sphondylodes*, in Bunge, Enum. Pl. China Bor.: 71. 1833 (Fig. 1A).

**Lectotypus** (designed here): CHINA: in montosis prope Ssi-jui Ssy, s.d., *Bunge s.n.* (lecto-: LE [2698.01]!; iso-: LE [2698.03]!).

**Syntypus**: CHINA: Hebei: Panshan, s.d., *Bunge s.n.* (LE [2698.02]!).

= *Poa strictula* Steud., Syn. Pl. Glumac. 1: 426. 1854.  
 ≡ *P. palustris* var. *strictula* (Steud.) Hack. in Bull. Herb. Boissier 7: 710. 1899. ≡ *P. misera* var. *strictula* (Steud.) Koidz. in Bot. Mag. (Tokyo) 31: 257. 1917.  
 ≡ *P. sphondylodes* var. *strictula* (Steud.) Honda in J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 83. 1930.  
**Typus**: “Japonia” [JAPAN]: Herb. Lugd. Batav., s.d., *Siebold s.n.* (holo-: L [0194115]!) (synonymised by ZHU & al., 2006).

Quite firm glaucous plants, loosely tufted, basal branching extravaginal. Culms (15-)30-50(-70) cm tall, usually erect, scabrous below the panicle, rarely smooth; nodes (2-)3-4, uppermost node at about 1/3 culm height. Leaf sheaths scabrous, much shorter than the internodes, usually longer than or, rarely, equal to the blades; ligules (2-)3.5-5(-10) mm long; blades (4-)6-12 cm long, (1-)1.5-2.5(-4) mm wide, flat or folded, lax or stiff. Panicles (4-)6-10 cm long, spindle-shaped, dense, narrow, (0.5-1.5 mm), branches 2-5 per node, erect, basal branches up to 2.5 cm, spikelets usually crowded near the base, longest branches usually at the second node. Spikelets (3.2-)3.5-5(-7) mm long, lanceolate, green or grassy yellow with 2-5(-11) florets; glumes 2.5-4(-4.5) mm long, narrowly lanceolate, unequal; rachilla glabrous or warty; calluses webbed or glabrous; lemmas lanceolate, 3-4 mm long, densely hairy. Anthers 1.3-1.5(-1.8) mm long.

**Distribution and habitats.** – Typical subspecies *P. sphondylodes* grows on open sandy ground, on river banks, in meadows among scattered thickets on slopes, and in grassy places on sunny slopes at 100-2500 m. It is common in the eastern and central provinces of China and in Korea and Japan and Russia (Far East). In the Far East of Russia it is quite rare, probably, having been consumed by introgressive hybridization.

**Nomenclatural and taxonomical notes.** – *Poa sphondylodes* is more uniform than most species of *Poa* sect. *Stenopoa*. Its blade morphology is highly dependent on the environmental conditions, varying from flat and lax under mesic conditions to folded and stiff under xeric conditions. Dried leaves, such as those on herbarium specimens, often appear stiffer than those on living plants. The height of the top culm node is also influenced by environmental conditions, being higher in wet climates. There are two Bunge collections from China mentioned in the protologue, and we select the one from “Ssi-jui Ssy” as the lectotype.

The morphological constancy of *P. sphondylodes* is consistent with the observation of KOBA & TATEOKA (1991), who studied it in Japan, that it is usually tetraploid. There are plants that differ from the above description, but such deviants are less common in *P. sphondylodes* than in other species of *Poa* sect. *Stenopoa*. Those entities that merit formal taxonomic recognition are discussed below, under the appropriate name.

The type of *Poa strictula*, and most collections so named, represent a mesomorphic form of *P. sphondylodes* subsp. *sphondylodes* that can be found throughout the range of the subspecies. The following taxa are recognized as varieties within *P. sphondylodes* subsp. *sphondylodes* because they differ only slightly from var. *sphondylodes* but appear to have a restricted distribution.

### Key to the varieties of *Poa sphondylodes* subsp. *sphondylodes*

1. Spikelets in distal halves of panicle branches ..... 2
- 1a. Spikelets to the base of panicle branches ..... 3
2. Ligule 1.5-2(-3) mm, stem 15-35(-40) cm ..... 1.5. var. *plurifolia*
- 2a. Ligule (3-)3.5-6 mm, stem 35-60 cm ..... 1.4. var. *macerrima*
3. Spikelets 3.5-5 mm ..... 1.1. var. *sphondylodes*
- 3a. Spikelets (4-)5-10 mm ..... 4
4. Robust plants with thick culms (4-6 mm diam. at the base) and broad leaves (3-4 mm) ..... 1.3. var. *subtrivialis*
- 4a. Quite thin plants with stems 2-3 mm diam. at the base and narrow leaves (1-2.5 mm) ..... 1.2. var. *erikssonii*

#### 1.1. *Poa sphondylodes* Trin. var. *sphondylodes*

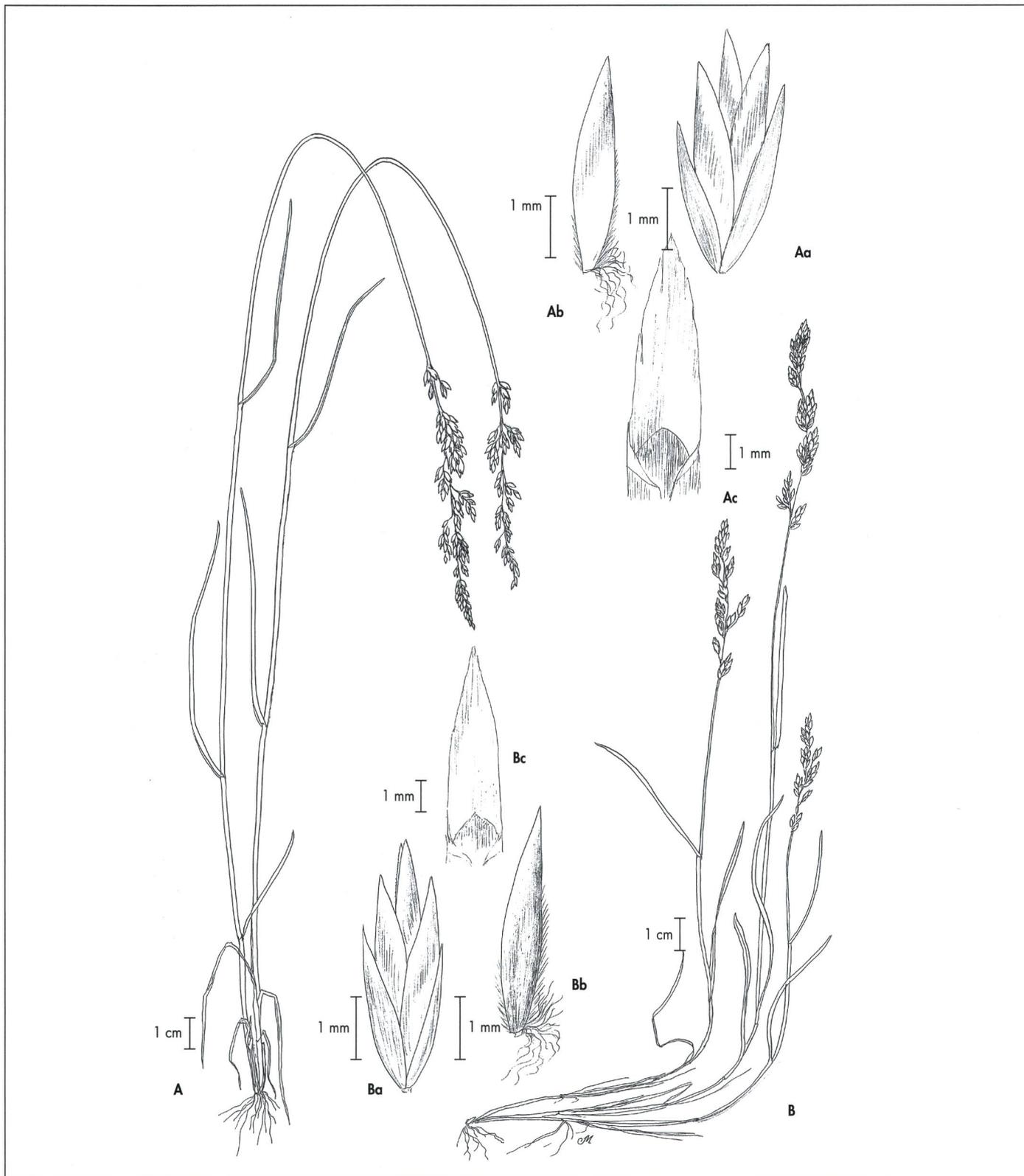
**Distribution and habitats.** – The typical variety is distributed throughout the range of the species, except in Taiwan.

#### 1.2. *Poa sphondylodes* var. *erikssonii* Melderis in T. Norlindh, Fl. Mongol. Steppe: 99. 1949.

**Typus**: CHINA: “Nei Mongol: 7.5 km (15 li) ad bor.-orient. A Khadain-sume, in convalle, flor et fruct.”, 29.VI. 1936, *Eriksson 894* (holo-: S; iso-: BM!).

Quite thin plants 25-40(-50) cm. Culms 2-3 mm at the base. Quite narrow leaves (1-2.5 mm); ligules up to 4 mm. Panicle quite dense, contracted to ovoid, branches up to 1.2-3 cm. Spikelets 4-8 mm, concentrated in the base of the panicle branches.

**Distribution and habitats.** – *Poa sphondylodes* var. *erikssonii* grows in meadows among scattered thickets on slopes, grassy places on sunny slopes at 100-1500 m in Chinese province Nei Mongol.



**Fig. 1.** – **A.** *Poa sphondylodes* Trin. subsp. *sphondylodes*. **B.** *P. sphondylodes* subsp. *kelungensis* (Ohwi) T. Koyama. [**a.** Spikelet; **b.** Lemma; **c.** Ligule].  
[**A.** Chinese coll. s.n., PE; **B.** N7983, TI] [Drawn by Marina Olonova]

*Taxonomical and nomenclatural notes.* – According to MELDERIS (1949), *P. sphondylodes* var. *erikssonii* differs from var. *sphondylodes* in forming looser tussocks and in having shorter leaves that are scabrous on both sides, longer and wider panicles with longer branches and elongated spikelets (up to 10 mm) with many florets and lemma with coloured bands. The isotype of var. *erikssonii* resembles the species of the *P. palustris* L. lineage (*P. versicolor* subsp. *stepposa* (Kryl.) Roshev. and *P. attenuata* Trin.) in its uppermost internode length (unlike typical samples of *P. sphondylodes*, it is not much elongated), shorter leaves and a purple band on the top of lemma. So, combining the characters of *P. versicolor* Besser s.l. and *P. sphondylodes*, and being situated between general areas of these polytypical species, it may be of hybrid origin between them. As for long and multiflowered spikelets, samples with such spikelets are seen among *Poa* sect. *Stenopoa* occasionally over the vast ranges of species.

*Iconography.* – MELDERIS (1949: 98, tab. 7).

**1.3. *Poa sphondylodes* var. *subtrivialis*** Ohwi in Acta Phytotax. Geobot. 10: 126. 1941 (Fig. 2C).

**Typus:** JAPAN: Shikoku, Yawatahama in Iyo, 24.V.1925, Yamashita, K. s.n. (holo-: KYO; iso-: US![?]).

= *Poa grandispica* L. Liu, Fl. Reipubl. Sin. 9(2): 394. 2002. **Typus:** CHINA: Hebei, Mt. grassy slope, 1150 m, 13.VII.1950, Liu, Y. 13059 (holo-: NAS!) (synonymised by ZHU & al., 2006).

Robust plants with thick culms (4-6 mm at the base). Broad leaves (3-4 mm); ligules 3-5 mm. Panicle dense, ovoid, branches up to 5(-6) cm. Spikelets 6-10 mm, usually concentrated in the base of the panicle branches.

*Distribution and habitats.* – *Poa sphondylodes* var. *subtrivialis* grows in grassy places on sunny slopes at 1000-3200 m in Hebei, Henan, Sichuan, and Shanxi provinces of China.

*Taxonomical notes.* – It differs from all other varieties of *P. sphondylodes* in having longer spikelets and in being more robust. Although rare, it grows sporadically throughout the provinces mentioned. Probably a polyploid, it seems to have arisen independently in different areas.

**1.4. *Poa sphondylodes* var. *macerrima*** Keng in Sunyatsenia 6: 55. 1941 (Fig. 2B).

**Typus:** CHINA: Hopei prov. Pei-Ping, at Pou-Hua Shan, 24.VII.1933, Wang, C. W. 60037 (holo-: PE!).

Quite thin plants 30-50 cm, with culms 2-3 mm diam. at the base. Quite narrow leaves (1-2.5 mm); ligules (3-)3.5-6 mm. Panicle quite lax, sometimes with long branches up to 4 cm. Spikelets (3.2-)3.5-5 mm, in distal part of panicle branches

*Distribution and habitats.* – *Poa sphondylodes* var. *macerrima* grows in grassy places on sunny slopes at 1000-3200 m. It is common in eastern China, Japan, and Korea.

*Taxonomical notes.* – It resembles *P. nemoralis* L. in its having longer panicle branches and longer spikelets confined to the distal halves of the branches. It may be derived from hybrids between *P. sphondylodes* and *P. nemoralis*, being intermediate between these two species.

**1.5. *Poa sphondylodes* var. *plurifolia*** (Keng) Olonova & W. L. Chen, comb. nova (Fig. 2A)

= *Poa plurifolia* Keng, Fl. Tsinling. 1: 436. 1976.

**Typus:** CHINA: Hebei, Xi Shan (Western Hills), saepe ad declivatatum collis, 30.VI.1930, Hao, K. S. 4553 (holo-: NAS!; iso-: LE!, PE!).

= *Poa longiglumis* L. Liu, Fl. Reipubl. Sin. 9(2): 397. 2002. **Typus:** CHINA: Hebei, Dongling (Eastern Tombs), ad declivatem, 1350 [ft.], Liu, K. M. 359 (holo-: NAS!; iso-: PE!) (synonymised by ZHU & al., 2006).

Quite thin plants 30-50 cm, with culms 2-3 mm at the base. Quite narrow leaves (1-2.5 mm); ligules 1.5-2(-3) mm. Panicle quite lax, narrowly effused, or contracted, sometimes with long branches up to 3(-4) cm. Spikelets (3.2-)3.5-5 mm, in distal part of panicle branches.

*Taxonomical notes.* – This variable variety is known only in suburbs of Beijing, where it seems to be quite common. This variation is the most morphologically divergent from typical *P. sphondylodes* and more detailed studies, including molecular analysis, are needed to clarify its relationship and, maybe, alter its taxonomical status. In ZHU & al. (2006), this taxon, and its heterotypic synonym *P. longiglumis*, were included in *P. sphondylodes* var. *erikssonii*.

**2. *Poa sphondylodes* subsp. *kelungensis*** (Ohwi) T. Koyama, Grasses Japan: 104. 1987 (Fig. 1B).

= *Poa kelungensis* Ohwi in Acta Phytotax. Geobot. 4: 60. 1935.

**Typus:** CHINA: Taiwan, in sylvis Kelung, 30.V.1903, U. Faurie 753 (holo-: KYO; iso-: BM!).

Quite soft pale, plants, loosely tufted, basal branching extravaginal. Culms 30-50 cm tall, erect or ascending firm, usually scabrous below the panicle, rarely smooth; nodes 6-8, uppermost node more than half way up. Leaf sheaths scabrous, much shorter than the internodes, usually longer than or equal to the blades; ligules 3.5-6 mm long; blades (4-)6-12 cm long, 1.5-2.5 mm wide, flat or folded, lax or stiff. Panicles 6-10 cm long, spindle-shaped, narrow, ca. 1.5 cm, contracted, dense, with branches 2-5 per node, erect, branches up to 2.5 cm,

spikelets always crowded near the base, longest branches at the second node. *Spikelets* (3-)3.5-5 mm long, lanceolate, green or grassy yellow with 2-5 florets; glumes 2.5-4 mm long, narrowly lanceolate, unequal; rachilla glabrous or warty; calluses webbed; lemmas lanceolate, 3-4 mm long, densely hairy. Anthers 1.3-1.5(-1.8) mm long.

*Distribution and habitats.* – Lowland in flatland hills and along roadsides by the Sea in Taiwan.

*Taxonomical notes.* – In ZHU & al. (2006), this taxon was tentatively included in *P. sphondylodes* var. *sphondylodes*.

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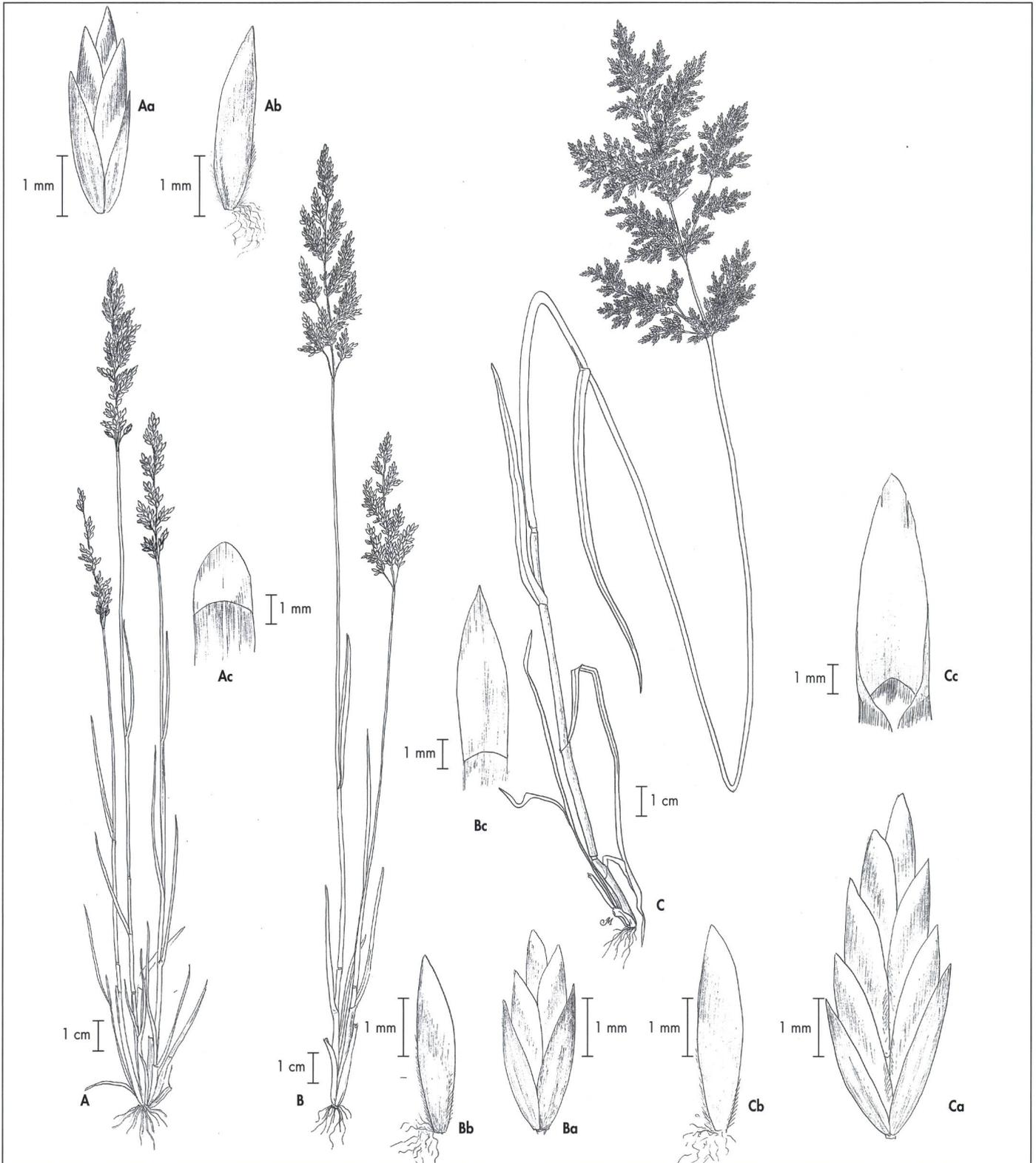


Fig. 2. – A. *Poa sphondylodes* var. *plurifolia* (Keng) Olova & W. L. Chen. B. *P. sphondylodes* var. *macerrima* Keng. C. *P. sphondylodes* var. *subtrivialis* Ohwi.

[a. Spikelet; b. Lemma; c. Ligule]

[A, B, C. Chinese coll. s.n., PE] [Drawn by Marina Olova]

