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BIODIVERSITY STUDIES

Sacciolepis Nash (Poaceae: *Panicoideae*: *Paniceae*) – a new genus to the flora of Russia

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ABSTRACT

A new genus *Sacciolepis* (Poaceae), represented by *S. indica* (L.) Chase, was discovered in the vicinity of the Nature Monument "Golubinyi Utyos" (Dove Cliff), Khasan District, Primorye Territory, Russia. The description of the species is given, its habitat and ecological and cenotic features are characterized.

Keywords: Poaceae, *Sacciolepis indica*, Tumen River valley, Primorye Territory, Russia

РЕЗЮМЕ

Чубарь Е.А., Пробатова Н.С. *Sacciolepis* Nash (Poaceae: Panicoideae: Paniceae) – новый род для флоры России. На юго-западе Приморского края, в Хасанском районе, в окрестностях комплексного памятника природы Голубиный Утес, выявлен новый для флоры России род *Sacciolepis* (Poaceae), представленный *S. indica* (L.) Chase. Приводится описание вида, характеризуется его местообитание и эколого-ценотические особенности.

Ключевые слова: Poaceae, *Sacciolepis indica*, река Туманная, Приморский край, Россия

Sacciolepis Nash (Man. Fl. N. States 89.1901 [Britton]) is a genus comprising about 30 annual and perennial grass species distributed in moist to wet sites of warm-temperate and tropical regions worldwide, but with a center of diversity in Africa (Stapf 1919, Simon 1972, Clayton 1989, Clayton & Renvoize 1999, Morrone et al. 2012). Seven species were identified in the Indochinae region (Camus & Camus 1922); six species – in the New World (Judziewich 1990); and only three species (*S. indica* (L.) Chase, *S. interrupta* (Willd.) Stapf, and *S. myosuroides* (R. Br.) Chase ex E.G. Camus & A. Camus) were found in China (Chen & Phillips 2006) and Australia (Atlas…, 2010). In Japan and the Korean Peninsula, only *S. indica* was recorded (Ohwi 1965, Osada 1993, Lee 2007). Recently, *S. myosuroides* has been introduced to Japan. To date, members of this genus have not been found in Russia. The specimen of *Sacciolepis* recorded by the authors from the wetland flora of the Tumen River valley in the vicinity of the Nature Monument "Golubinyi Utyos" (Dove Cliff), Primorye Territory, Russia, belongs to *S. indica*.

Sacciolepis indica is an annual C3 grass (Aliscioni et al. 2003, De Gennaro 2011), 2*n*=18, x=9 (Tateoka 1956, Chen & Hsu 1961, Mehra & Sharma 1975). It is native to Southeast Asian tropics. PIER (2018) also reports this species as native to East Asia, Australia, and some Pacific islands. It has been introduced to tropical regions of Africa, India, New Zealand, several Pacific islands, the south-eastern USA, the Caribbean, and parts of South and Central America. *Sacciolepis indica* is recognized as an agricultural and naturalized weed (Randall 2012). It is a weed of rice in Indonesia, the Philippines, and Malaysia (Moody 1989).

Taxonomy

Sacciolepis indica (L.) Chase, Proc. Biol. Soc. Washington 21: 8. 1908. Basionyme: *Aira indica* Linnaeus 1753: 63, Sp. Pl. (as "*spicata*"), et errata: 1753:1231. Type: Sri Lanka: Saboragamura Prov.; Ragnagsura Distr., 22 Oct 1974, Davidse 7871 (neotype: K; isoneotype: MO). Neotypified by Renvoize, in Cafferty et al., Taxon 49: 244. 2000. It has 47 Synonyms (IPNI 2022).

MATERIAL AND METHODS

Plant specimens of *S. indica* were collected in September 2021 and August 2022. The measurements, color and other characters, indicated in the description of *S. indica* were based on herbarium and living material. Morphological date were recorded from >50 collected at flowering and fruiting specimens at two localities on August 20–22, 2022. The specimens were deposited at the LE, MIMB, VBGI and VLA. Besides the found and examined specimens of *S. indica*, other specimens of the morphologically closely allied Asian *Sacciolepis* species were studied in detail (a complete list is provided in Appendix). Comparative studies were conducted using the online herbarium databases and digital images available at BM, BRI, CDBI, IBK, IBSC, K, L, P, PE, and USF (acronyms follow Index Herbariorum). The digital images of the *S. indica* specimens were taken from the herbarium and live specimens using a SteReo Discovery V12 microscope (Carl Zeis, Germany). The species names are according to the International Plant Names Index; additional species names of Poaceae are according to Tzvelev & Probatova (2019).

RESULTS

Description. Plants annual. Culms solitary slender, tuft or cespitose, 15–45 cm, erect, in the lower part geniculate, decumbent, spreading, trailing, often rooting at the lower nodes; nodes glabrous (Fig. 1). Sheaths and collars glabrous; leaf-sheath auricles absent, or erect 0.2–0.4 mm long, ligules 0.1–0.7 mm long, membranous, truncate; leaf-blades 1–15 cm long, 1.5–5.1 mm wide, glabrous, not cordate at the base, with apex acuminate. Inflorescence panicle. Panicles spiciforme, linear, or oblong, 0.5–9(13) cm long, 2.1–4.5 mm wide, densely, contracted; axis glabrous; primary branches fused into the rachises for at least 3/4 of their length; lower branches 0.1–0.5 cm; pedicels 0.3–1.8 mm. Spikelets narrowly ovate-lanceolate, green, yellowish-green, 2.1–2.4 mm long, apex acute or subobtuse (Fig. 2a, b); basal sterile florets male, or barren; the second floret bisexual. Spikelets with papillose-based hairs on the upper glumes and lower lemmas. Lower glume ovate, ca. 1/2 as long as spikelet or slightly shorter than spikelet (1.0–1.5 mm), glabrous, 3–7-veined, margins hyaline, near maturity swollen and gibbous on back; upper glumes 2–2.3 mm, saccate, glabrous adaxially, 9–11-veined, lateral veins ribbed; lemma of lower sterile floret similar to upper glume, elliptic, 1 length of spikelet, 1.9–2.1 mm, 7–9-veined, veins equidistant; palea of lower sterile floret 0.1–0.2 length of lemma; fertile lemma elliptic, dorsally compressed, 1–2 mm long, coriaceous, shiny, without keel, 5-veined. Palea involute, coriaceous. Stamens 3, reddish-purple, 0.3–0.5 mm long. Caryopses 1–1.3 mm long, 0.3–0.5 mm wide (Fig. 2c), glabrous, shining. Spikelets falling entire.

Habitat. Tumen River valley, Khasan District, Primorye Territory, Russian Federation. 42°24'43"N 130°45'20"E, 0.8–1.2 m above sea level (a.s.l.). Swampy coastal lowland southeast of the Mount Golubinyi Utyos, moist and wet sedge-forbs meadows on dunes and in depressions between the dunes. The soil is silty soded sand. Mount Golubinyi Utyos (elev. 180 m a.s.l., area 150 ha, with a 200 m wide buffer zone around) is a regional complex natural monument. Habitats of *S. indica* are located in its buffer zone. Plants of *S. indica* form small dense clumps on dunes, or are single scaterred specimens and groups in flooded areas in the interdune depressions.

Species composition of phytocoenosis and abundance (in Drude scale). **Sp–cop1:** *Carex suifunensis*, *Rhynchospora fujiiana*; **Sp:** *Leucanthemella linearis*, *Lobelia sessilifolia*, *Dimeria neglecta*; **Sol:** *Arthraxon langsdorffii* (*A. hispidus* aggr.), *Phragmites australis*, *Sacciolepis indica*, *Bulbostylis densa*, *Cyperus amuricus*, *C. flavidus* (=*Pycreus nilagiricus*), *C. sanguinolentus* (=*Pycreus sanguinolentus*), *C. orthostachyus*, *C. polystachyos* (=*Pycreus polystachyos*), *Eleocharis pellucida* var. *maximowiczii* (=*E. maximowiczii*), *E. ovata*, *E. parvula*, *E. tetraquetra*, *E. yokoscensis*, *E. wichurae*, *Fimbristylis dichotoma*, *Lipocarpha microcephala*, *Scleria parvula*, *Lythrum salicaria*, *Artemisia subulata*, *Hololeion maximowiczii*, *Hypericum japonicum* (=*H. laxum*), *Allium sacculiferum*, *Eriocaulon decemflorum*, *E. parvum*, *Iris ensata*, *Juncus papillosus*, *Mitrasacme prolifera* (=*M. indica*), *Parnassia palustris*, *Habenaria linearifolia*, *Pecteilis radiata* (=*Habenaria radiata*), *Platanthera hologlottis*, *Pogonia japonica*, *Spiranthes sinensis*, *Potentilla freyniana*, *Persicaria muricata* (=*Truellum nipponense*), *Ranunculus tachiroi*, *Sium tenue*, *Utricularia caerulea*. Relevé area: 800 m^2.

DISCUSSION

The plants of *S. indica* from the Primorye Territory show similarities with different specimens of this species

Figure 1 Samples of *Sacciolepis indica* (L.) Chase from the Tumen River valley (Russia), collected on of dune tops (A) and in depressions between dunes in flooded areas (B)

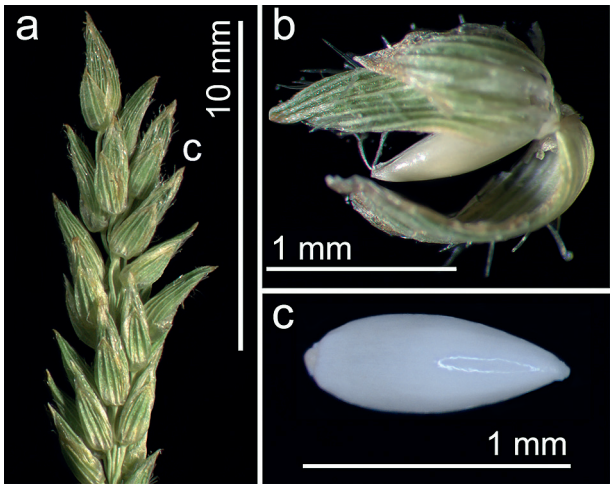

Figure 2 Reproductive parts of *Sacciolepis indica*: a – apex of panicle; b – spikelet with caryopsis; c – caryopsis

from other herbariums of the world in such characters as the structure of the inflorescence, habit, and spikelet form (Figs 1–2, Appendix). They are also highly variable in habit, spikelet length, and pubescence. The plants found on dune tops have a maximum panicles size vs., minimum sizes of inflorescence and slender habit – in the plants from the flooded areas in depressions. *Sacciolepis indica* differs from other annual Asia species such as, *S. fenestrata* Bor, *S. myosuroides* (R. Br.) Chase ex E.G. Camus & A. Camus, and *S. tenuissima* C.E. Hubb., by larger sizes, and a narrow ovate-lanceolate, not ovoid or ovate-elliptical, shape of spikelets. Furthermore, this species, like *S. myosuroides*, differs from *S. fenestrata* and *S. tenuissima*, by a greater width of leaves, which are very narrow, 1–2 mm wide in the latter two species (Hubbard 1927, Bor 1965). Lemma of lower sterile floret of *S. fenestrata* is much thinner above, and fenestrate, which is not characteristic of the other *Sacciolepis* species (Bor 1965, De Gennaro & Scataglini 2012). African specimens of *S. indica* often have little auricles. These specimens have been described as *S. auriculata* in the past (Stapf 1920). However, according to Flora Zambesiaca (Clayton 1989), *S. indica* intergrades completely from forms with auricles to the commoner form that lacks auricles. *S. myosuroides* is habitually very similar to *S. indica*, and differs from the latter by a roundish shape of spikelets (Camus & Camus 1922), shorter spikelet, and pubescent pedicels (Simon & Alonso 2012).

The *S. indica* population from the Tumen River valley does not seem to be alien. There is no agricultural land in this area. This is a swampy coastal lowland with brackish-water channels and bays. Relatively recently, a complex of warm-temperate species has been discovered here: *Eriocaulon parvum* Koern., *Fimbristylis dichotoma* (L.) Vahl, *Hypericum laxum* (Blume) Koidz., *Lipocarpha microcephala* (R. Br.) Kunth, *Mitrasacme indica* Wight, *Pycreus polystachyos* (Rottb.) Beauv., *Ruppia megacarpa* R. Mason, *Scleria parvula* Steud., *Utricularia caerulea* L. (Kozhevnikov & Kozhevnikova 2000a, b, c, 2001a, b, Ito et al. 2014, Chubar 2020). They occur together with typical East Asian and boreal species and form a mixed phytocenosis. It is likely that the emergence of these species is a consequence of climate change, and their succession occurs. Another opinion is that these species are relic elements (the Holocene optimum) of the warm-temperate flora in the Russian Far East (Kozhevnikov et al. 2000).

Some climatic parameters in the Tumen River estuarine zone are similar to those of warm temperate climate with dry winter: Precipitation of the Warmest Quarter (July–September) – 450 mm, Mean Temperature of Warmest Quarter (July–September) – 20°C, Max Temperature of Warmest Month (August) – 30°C. However, they have significant differences in the following parameters: Annual Mean Temperature – 6°C, Mean Temperature of Coldest Quarter (December–February) – -10°C, etc. (Anonymous 1988, Fick & Hijmans 2017). The warm-temperate species from the Tumen River valley are mostly short-lived annuals, they grow and develop within 1.5–2 months and die in late of September.

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LITERATURE CITED

Aliscioni, S.S., L.M. Giussani, F.O. Zuloaga & E.A. Kellogg 2003. A molecular phylogeny of *Panicum* (Poaceae: Paniceae): test of monophyly and phylogenetic placement within the Panicoideae. *American Journal of Botany* 90:796–821.

Anonymous 1988. *Reference book on the climate of the USSR. 1988. Ser. 3. Long-term data. Primorskyi Krai, Vol. 1–6. Issue 26*. Gidrometeoizdat, Leningrad, 416 pp. (in Russian). [Научно-прикладной справочник по климату СССР. 1988. Сер. 3. Многолетние данные. Приморский край. Ленинград: Гидрометеоиздат. Ч. 1–6. Вып. 26. 416 с.]

Atlas of Living Australia. *Open access to Australia's biodiversity data* [online] http://www.ala.org.au Last accessed 05.08.2022.

Bor, N.L. 1965. Studies in the Flora of Thailand 26. Gramineae. (Notes are provided on synonymy, habitats and distribution on the species collected during expeditions to Thailand in 1961–63). *Dansk Botanisk Arkiv* 23:141–168.

Cafferty, S., C.E. Jarvis & N. Turland (eds) 2000. Typification of Linnaean plant names in the Poaceae (Gramineae). *Taxon* 49 (2): 239–260.

Camus, E.G. & A. Camus 1922. Gramineae. In: *Flore Générale de L'Indo – Chine* (M.H. Lecomte, ed.), t. 7, pp. 202–650, Masson et Co., Paris.

Chase, A. 1908. Notes on Genera of Poaceae. In: *II. Proceedings of the Biological Society of Washington, vol. XXI*:1–10. [online] https://bhl.org Last accessed 05.08.2022.

Chen, C.C. & C.C. Hsu 1961. Cytological studies on Taiwan grasses I. Tribe Paniceae. *Botanical Bulletin of Academia Sinica, Ser. 2* 2: 101–110.

Chen, Sh.-L. & S.M. Phillips 2006. *Sacciolepis* Nash, Man. Fl. N. States 89.1901. In: *Flora of China, vol. 22* (Z.Y. Wu, P.H. Raven & D.Y. Hong, eds.), pp. 511–512. Science Press, Beijing; Missouri Botanical Garden Press, St. Louis. Missouri Botanical Garden, St. Louis, MO & Harward University Herbaria, Cambridge, MA.

Chinese Virtual Herbarium [online] https://www.cvh.ac.cn/ Last accessed 17.10.2022.

Chubar, E.A. 2020. *Scleria parvula* subsp. *tumanganica* (Cyperaceae), a new taxon from the Russian Far East. *Phytotaxa* 441(1):078–086.

Clayton, W.D. 1989. *Flora Zambesiaca. Vol. 10, Part 3*. Royal Botanic Garden, Kew, 231 pp.

Clayton, W.D. & S.A. Renvoize 1982. Gramineae (Part 3). In: *Flora of Tropical East Africa* (W.B. Turrill & R.M. Polhill, eds), pp. 451–898, A.A. Balkema, Rotterdam.

Clayton, W.D. & S.A. Renvoize 1999. *Genera Gramineum: Grasses of the World*. Royal Botanic Garden, Kew, 389 pp.

De Gennaro, D. 2011. *Revisión del género Sacciolepis (Poaceae, Panicoideae, Paniceae) en sus aspectos taxonómicos, histofoliares y filogenéticos. Tesis doctoral*. Universidad de Buenos Aires, Facultad de Ciencias Exactas y Naturales.

De Gennaro, D. & M.A. Scataglini 2012. Análisis filogenético del género *Sacciolepis* (Poaceae, Panicoideae, Paniceae) con caracteres morfológicos. *Darwiniana* 50(1):81–96.

Fick, S.F. & R.J. Hijmans 2017. Worldclim 2.1: new 1 km spatial resolution climate surfaces for global land areas. I*nternational Journal of Climatology* 37(12):4302–4315.

Hubbard, C.E. 1927. *Sacciolepis tenuissima* C.E. Hubbard [Gramineae]. *Bulletin of Miscellaneous Information (Rojal Botanic Gardens, Kew)* 29(5): 220–224.

Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical´s Virtual Herbarium [online] http://sweegum.nybg.org/ih/ Last accessed 19.10.2022.

International Plant Names Index (IPNI): [online] http://www.ipni/index.html Last accessed 03.11.2022.

Ito, Y., T. Ohi-Toma, A.V. Scriptsova, M. Sasagawa, N. Tanaka & J. Murata 2014. *Ruppia megacarpa* (Ruppiaceae): a new species to the floras of Japan, Korea, and Russia. *Botanica Pacifica* 3(1):49–52.

Judziewich, E.J. 1990. A new South American species of *Sacciolepis* (Poaceae: Panicoideae: Paniceae), with summary of the genus in the New World. *Systematic Botany* 15(3):415–420.

Kew Gardens Herbarium [online] https:/specimens.kew.org/herbarium Last accessed 13.10.2022.

Kozhevnikov, A.E. & Z.V. Kozhevnikova 2000a. The finding of *Mitrasacme indica* (Loganiaceae, a new family to Russia) on the Russian Far East. *Botanicheskii Zhurnal* 85(5):130–134 (in Russian). [Кожевников А.Е., Кожевникова З.В. 2000. Находка на российском Дальнем Востоке *Mitrasacme indica* из нового для флоры России семейства Loganiaceae // Ботанический журнал. Т. 85, № 5. С.130–134].

Kozhevnikov, A.E. & Z.V. Kozhevnikova 2000b. *Lipocarpha* (Cyperaceae), a new genus for the flora of Russia from the Russian Far East (Maritime Region). *Byulleten' Moskovskogo obshchestva ispytatelei prirody, otdelenie biologii* 105(2):58 (in Russian). [Кожевников А.Е., Кожевникова З.В. 2000. Новый для флоры России род *Lipocarpha* (Cyperaceae) с территории российского Дальнего Востока (Приморский край) // Бюллетень МОИП, отд. биол. Т. 105, № 2. С. 58].

Kozhevnikov, A.E. & Z.V. Kozhevnikova 2000c. *Utricularia caerulea* L. (Lentibulariaceae), a new species for Russia (Khasan Natural Park (Primorye Territory). *Byulleten' Moskovskogo obshchestva ispytatelei prirody, otdelenie biologii* 105(3): 66–68 (in Russian). [Кожевников А.Е., Кожевникова З.В. 2000. Новый для флоры России вид *Utricularia caerulea* L. (Lentibulariaceae) с территории Хасанского природного парка (Приморский край) // Бюллетень МОИП, отд. биол. Т. 105, № 3. С. 66–68].

Kozhevnikov, A.E. & Z.V. Kozhevnikova 2001a. *Hypericum laxum* (Hypericaceae), a new species for the flora of Russia (Primorye Territory). *Botanicheskii Zhurnal* 86(4):160–163 (in Russian). [Кожевников А.Е., Кожевникова З.В. 2001. *Hypericum laxum* (Hypericaceae) – новый вид для флоры России (Приморский край) // Ботанический журнал. Т.86, № 4. С.160–163].

Kozhevnikov, A.E. & Z.V. Kozhevnikova 2001b. New findings of warm-temperate and subtropical relic flora elements in the South-West of Primorye Territory. In: *Biological researches in V.L. Komarov Mountain-Taiga Station, Issue 7* (N.N. Gurzenkov, ed.), pp. 188–193, FEB RAS, Vladivostok (in Russian). [Кожевников А.Е., Кожевникова З.В. 2001. Новые находки теплоумеренных и субтропических реликтовых элементов флоры на юго-западе Приморского края // Биологические исследования на Горнотаежной станции. Сб. научных трудов. Владивосток: ДВО РАН. Вып. 7. С. 188–193].

Kozhevnikov A.E., Z.V. Kozhevnikova & R.I. Korkischko 2000. The Golubiny Utyos mtn. as a refuge for West Pacific warm temperate relic elements of flora of the Russian Far East. In: *Monsoon Climate Plants. Theses of the 2nd International Conference "Plants in Monsoonal Climate"* (O.V. Khrapko, ed.), pp. 91–92, Dalnauka, Vladivostok (in Russian). [Кожевников А.Е., Кожевникова З.В., Коркишко Р.И. 2000. Голубиный Утес как рефугиум западно-пацифических теплоумеренных реликтовых элементов флоры на юге российского Дальнего Востока // Растения муссонного климата. Тезисы 2-й международной конференции "Растения в муссонном климате" / под ред. О.В. Храпко. Владивосток: Дальнаука. С. 91–92].

Lee, Y.-N. 2007. Poaceae Barnhart (Gramineae Juss., nom. alt.). In: *The Genera of vascular plants of Korea* (C.-W. Park, ed.), pp.1183–1264. Academy Publishing Co, Seoul.

Linnaeus, C. 1753. *Species Plantarum*. Impensis Laurentii Salvii, Holmiae, 63 pp.

Mehra, P.N. & M.L. Sharma 1975. Cytological studies in some central and eastern Himalayan grasses. II. The Paniceae. *Cytologia* 40(1):75–89.

Morrone, O., L. Aagesen, M.A. Scataglini, D.L. Salariato, S.S. Denham, M.A. Chemisquy, S.M. Sede, L.M. Giussani, E.A. Kellogg & F.O. Zuloaga 2012. Phylogeny of the Paniceae (Poaceae: Panicoideae): integrating plastid DNA sequences and morphology into a new classification. *Cladistics* 28: 333–356.

Moody, K. 1989. *Weeds reported in rice in South and Southeast Asia*. International Rice Research Institute, Manila, Philippines, 442 pp.

Nash, G.V. 1901. *Sacciolepis* Nash. In: *Manual of the Flora of the Northern States and Canada* (N.L. Britton, ed.), p. 89. H. Holt & Co, New York.

Ohwi, J. 1965. *Flora of Japan* (F.G. Meyer, E.H. Walker, eds), 1081 pp., Smithsonian Institution, Washington.

Osada, T. 1993. *Illustrated grasses of Japan*. Heibonsha Ltd, Himonya, Mequro-Ku, Tokyo, 777 pp.

PIER 2018. *A Product of the Pacific Island Ecosystems at Risc* [online] http://www.hear.org/pier/threats.htm Last accessed 17.10.2022.

Randall, R.P. 2012. *A Global Compendium of Weeds. 2-th edition*. Department of Agriculture and Food Western Australia, Perth, Australia, 1112 pp.

Royal Botanic Gardens: [online] http://specimems.kew.org/herbarium [Accessed 8 August 2022 and 17 October 2022]

Simon, B.K. 1972. A revision to the genus *Sacciolepis* (Gramineae) in the "Flora Zambesiaca" area. *Kew Bulletin* 27(3):387–406.

Simon, B.K. & Yu. Alfonso 2022 *AusGrass2*. [Accessed 19 October 2022]

Stapf, O. 1920. *Saccolepis* Nash. In: *Flora of Tropical Africa, vol. 9 (pt. 3–4)* (D. Oliver, ed.), pp.747–768, L. Reeve and Co, London.

Tateoka, T. 1956. Karyotaxonomy in Poaceae IV. Chromosomes and systematic relationships of several species. *The Botanical Magazine (Tokyo)* 69: 112–117.

Tzvelev N.N. & N.S. Probatova 2019. *Grasses of Russia*. KMK Scientific Press, Moscow, 646 pp. (in Russian) [Цвелев Н.Н., Пробатова Н.С. 2019. Злаки России. М: Товарищество научных изданий КМК. 646 с.]

APPENDIX

Additional specimens examined [digital images!].

Sacciolepis indica. **AUSTRALIA:** Queensland, Lakefield NP, 7 km by road NW of Breeze Planes, 30 Jun 2010, McDonald K.R. KRM9592, BRI-AQ794660; Queensland, Moreton District, 26°5'S 152°5'E, 16 Mar 1960, Blake S.T. 21227, BRI-AQ425788; Queensland, North Kennedy, 24 Jun 1949, Smith L.S. 04387, BRI-AQ9868; Queensland, 37.8 km along Abingdon Downs Road from Gulf Development Road, 28 Mar 2008, McDonald K.R. KRM 7461, BRI-AQ792318; Queensland, Mareeba wetlands, Pelican Lagoon, 1 May 2013, Simon B.K. 4531, BRI-AQ819553; Queensland, Daisy Hill State Forest, Logan City, 27°38'S 153°10'E, elev. 80 m, 14 Feb 1993, Thompson E.J. MOR41, BRI-AQ570608; North Queensland, 17°S 146°10'E, between Tully and Mission Beach, Nov 1965, Webb L.J., Tracy J.G. 8141, BRI-AQ295826; Queensland, 1.5 km W of Silver Plains, Homestead, 9 May 2012, Thompson S. ST12341, BRI-AQ907533; Queensland, Orchid Creek Station, 29 Apr 2014, McDonald K.R. et al. KRM15623, BRI-AQ857448; North Queensland, Cook District, 16°54'S 144°51'E, elev. 750 m, Mount Mulligan on the southern plateau of the mountain, 12 Apr 1984, Clarkson J.R. 5299, BRI-AQ395419; Queensland, Adjacent a swamp near Camp Two in Staten River NP, 42 km WNW of Bulimba Station homestead, 16°40'04"S 143°8'37"E, elev. 129 m, 22 Apr 2004, Wilson G.W. GWW274, BRI-AQ614912; North Queensland, Cook District, ca 25 km SW of Heathlands, Cape York mapping site 639, 11°52'S 142°23'E, elev. 35 m, 15 Apr 1993, Clarkson J.R. 9807, BRI-AQ591097. **BRAZIL:** Paraná Maringá, 6°59'21.7"S 42°25'97.5"W, Locaidade na Estrada Floriano-Oieras 42 km para Oieras, proxima á lagoa, elev. 240 m, Apr 1998, Nascimento M.S.B. et Renvoize S.A. 1324, K001068834; São Paulo Paraguaçu Paulista Estação Florestal de Paraguaçu Paulista, 6 km N of city), 22°17'S 50°34'W, elev. 500 m, 10 Feb 1965, Clayton W.D. 4620, K001068837; Santa Catarina, Mun. Santa Cecilia Campo Alto, 26°50'S 50°25'W, elev. 1200 m, 11 Feb 1975, Smith L.B. et Klein R.M. 16054, K001068835; State of Paraná, Clayton W.D. 4297, K001068836. **CENTRAL AFRICAN REPUBLIC:** Territoire du Chari, Dar Banda, Ndellé, 15–20 Dec 1902, Chevalier A.J.B. 6820, K000282361 & MNHN-P-P00442117; Terr. Chari, Dar Banda, Ndellé, T. Oubangui, 15 Dec 1902, Chevalier A. 6798, K000282367. **CHINA:** Guangxi Zhuang Autonomous Region, 21 Oct 1963, Chen Zhaozhou 53121, IBK00182043; Guangdong, 15 Nov 1934, Huang Zhi 37805, IBK00182044; Guangxi Zhuang Autonomous Region, 5 Sep 1957, Deng Xianfu 10389, IBK00182010; Guangxi Zhuang Autonomous Region, 3 May 1957, Chen Zhaozhou 50397, IBK00182011; Guangxi Zhuang Autonomous Region, 21 Dec 1958, Li Yinkun 403066, IBK00182014; Guangdong, 17 Nov 1930, Gao Xipeng G. 50906, IBK0018240; Guangdong, 26 Aug 1958, Li Huegen 202724, IBK0018242 & PE00621017; Hainan, 25 Apr 1935, Hou Kuanzhao 72142, IBK00182041; Hainan, 26 Aug 1953, Zhong Jixin, IBSC0127215; Hainan, Dec 1954, Liang Xiangri 68378, IBSC0127228; Jiangxi, Apr 1942, Ximu Mo 20989, IBSC0127305; Yunnan, Apr 1956, Sino-Soviet Team 17, IBSC0127277; Hunan, elev. 350 m, Nov 1963, Liu Linhan L 16713, IBSC0127289; Anhui, elev. 70 m, 3 Nov 1986, Xiao Yunfeng et Wang Rui 861010, IBSC0127313; Guizhou, 1931, Sin S.S. 50945, IBSC0127314; Taiwan: Shinten, 21 Apr 1929, Yamamoto Y. (s. n.), IBSC0127332; Vicinity of Sozan, 22 Jun 1929, Tanaka T., MNHN-P-P02238551; 14 May 1933, Fukuyama N. 4213, IBSC0127333. **ETHIOPIA:** Amhara-Dambia, Asoso, 17 Oct 1909, Chiovenda 2576, K000282318; Amhara-Dambia, Gondor, 6 Oct 1909, Chiovenda 2342, K000282317. **GUINEA:** Vallée du Baffing, Sep 1907, Pobéguin M., K000282365; Vallée du Baffing, Oct 1907, Pobéguin M., K000282364. **INDIA:** Khasia, Hooker J. 39, K000245890, K000245891 & K000245258; Maflong, Khasia, elev. 1829 m, Hooker J.D. et Tomson T. 1983, K000245257; Peninsula Ind., Wight R. 642, K000245256; India, Bentham G. 8696, K000674798; Shillong, elev. 1768 m, 5 Sep 1886, Clarke C.B. 44606, K000245259; Manipur, Nongjinibang, elev. 1700 m, 30 Nov 1885, Clarke C.B., 42307, K000245260; Khasia, Mamloo, 2 Oct 1867, Clarke C.B. 5496, K000245261; Khasia, Maokadokadok, elev. 1524 m, 13 Sep 1885, Clarke C.B. 40396, K000245267; Khasia, Maokadokadok, elev. 1676 m, 17 Oct 1886, Clarke C.B. 45267, K000245268. **INDONESIA:** Lesser Sunda Island, W Sumbawa, 23 Apr 1961, Kostermans A.J.G.H. 18420, L.1333582. **JAPAN:** Yokohama, 1862, Maximowicz K., MNHN-P-P02238550; Hondo, Pref. Tochigi, 23 Sep 1995, Furusae M. 57222, PE01224838; Prov. Idzu, 28 Aug 1971, Furusae M. 50688, PE01224839; Prov. Ohsumi, Pref. Kagoshima, Kyushu, 17 Nov 1976, Furusae M. 11957, PE012224842; Hondo, Prov. Shima, Pref. Tochigi, 13 Oct 1995, Furusae M. 57307, PE01224843; Pref. Okinawa, Ryukyu, 31 Oct 1972, Furusae M., PE01224844; Pref. Okinawa, Ryukyu, Hoshitate, Taketomi cho, 24°23'48.4"N 123°45'22.9"E, 12 Nov 2002, Yasuda K. 1100, ID2318 (L.3878988). **MALAYSIA:** Peninsular Malaysia, Penang, in Botanic Gardens, 14 Feb 1919, Nur M. 4517, K000290343; Peninsular Malaysia, Malacca, Wight (s. n.), K000290345; Peninsular Malaysia, Selangor, Kuala Lumpur, 23 Feb 1919, Nur M. 4439, K000290346; Singapore, 10 Jan 1894, Hullett R.J., K000290344; Peninsular Malaysia, Penang, 4 Mar 1879, King G. (s. n.), K000290347; Peninsular Malaysia, Penang, 1882, Porter E.G. 8697, K000290348; Peninsular Malaysia, Pulau Pinang, Waterfall Gardens, 16 Dec 1918, Burkill I.H. 4625, K000290342; Borneo, Sandakan and vicinity, Sep–Dec 1920, Ramos M. 1845, MNHN-P-P02238848. **NEPAL:** Bentham G. 8696, K000674799. **NIGERIA:** Borgy, Niger Expedition, Barter 732, K000282662; Lagos, Feb 1902, Dawodu 157, K000282366. **PHILIPPINES:** Along the bank of Maloong River, Bavio Maloong northeast of, 31 May 1948, Santos J.V. 4477, L.1333649; District Bontoc, Luzon, 1 Jan 1907 to 31 Jan 1907, Ramos M.B.S. 5964, L.1333567 & L.133568. **REPUBLIC OF KOREA:** Fusan, 4 Oct 1901, Faurie U. 832, MNHN-P-P02238611. **SRI LANKA:** Sabaragamuwa Ratnapura Deniyaya, elev. 750 m, 22 Oct 1974, Davidse G. 7871, K000245262. **THAILAND:** Prov. Chiang Mai, District Muang, Doi Sutep, elev. 700 m, 1 Oct 1987, Maxwell J.F. 87-1078, L.1333555 (L000890459); Phu Kradung, S. of Loi, 16°53'N 101°53'E, elev. 1100 m, 1–7 Nov 1970, Charoenphol Ch., Larsen K., Warncke E. 4698, MNHN-P-P02238600; Kuan Karong, 40 km NW of Satun, 6°51'N 100°01'E, 15 Oct 1970, Charoenphol Ch., Larsen K., Warncke E. 3835, MNHN-P-P02238624. **UGANDA:** between Nkoko and Nakaswa, elev. 1219 m, 2–4 Aug 1916, Dümmer R. 2951, K000282363. **USA:** Florida, Hillsborough Co., 28°9'32.7"N 82°36'11.72"W, 10 Sep 2015, Farid A. et al. 106, USF281827; Florida, Hendry Co., Okaloacoochee Slough State Forest, 14 Sep 2009, Franck A.R. 1444, USF251421; Florida Prov., Charlotte Co., 26°59'N 81°58'00"W, 6 May 2010, Franck A.R. 2029, USF254267; Florida, Orange Co., 12 Apr 1972, Wunderlin R. et al. 5485, USF122599; North Carolina, Sampson Co., 12 Oct 1957, Ahles H.E., USF45556. **VIETNAM:** Lam Dong, 69.5 km from Bao Loc, road to Da Lat, 110°39.3'N,1080.18'E, elev. 850 m, 15 Nov 1998, Hacker J.B. 1626, L.1333763 (L03992295). **ZAMBIA:** Choma, elev. 1311 m, 28 Mar 1955, Robinson E.A. 1205, K000282313. **ZIMBABWE:** Salisbury, elev. 1554 m, Jun 1929, Eyles F. 2264, K000282314 & K000282315.

Sacciolepis myosuroides. **ANGOLA:** Humpata District, Apr 1860, Welwitsch 2699, K000282311 and K000282312. **AUSTRALIA:** Northern Territory, 12°15'S 133°30'E, 27 May 1988, Munir A.A. 5940, IBSC0127377; Cook District, Caino, 14 Jun 1935, Blake S.J. 9362, PE02067034; Queensland, ca. 19.6 km SW of Normanton on Burke Developmental Road (n. site 81), 9 Jun 2001,Turpin G.P. et Thompson E.J. GPT27, BRI-AQ574292. **CHINA:** Guangxi Zhuang Autonomous Region, 26 Oct 1955, Radar Mei et Wei Zhanye 40155, IBK00182060; Hainan, 24 Dec 1933, Huang Zhi 35850, IBK00182061; Hainan, 28 Nov 1954, Hainan East Road Team 838, IBK00182062; Guangdong, Nov 1934, Huang Zhi 37805, IBSC0127336; Guangdong, Oct 1984, Mountain vegetation group, IBSC0127337; Fujian, elev. 400 m, 10 Jun 1959, Huang Shumei 190605, IBSC0127371; Guangdong, elev. 2 m, 24 Dec 1982, Li Zexian 0747, IBSC0127348; Guangdong, 11 Nov 1980, Ding Guangqi 6053, IBSC0127347; Yunnan, Guanpo, elev. 2550 m, 15 Aug 2002, Li H., Yang S.H., Li R., Ji X.H. et Yang B. 0321, PE02102132 & PE02102151, IBSC02102151; Hainan, Dec 1954, Diaoluoshan Team 3033, CDBI0157175; Hainan, elev. 100 m, 14 Jan 1955, Diaoluoshan Team 3403, IBSC012736; Hainan, 28 Nov 1954, Hainan East Team 838, IBSC0127350; Hainan, Feb 1964, Wu Zhonglun 1981, IBSC0127349; Guizhou, elev. 1000-750 m, 11 Sep 1986, Bartholomew B. et al. 1179, PE0621087; Yunnan, 23°19'54"N 104°44'28"E, elev. 1392 m, 30 Oct 2011, Liu Yanchun LYC848, CSH0024516; Jiangxi, elev. 500 m, 25 Sep 1965, Lai Shukun L. 5068, KUN318089. **ETHIOPIA:** ex Tigré v. Begemder, elev. 2591 m, Schimper 1478, K000282319; Schire, Schimper 1825, K000282320. **MADAGASCAR:** Ost-Imerina, Andrangaloaka, Nov 1880, Hildebrandt J.M. 3760, K000244747. **ZAIRE:** Congo, the Democratic Republic of the; Entre Amadi et Poko (Uélé-Nepoko), Lebrum J. 3109, K000282328 and K000282329. **ZAMBIA:** Mporokoso, 19 Apr 1961, Phipps J.B. 3295, K000282309. **ZIMBABWE:** Intensive Conservation Area; Inyanga District, 6 Feb 1966, Crook L. 789, K000282310;

Sacciolepis fenestrata. **THAILAND:** Ban Kao, elev. 70 m, 8 Nov 1961 Larsen K. 8068, K000290318.

Sacciolepis tenuissima. **THAILAND:** Taruang, Chantaburi, elev. 100 m, 21 Dec 1924 Kerr A.F.G. 9732, K000290577, K000290319, K000290320, K00029321 & K000290322; Rachasima, Korat, Chan Tuk, elev. 300 m, 19 Dec. 1923, Kerr A.F.G. 8061, K000290323.