Yong No LEE*: Taxonomic studies on the genus *Miscanthus* (1) New species and varieties

李 永 魯*: ススキ属の分類学的研究 (1) 新種および新変種

The work consists of three parts; i. e., 1. New species and varieties, 2. Anatomical patterns of leaves, 3. The relationships among sections, subsections and species. The present report deals only with the first part including some anatomical characters of leaves. The other two parts will be published later.

The herbarium specimens for the present work were obtained from University of Tokyo, Kyoto University, and National Science Museum, Ueno, Tokyo.

This study has been conducted under the supervision of Prof. Hiroshi Hara of University of Tokyo, to whom the author is grateful for the kind and valuable guidance throughout the investigation. He is also grateful to Dr. T. Yamazaki, Prof. F. Maekawa, Dr. S. Watari and Dr. H. Kanai of University of Tokyo for their kind helps. Thanks are extended to Dr. Jisaburo Ohwi, Mr. S. Okuyama and Dr. T. Tateoka of National Science Museum, Prof. K. Hisauchi of Toho University, Prof. T. Tuyama of Ochanomizu University, and Prof. S. Kitamura and Ass. Prof. M. Tagawa of Kyoto University for their helpful suggestions and assistances during the studies. The author also appreciates Dr. F.A. McClure and Dr. Thomas R. Soderstrom of Smithsonian Institution of the United States for their kind help in finding literature.

Miscanthus Changii Y. Lee, sp. nov.

Perennis rhizomata praesentia. Culmi 70 cm alti, caespitosi, glabri leves, nodis villosis. Folia linearia ad apicem sensim attenuata, 5–7 mm lata, 15–20 cm longa, utrinque glabra, margine aculeolato-scaberrima. Panicula 15–18 cm longa, flabellata. Rachis paniculae brevissima, racemo 5–7. Pedicelli longiores 3.5 mm longi, pedicelli breviores 1 mm longi. Gluma I lanceolata, acuminata, 5 mm longa, 5–7-nervis. Gluma II 5-nervis, dorso dense longeque pilosa, 5 mm longa. Lemma sterile hyalinum, 3.5 mm longum. Lemma fertile 4 mm longum, arista 3 mm longa, albida. Villi calli 6 mm longi. Stamina 3. Antherae 2.5 mm longae.

* Research fellow of Department of Botany, Faculty of Science, University of Tokyo. 東京大学理学部植物学教室研究生. (Associate Professor of Ewha Womans University, Seoul, Korea. 梨花女子大学, ソウル.)

Hab. Mt. Tenma foot, Kapyong, Korea, leg. Chang Heungdo, No. 272, 1947, Type in TNS.

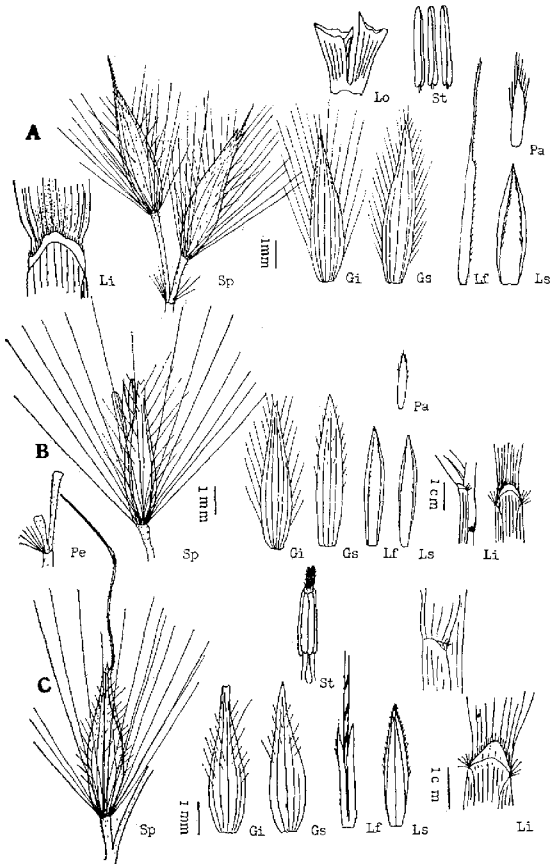

Fig. 1. A. *M. Changii* Y. Lee. B. *M. sinensis* var. *sunanensis* Y. Lee. C. *M. oligostachyus* var. *shinanoensis* Y. Lee. Sp: Spikelet; Gi: First giume; Gs: Second glume; Lf: Fertile lemma; Ls: Sterile lemma; Pa: Palea; St: Stamen; Lo: Lodicule; Li: Ligule.

The species is allied to *M. tinctorius* (Steud.) Hackel, but differs in the presence of rhizome, very much narrower leaves, slender awns exserted from the fertile lemma, and long villous hairs on the back of the glumes (Fig. 1. A).

Epidermis of leaf blade: Papillae 26 μ long, 18 μ wide, and alternate with stomata in the same row, but less developed than in *M. tinctorius*. Stomata 18 to 21 μ long, 10 μ wide, and subsidiary cells triangular or dome-shaped. Many prickles over the midvein of the abaxial surface. Bicellular microhairs 49 (47–52) μ long, and basal cells 26 to 29 μ long.

T.S.[1] Leaves. Midrib: M.d.,[1] m.j.[1] and m.n.[1] bundles rounded and enclosed by an interrupted bundle sheath abaxially. M.d. bundles 105 μ long and 105 μ wide. G.d.[1] bundles are not significant.

Lamina: The bulliform cells well developed on the abaxial surface.

1) T.S.: cross section, M.d.: median bundle, m.n.: minor bundle, m.j.: major bundle, G.d.: girder bundle.

Miscanthus oligostachyus Stapf. var. **shinanoensis** Y. Lee, var. nov.

Culmi 1 m alti, 4–5 mm crassi. Folia 16 mm lata, 45 cm longa, infra pulvinatopilosa. Ligula 2.5 mm longa, membranacea. Inflorescentia corymbosa 20–25 cm longa, rachis paniculae longitudine 1/2 aequans. Spiculae purpurascentes, gluma I 5.2 mm longa, 5(4) nervis. Gluma II 5.5 mm longa, 3-nervis. Glumae 1/3 supera dorsa villosae. Villi calli sericei 8.5 mm longi. Lemma sterile 4 mm longum, margine superne molliter villosum. Lemma fertile hyalinum, 3.3 mm longum, arista 9 mm longa. Stamina 3, antherae 2.3 mm longae.

Hab. Kirigamine, Shinano, Japan, leg. H. Tobida, No. 60, 1936, Type in TI. The variety is allied to *M. oligostachyus*, but differs in the first glume 5 to 4-nerved, and silky callus hairs 8.5 mm long. In the cross section of the midrib of leaves occur many major and minor bundles (Fig. 1. C).

Epidermis of leaf blade: Papillae 23 μ long and 18 μ wide. Stomata 20 to 23 μ long and 16 to 18 μ wide. The stomata alternate with large papillae in the same row of the costal zone. Bicellular microhairs 77 (73–81) μ long, and basal cell 44 to 49 μ long. Long cusion hairs on the abaxial surface.

Miscanthus condensatus Hackel var. **intermedius** Y. Lee, var. nov.

Culmi 2 m alti, 1 cm crassi, superne glabri leves. Folia plana utrinque glabra, 25–30 mm lata, 70 cm longa. Inflorescentia corymbosa 25 cm longa, rachis paniculae 13 cm longa, multi-racemosa. Spiculae geminae pedicellis hirsutis, brevioribus 0.5 mm longis, longioribus 1.5 mm longis. Gluma I 7–7.5 mm longa, 3–4-nervis, dorso sericeo-villosa. Gluma II 3-nervis. Lemma fertile hyalinum, arista controrta. Lemma sterile aculeolatum 5 mm longum, uninerve interdum aristatum. Arista 8 mm longa. Palea lanceolata hyalina 2.5–3.5 mm longa. Villi calli 6 mm longi. Stamina 3, antherae 1.8 mm longae. Lodicula truncata 0.7 mm longa, venosa.

Hab. North Sulphur Isl. (Bonin group) leg. T. Tuyama, 1935, Type in TI. The variety allied to *M. condensatus*, but differs in the first glumes 3–4-nerved, more than 7 mm long, very short pedicels, and larger caryopsis (Fig. 2. A).

Epidermis of leaf blade: Large papillae 57 μ long, 31 μ wide, on the costal zone as *M. condensatus*. Stomata 21 μ long, 10 μ wide, and alternate with small papillae in the same row on the intercostal zone. Bicellular microhairs 60 (57–63) μ long, and basal cell 36 μ long. The pattern of the epidermis is not fundamentally different from that of *M. condensatus*.

T.S. Leaves: The pattern of leaf cross section is similar to that of *M.*

condensatus.

Miscanthus sinensis Andersson var. **longiaxis** Y. Lee, var. nov.

Culmi erecti, 1.5 m alti. Folia 20 mm lata, 60 cm longa, glabra vel infra villosa. Spinulis curvatis 0.5 mm longis marginata. Ligula 2–3 mm longa, membranacea, dorso villosa. Inflorescentia paniculata 20–30c m longa. Rachi plus quam 2/3 paniculae aequans. Rami intimi bis ramulosi. Spicula 5–5.5 mm longa. Villi calli 4.5 mm longi. Arista 9 mm longa, gluma I 2–3-nervis. Gluma II 3-nervis utrinque glabra vel dorso villosa. Pedicalli longiores 3 mm longi, pedicelli breviores 1 mm longi. Stamina 3, antherae 2.2 mm longae.

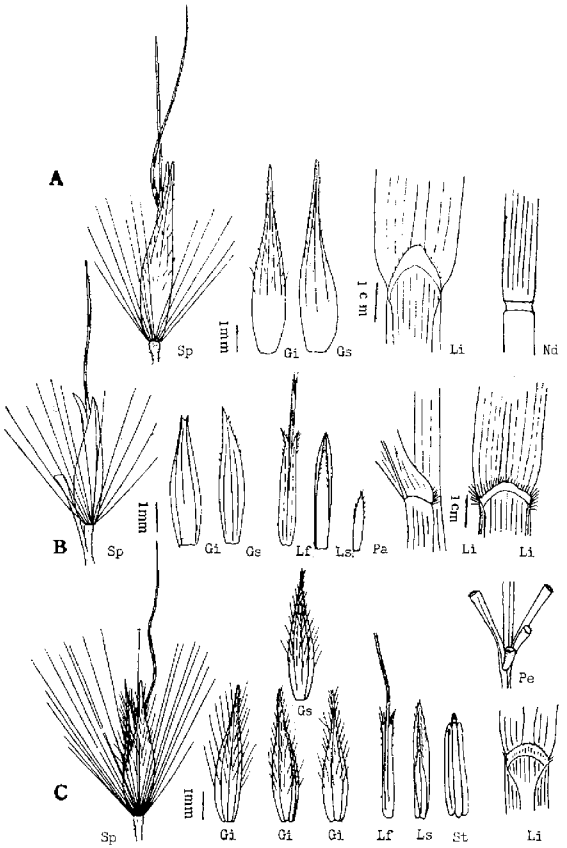

Fig. 2. A. *M. condensatus* var. *intermedius* Y. Lee. B. *M. sinensis* var. *longiaxis* Y. Lee. C. *M. sinensis* var. *keumunensis* Y. Lee. Sp: Spikelet; Gi: First glume; Gs: Second glume; Lf: Fertile lemma; Ls: Sterile lemma; Pa: Palea; Li: Ligule; Nd: Node; Pe: Pedicel; St: Stamen.

Hab. Mt. Chibusa-yama, Hahajima, Bonin, leg. T. Tuyama, 1933, Type in TI. The variety is allied to *M. sinensis*, but differs in the main axis of inflorescence much longer than two thirds of the panicle, first glumes 2–3-nerved, and curvated long spinules on the margin of leaves (Fig. 2. B).

Epidermis of leaf blade: Large papillae 26 μ long and 23 μ wide. Stomata 21 μ long and 10 μ wide. Bicellular microhairs 62 (60–66) μ long, and basal cell

45 (44–49) μ long. Cushion hairs on abaxial surface, and prickles present on both surfaces.

T.S. Leaves: The pattern of cross section of leaves is similar to that of *M. sinensis*.

Miscanthus sinensis var. **keumunensis** Y. Lee, var. nov.

Miscanthus kokusanensis Nakai et Honda in Honda, Monogr. Poac. Japon. 388 (1930), pro parte.

Culmi 150–200 cm alti. Folia 10–15 mm lata, 30–60 cm longa, margine scaberrima. Inflorescentia corymbosa 20–30 cm longa. Spiculae 5–6 mm longae. Glumae dorso villosae. Gluma I 2–3-nervis, gluma II 3-nervis. Villi calli 8 mm longi. Lemma fertile arista 13 mm longa. Stamina 3, antherae 3 mm longae.

Hab. Tongdo, Keumundo, Korea, leg. No. 10754, 10756, 1028, Type in TI. The variety is allied to *Miscanthus sinensis*, but differs in the glume I 2–3-nerved and soft hairy on the back, longer callus hairs, double-celled prickles on the costal zone, and the absence of cushion hairs (Fig. 2. G).

Epidermis of leaf blade: Papillae 26 μ long and 21 μ wide. Stomata 23–29 μ long and 18–21 μ wide. Bicellular microhairs 65 (61–71) μ long and basal cell 42 (39–47) μ long. Double-celled prickles on the costal zone.

T.S. Leaves: The pattern of cross section of leaf is similar to that of *M. sinensis*.

Miscanthus sinensis var. **sunanensis** Y. Lee, var. nov.

Culmi 90 cm alti, glabri leves. Folia 8 mm lata, 40–50 cm longa, utrinque glabra. Inflorescentia 28 cm longa, flabellata. Rachis longitudine 2/3 paniculae aequans. Spiculae 5 mm longae. Gluma I spiculae brevi-pedicellatae 5-nervis, longi-pedicellatae 3-nervis, glumae dorso sericeo-villosae. Villi calli 8 mm longi. Lemma fertile 4 mm longum, hyalinum margine villosum. Stamina 3, antherae 2.2 mm longae.

Hab. Sunan, Korea, leg. T. Nakai, No. 3013, 1915, Type in TI. The variety is allied to *M. sinensis*, but differs usually in awnless fertile lemma, 5-nerved first glumes, silky callus hairs, and leaves glabrous on both surfaces (Fig. 1. B).

Epidermis of leaf blade: Large papillae 34 μ long, 23 μ wide, and alternate with stomata in the same row of the intercostal zone. Stomata 18–24 μ long, 10–13 μ wide, and subsidiary cell dome- or plane-shaped. Bicellular microhairs 55 (52–72) μ long, and basal cell 34 to 36 μ long. Long cell sinuous on the adaxial surfaces, and near the margin of abaxial surface. Cushion hairs not

seen on both surfaces of the leaves.

T.S. Leaves: The pattern of cross section is similar to that of *M. sinensis*.

Miscanthus floridulus (Labill.) Warburg var. **papillatus** Y. Lee, var. nov.

Culmi 150 cm alti. Folia 15 mm lata, 60 cm longa, utrinque glabra. Ligula chartacea, villosa. Inflorescentia 40–50 cm longa. Rachis paniculae 28 cm longa, robusta, racemosa. Spicula 38 mm longa. Villi calli 6–7 mm longi. Gluma dorso glabra. Gluma I 3.7 mm longa, 3-nervis. Gluma II 3-nervis. Pedicelli inferne villosi brevioes 2 mm longi, pedicelli longiores 4 mm longi.

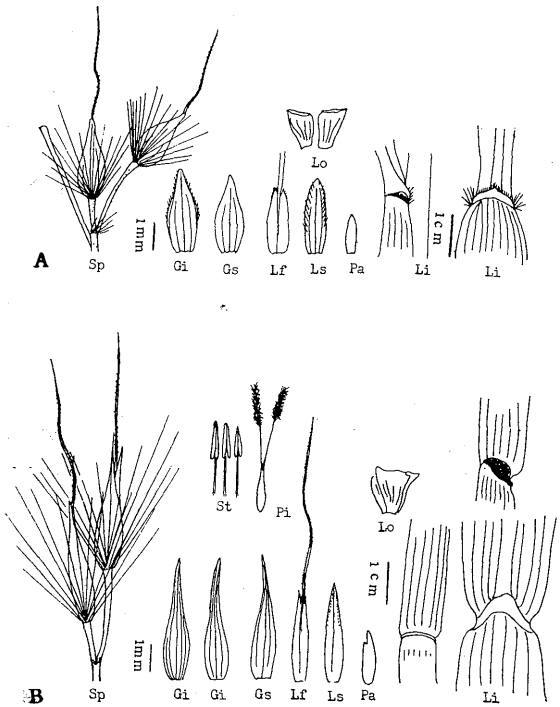

Fig. 3. A. *M. floridulus* var. *papillatus* Y. Lee. B. *M. floridulus* var. *malayanus* Y. Lee. Sp: Spikelet; Gi: First glume; Gs: Second glume; Lf: Fertile lemma; Ls: Sterile lemma; Pa: Palea; Li: Ligule; Lo: Lodicule; St: Stamen; Pi: Pistil.

Hab. Taipei, Formosa, leg. K. Odashima, 1932, Type in TI. Sharyoto, T. Makino, 1896. Sirin, K. Odashima, 1932. Taipei, Formosa, K. Owatari, 1897, Susuki, 1936, C.C. Hsu, 1960.

The variety is allied to *M. floridulus*, but differs in narrow leaves with strongly enrolled margins when dry, much hairy ligule, papillae on the abaxial surface, and dome-shaped stomata (Fig. 3. A).

Epidermis of leaf blade: The pattern of the epidermis is similar to that of the type species, but differs in the presence of papillae, and dome-shaped subsidiary cells.

Miscanthus floridulus var. **malayanus** Y. Lee, var. nov.

Perennis, robusta. Culmi 2 m alti, 12 mm crassi, nodi et vaginae glabri. Folia 60–70 cm longa, 20 mm lata, utrinque glabra. Ligula scortea membranacea. Inflorescentia 45 cm longa, dense fasciculata longitudine 2/3 aequans. Spicula 5.5 mm longa. Gluma spiculae longipedicellata 5-nervis. Gluma II 3-nervis, glabra. Lemma sterile 4.3 mm longum, lemma fertile 4 mm longum, arista plus quam 7 mm longa. Palea 2 mm longa. Pedicelli breviores 1.5 mm longi. Pedicelli longiores 3.5 mm longi. Villi calli 5.5 mm longi. Stamina 3, antherae 1.5 mm longae.

Hab. Alt. 2000 m high, *Camero* Highland, Malaya, leg. M. Togashi, No. 62222134, 1962, Type in TI.

The variety is allied to *M. floridulus*, but differs in the first glume of long-pediceled spikelets over 5 mm long and 5-nerved. The inflorescence is purplish and tufted (Fig. 3. B).

Epidermis of leaf blade: Papillae 23.4 μ long and 18.2 μ wide, alternate with stomata in the same row on the intercostal zone. Stomata 23.4 μ long and 15 μ wide. Bicellular microhairs 57 μ long, and basal cell 31 μ long.

T.S. Leaves: The pattern of cross section is similar to that of *Miscanthus floridulus*.

Miscanthus floridulus var. **taiwanensis** Y. Lee, var. nov.

Rhizomata brevia, culmi 1.5–1.8 m alti, 6 mm crassi. Folia plana, scortea 30–45 cm longa, 9–10 mm lata. Vagina et lamina glabra. Marginae villosae. Ligula membranacea 1.2 mm longa. Inflorescentia 20–35 cm longa. Glumae dorso glabra, gluma I 3.5 mm longa, 4–5-nervis, gluma II 3.7 mm longa, 3-nervis. Lemma fertile 2.7 mm longum, margine superne villosum. Palea 0.5 mm longa, superne villosa. Stamina 3, antherae 1.5–2.0 mm longae. Pedicall longi 2.5 mm longi.

Hab. Kankankei, Formosa, leg. B. Hayata, 1916, Type in TI.

The variety is allied to *M. floridulus*, but differs in leathery thick narrow and short leaves, small inflorescence, large papillae in the costal zone, 39 to 47 μ long and 42 μ wide (Fig. 4. A).

Epidermis of leaf blade: Papillae 39 to 37 μ long and 42 μ wide. Stomata 18 to 21 μ long, 13 to 16 μ wide and dome-shaped. Bicellular microhairs 88 (86 to 89) μlong. The basal cells 57 to 60 μ long.

T.S. Leaves: The pattern of cross section of leaves is similar to that of *M. floridulus*, but all elements are smaller and compact.

Miscanthus floridulus var. **intermedius** Y. Lee, var. nov.

Culmi 1.5 m alti. Folia 15–20 mm lata, 45–50 cm longa, utrinque glabra. Ligula 2 mm longa membranacea. Inflorescentia 35 cm longa. Rachis longitudine 2/3 paniculae aequans. Spiculae 4 mm longae, pedicelli breviores 1 mm longi, pedicelli longiores 3.5 mm longi. Glumae glabrae. Gluma I 4–5-nervis, gluma II

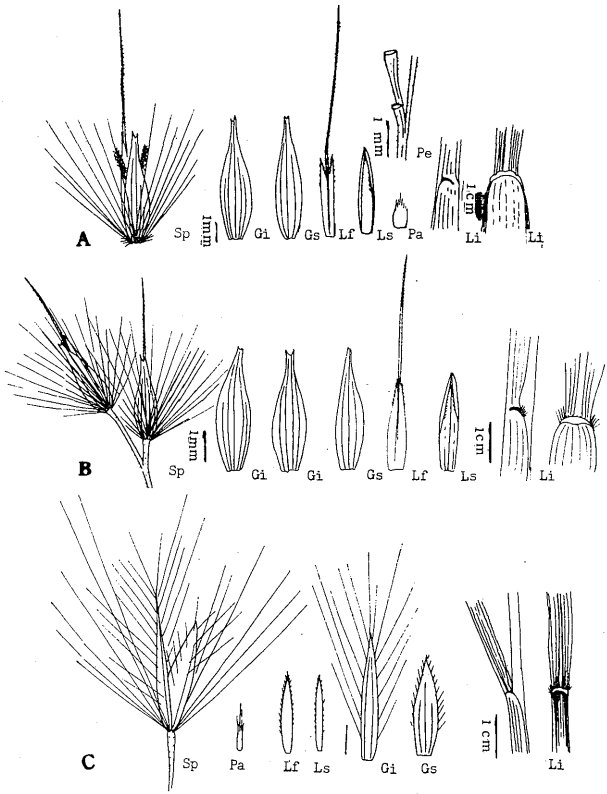

Fig. 4. A. *M. floridulus* var. *taiwanensis* Y. Lee. B. *M. floridulus* var. *intermedius* Y. Lee. C. *M. sacchariflorus* var. *gracilis* Y. Lee. Sp: Spikelet; Gi: First glume; Gs: Second glume; Lf: Fertile lemma; Ls: Sterile lemma; Pa: Palea; Li: Ligule; Pe: Pedical.

4(3)-nervis. Lemma fertile 2.5 mm longum. Arista 7 mm longa. Lemma sterile 3 mm longum. Villi calli 5–6 mm longi, purpurascentes. Stamina 3, antherae 1.6 mm longae.

Hab. Mt. Nanfeungsian, leg. S. Okamoto, No. 1937, Type in KYO.

The variety is allied to *M. floridulus*, but differs in the first glume 4 to 5-

nerved 4 mm long, the second glume 4(3)-nerved, and spikelets sparcely attached on the axis (Fig. 4. B).

Epidermis of leaf blade: Papillae absent on the abaxial surface. Stomata 23.5 μ long and 15 μ wide. Subsidiary cells half circle to slightly triangular shaped. Bicellular microhairs 65 μ long, and basal cell 47 μ long.

T.S. Leaves: The pattern of cross section of leaf is intermediate between that of *M. floridulus*, and *M. condensatus*.

Miscanthus sacchariflorus (Maxim.) Hackel var. **gracilis** Y. Lee, var. nov.

Culmi 60 cm alti, rhizomata prominentia. Folia 5–10 mm lata, 30 cm longa, utrinque glabra. Inflorescentia 15–20 cm longa, corymbosa. Rachis longitudine 1/2 paniculae aequans Gluma I 2-nervis, 4 mm longa, lemma fertile muticum. Villi calli 8 mm longi sercei. Stamina 3, antherae 1.8 mm longae.

Hab. Kuunri, Suwan, Korea, leg. Uchiyama, No. 5369, 1930, Type in TI. Mankeungdai, Korea, Uchiyama, 1902. Sanchangko, North China, Kitagawa, 1931.

The variety is allied to *M. sacchariflorus*, but differs in short culms, narrow leaves, short callus hairs, papillae on the abaxial surface, and dome-shaped subsidiary cells (Fig. 4. C).

Epidermis of leaf blade: Large papillae 39 μ long, 26 μ wide, and alternate with stomata on the same row of the abaxial surface. Small papillae over the costal zone. Stomata 21 to 28 μ long, and basal cell 36 to 39 μ long. Silica cells dumbell-shaped on the costal zone.

T.S. Leaves: The pattern of cross section of leaf is similar to that of *M. sacchariflorus*.

* * * * *

研究結果を3部に分けて，本報の外に，第2部ススキ葉の解剖型，第3部，ススキの類縁関係について発表する予定である。本報では新種 *Miscanthus Changii* と，トキワススキに類縁をもつと思われる4変種，ススキに縁をひく3変種，ハチジョウススキに似て異なるもの1変種，カリヤスの1変種を記録する。新種として発表したものは韓国の中部加坪にて故張亨斗氏の採集で，外形は *Miscanthus tinctorius* に似て小穂に芒が発達し，小穂の外側にやわらかくて長い毛がある。地下茎が発達し葉は巾 5–7 mm で両面とも毛がない。学名には採集者の功をたたえ，張氏の名を種名にとどめる。

本研究に関して直接親切に御指導をたまわった原寛教授に厚く御礼申し上げるとともに，教室員の方々の深かい御援助，および外部の方々の物心両面から便宜をはかっていただいたことに対し心から感謝する。