

## Distribution of *Typha laxmanni* Lepechin (Typhaceae) in Korea

Changkyun Kim and Hong-Keun Choi\*

Division of Natural Sciences, Ajou University, Suwon 442-749, Korea

**A previously unrecorded *Typha* species has been found in Korea. Its morphology is characterized by short plant height ( $1.0 \pm 0.2$  m), narrow leaves ( $3.2 \pm 0.9$  mm), short pistillate inflorescences ( $4.7 \pm 1.4$  cm), and a high ratio of staminate inflorescence length to pistillate inflorescence length ( $2.2 \pm 0.4$ ). Because these characters are identical to the original description of *Typha laxmanni* Lepechin, we can now report its distribution in Korea.**

*Keywords:* *Typha*, *Typha laxmanni*, unrecorded species

*Typha laxmanni* was described by Lepechin (1801) as a new species because of its short pistillate inflorescence and narrow leaves. In addition, it was distinguished from other species in the genus by plant height, distance between the staminate and pistillate inflorescences, and the ratio of staminate inflorescence length to pistillate inflorescence length (Kronfeld, 1889; Graebner, 1900; Fedchenko, 1934; Saha, 1968; Cook, 1980; Bokhari, 1983; Sun et al., 1992). *T. laxmanni* is distributed in Europe (Fedchenko, 1934; Cook, 1980) and in Asia, including India (Saha, 1968), Iran and Pakistan (Bokhari, 1983), China (Sun et al., 1992), and Mongolia (Noda, 1971). However, its distribution had not yet been officially reported in Korea (Komarov, 1901; Nakai, 1911, 1952; Chung, 1957; Choi, 2000). Recently, we found an unrecorded *Typha* species in Gangwon, Gyeonggi, and Chungcheong provinces in Korea. For this study, we compared the characteristics of this unrecorded taxon with the original description and syntype specimen (Fischer, no. 66 in LE) of *T. laxmanni* (Lepechin, 1801; Kronfeld, 1889; Graebner, 1900; Fedchenko, 1934; Cook, 1980; Bokhari, 1983).

### MATERIALS AND METHODS

We collected materials of an unidentified *Typha* species from Gangwon, Gyeonggi, and Chungcheong provinces in Korea. Voucher specimens are deposited at AJOU. For identification by morphological characters, we measured plant height; butt width; length, width, thickness, and cross-sectional shape of the leaves;

numbers of leaf veins and septa; leaf apex angle and sheath shape; lengths of the staminate inflorescences; length and width of the pistillate inflorescence; distance between staminate and pistillate inflorescences; length and width of stigmas; and lengths of the ovary and gynophore. The first leaf below the pistillate inflorescence was selected for describing leaf characters. Hand-sectioned preparations were used to determine the number of septa and the thickness of the leaf, under a stereoscopic microscope. Dimensions of the stigma, ovary, and gynophore also were measured under a stereoscopic microscope, as taken from 10 flowers per pistillate inflorescence.

### RESULTS AND DISCUSSION

*Typha laxmanni* Lepechin, Nova Acta Acad. Petrop. 12: 335 (1801); Kronfeld, Verhandl. Zool.-Bot. Gesellsch. Wien. 39: 167 (1889); Graebner, Engl. Pflanzenr. IV(8): 10 (1900); Fedchenko, Fl. USSR I: 167 (1934); Saha, Bull. Bot. Soc. Bengal 22: 11-18 (1968); Cook, Fl. Europ. 5: 276 (1980); Bokhari, Biologia 29: 85-91 (1983); Sun, Fl. Sinicae 8: 5 (1992). Type: Fischer, 66 (syntype: LE!).

### Korean name: Kko-ma-bu-deul

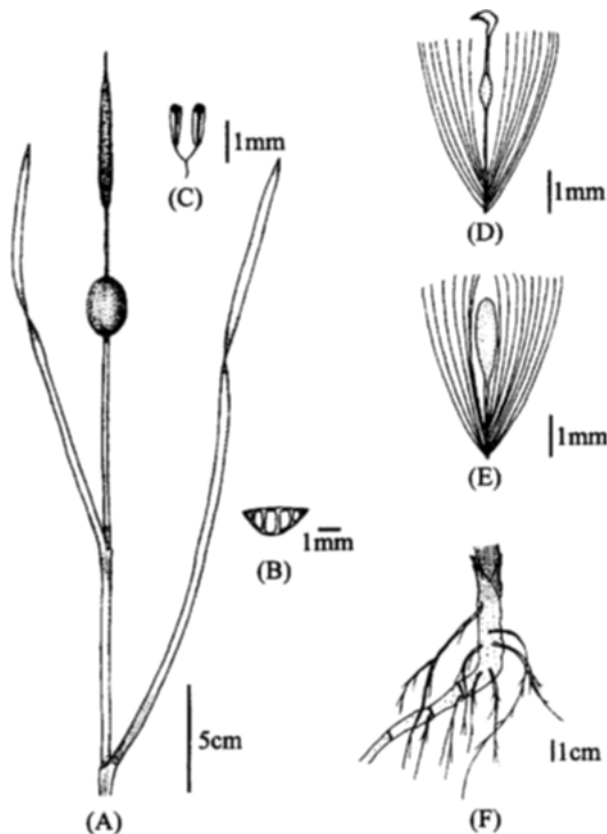
Monoecious, perennial herb, 0.8-1.2 m tall. Butt 5.5-9.1 mm wide. Root adventitious. Leaves plano-convex or concavo-convex, 47.0-89.0 cm long, 2.3-4.1 mm wide; main veins 8-13; lateral veins 0-2. Distance between staminate and pistillate inflorescences 1.7-4.4 cm long; staminate inflorescences 8.2-13.7 cm long; pistillate inflorescences oblong-ovoid, 3.3-6.2 cm long and 1.1-2.0 cm wide. Pistillate flowers without

\*Corresponding author; fax +82-31-219-1615  
e-mail hkchoi@madang.ajou.ac.kr

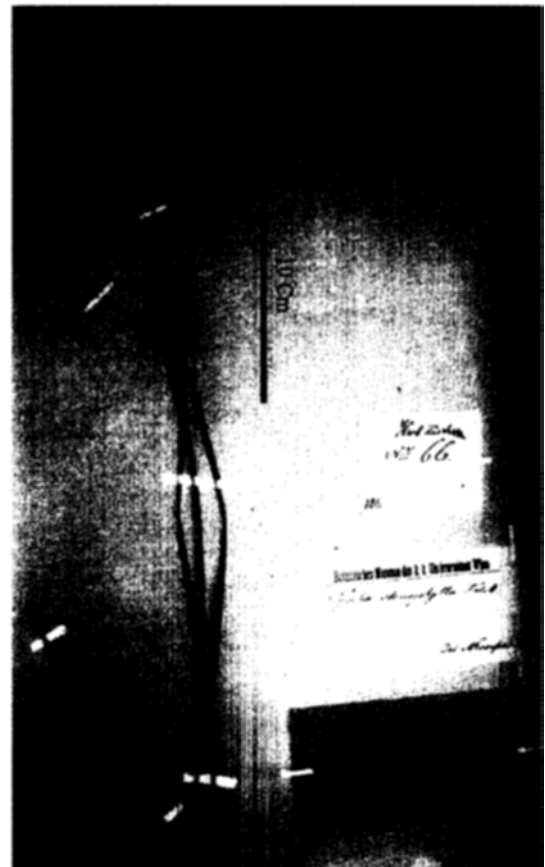
bracteole; stigma flattened spatulate. Pollen single. Flowering June-August. Wet marshy places.

**Specimens examined: Korea.** Gangwon Province; Yeongwol County, 29 July 1998, Kim and Kim 78, 80, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255 (AJOU). Gyeonggi Province; Ansan City, 20 Sept. 1999, Kim and Kim 282, 283, 284, 480, 481, 482, 483, 484, 485, 486 (AJOU); Hwaseong County, 11 July 1997, Choi *s.n.* (AJOU [2 sheets]). Incheon City; Daechong Is., Ongjin County, 22 Aug. 1994, Choi *s.n.* (AJOU [3 sheets]); Yeongheung Is., Ongjin County, 6 June 1998, Kim and Choi 105, 106, 108, 109, 110, 111, 112, 113, 116, 119, 221 (AJOU). Seoul City; Cheonho-dong, 11 July 1999, Kim and Kim 367, 368, 373, 374, 375 (AJOU). Chungcheong Province; Asan City, 3 July 1998, Kim and Kim 137, 139, 141, 142, 143, 144, 145, 146, 147, 225, 226, 227, 229, 230, 231, 232, 233, 234 (AJOU); Hongseong County, 20 Sept. 1999, Choi and Kim 479

(AJOU); Taean County, 27 Oct. 1999, Kim and Kim 557, 558, 559, 560, 561, 562 (AJOU). **Romania.** 19 June 1972, Cirtu 3240 (WU). **Slovakia.** 7 Sept. 1996, Flala 3172 (WU). **Russia.** 21 July 1931, Schischkin 1201 (LE); 4 Aug. 1913, Komarov 814 (LE); 20 July 1913, Wunzunhckin 589 (LE); Choi *s.n.* (AJOU [14 sheets]). **Oman.** 15 Aug. 1890, Strauss 1241 (WU). **China.** 1 July 1953, Jang 1217 (LE); 23 June 1951, Lieu 3147, 3851 (LE); 3 Sept. 1951, Wang and Liou 1412 (LE); 30 July 1951, Wang 606 (LE); 24 Aug. 1951, Wang 2076 (LE); 20 Aug. 1951, Wang 870, 1159 (LE); Fedchenko, *s.n.* (LE); 6 Sept. 1878, Kosch 3000, 4500 (LE); 18 Aug. 1896, Komarov *s.n.* (LE); 20 May 1925, Aibard 28 (LE); 22 June ?, Bucoyx 94 (LE); 1 Aug. 1931, Chen 238 (LE); 16 July 1879, Przewxl-ski 380 (LE); ? 1884, Potanin 153 (LE); 6 July 1901, Runius *s.n.* (LE). **Mongolia.** 16 July 1879, Przewxl-ski 380 (LE); 1 Aug. 1990, Jysaub, Kaueunt, and Rauseng 450 (LE); 19 July 1977, Mahgax, 1834 (LE); 25 Aug. 1950, Aabpehko 18957 (LE); 22 July 1970, Fanyo-



**Figure 1.** *T. laxmanni* Lepechin reported from Korea (Kim and Kim, Collection no. 367 in AJOU): A, Habit; B, Cross-section of leaf (middle); C, Stamen; D, Fertile pistillate flower; E, Abortive pistillate flower; F, Rhizome.



**Figure 2.** Type specimen of *T. laxmanni* Lepechin in Herbarium of Komarov Botanical Institute of Russian Academy of Science (Fischer, no. 66 in LE).

gpas 465 (LE); 1 Aug. 1976, Kepkrgo s.n. (LE); 1 Sept. 1928, Tugarinov 228 (LE). **Unknown nation.** 17 Aug. 1910, Heindr 626 (WU).

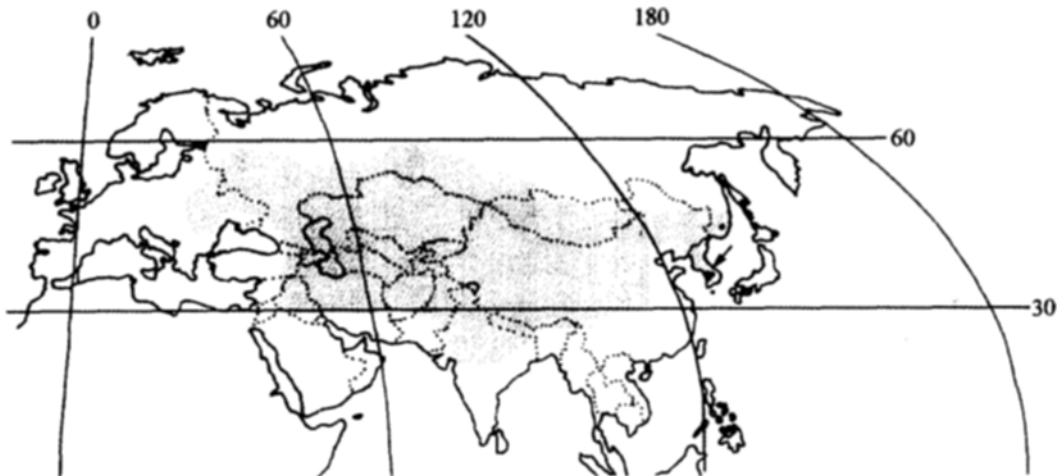
Figure 1 presents the habit, as well as the cross-sections of leaves, stamens, and fertile and abortive female flowers of the unidentified species. The measurements of major morphological characters from our unidentified species, including plant height, leaf width, lengths of staminate and pistillate inflorescences, distance between staminate and pistillate inflorescences, and the ratio of staminate inflorescence length to pistillate inflorescence length are consistent with those previously observed in *T. laxmanni* by Lepechin (1801), Kronfeld (1889), Graebner (1900), Fedchenko (1934), Cook (1980), and Bokhari (1983) (Table 1). We also examined the type specimen of *T. laxmanni* (Fig. 2), and are certain that the unrecorded species is also *T. laxmanni*.

Until now, three species of *Typha* (*Typha angustifolia*,

*Typha orientalis*, and *Typha latifolia*) were known to be distributed in Korea (Nakai, 1911, 1952; Chung, 1957; Choi, 2000). In this study we identified the unrecorded taxon as *T. laxmanni* Lepechin. We propose, therefore, that the previously described range of *T. laxmanni* (Fig. 3) be expanded to include South Korea.

**ACKNOWLEDGEMENTS**

We are grateful to Drs. Tkachenko and Grabovskaya (LE), and to Dr. Walter (WU) for supplying plant specimens. We also thank two anonymous reviewers for helpful comments on the manuscript. This work was supported in part by a grant (No. 2000-1-201-004-2) from the Basic Research Program of the Korea Science & Engineering Foundation, and the 21C Frontier Program of Plant Diversity Research Center (PF 001302-00) by the Ministry of Science & Technology of Korean government. CK was also supported in his



**Figure 3.** Distributions of *T. laxmanni* Lepechin by the previous authors (Kronfeld, 1889; Graebner, 1900; Fedchenko, 1934; Saha, 1968; Cook, 1980; Bokhari, 1983; Sun et al., 1992) and collections at AJOU ( ● ).

**Table 1.** The variation in morphological characters of *T. laxmanni*.

Morphological characters	Current study	Type specimen	Lepechin (1801)	Kronfeld (1889)	Graebner (1900)	Fedchenko (1934)	Cook (1980)	Bokhari (1983)
Plant height (m)	1.0 ± 0.2	—	—	1.0-1.2	0.8-1.5	0.8-1.3	0.8-1.2	0.8-1.5
Leaf width (mm)	3.2 ± 0.9	3.0	Narrow	—	2.0-4.0	<4.0	—	2.0-7.0
Length of staminate inflorescence (cm)	10.9 ± 2.8	>5.2*	—	9.0-15.0	—	—	—	—
Length of pistillate inflorescence (cm)	4.7 ± 1.4	3.2	—	3.0-5.0	—	—	4.0-9.0	—
Distance between staminate and pistillate Inflorescence (cm)	2.5 ± 0.8	3.3	Remote	2.0-5.0	2.0-5.0	Remote	1.0-6.0	Remote
Ratio of staminate inflorescence length/ Pistillate inflorescence length	2.2 ± 0.4	>1.6*	>1	3.0-4.0	3.0-4.0	2.0-4.0	2.0-4.0	—

\*The length of staminate inflorescence was not measured exactly because type specimen was broken.

graduate work by the Graduate School of Ajou University.

Received May 31, 2001; accepted July 3, 2001.

### LITERATURE CITED

- Bokhari MH (1983) The aquatic plants of Iran and Pakistan. III. Typhaceae *Biologia* 29: 85-91
- Choi H-K (2000) Aquatic vascular plants, *In* Plant of Korea, Vol 5. Korea Research Institute of Bioscience and Biotechnology, Junghengsa, Seoul
- Chung TH (1957) Korean Flora. Part II. Sinjisa, Seoul
- Cook CDK (1980) Typhaceae, *In* TG Tutin et al, eds, *Flora Europaea*, Vol 5. Cambridge University Press, pp 275-276
- Fedchenko BA (1934) Family Typhaceae, *In* VL Komarov, ed, *Flora of USSR*, Vol 1. pp 165-170 (English edition published in 1986)
- Graebner P (1900) Typhaceae. *Das Pflanzenreich. Regni vegetabilis conspectus* IV(8): 1-18
- Komarov VL (1901) *Flora Manchuriae*. I. *Act Hort Petrop* 20: 1-550 (Japanese edition published in 1926)
- Kronfeld M (1889) *Monographie der Gattung Typha* Tourn. *Verhandl Zool-Bot Gesellschaft* 39: 89-192
- Lepechin F (1801) *Typha laxmanni*. *Nova Acta Acad Petrop* 12: 335
- Nakai T (1911) *Flora Koreana*. *J Coll Sci Imp Univ Tokyo* 2: 269
- Nakai T (1952) A synoptical sketch of Korean flora. *Bull Nat Sci Mus* 31: 124
- Noda M (1971) *Flora of the Northern Province (Manchuria) of China*. Kazama Bookshop Co, Japan (in Japanese)
- Saha S (1968) The genus *Typha* in India - Its distribution and uses. *Bull Botanic Soc Bengal* 22: 11-18
- Sun X, Wang H, Li Q, Guo Y, Zhou S, You J, Zhong X, Chen Y (1992) *Flora Republicae Popularis Sinicae* 8: 1-12 (in Chinese)