

***Rorippa sylvestris* (L.) Bess., a Newly Naturalized Mustard Species in Taiwan**

Tsung-Hsin Hsieh^(1,2)

(Manuscript received 15 July, 2005; accepted 19 August, 2005)

ABSTRACT: *Rorippa sylvestris* (L.) Bess., a species of the Brassicaceae widespread in SW Asia and Europe, was recently found naturalized at ca. 1500 m altitude in central Taiwan. Morphologically, *R. sylvestris* resembles *R. palustris*, both having deeply pinnatifid leaves, but can be distinguished from *R. palustris* by similar size pinnules, slender pedicels in fruiting stage (8-12 mm) and linear fruits. SEM micrographs of pollen grains, chromosome number, descriptions, line drawing and taxonomic notes are provided.

KEY WORDS: *Rorippa sylvestris*, Brassicaceae, Naturalized plant, Taxonomy, Taiwan.

INTRODUCTION

The genus *Rorippa* Scopoli (Brassicaceae) is composed of about 75 species of wide distribution, but mainly in the northern temperate zone (Cheo *et al.*, 2001). In Taiwan, the genus is represented by three species, *R. cantonensis* (Lour.) Ohwi, *R. dubia* (Pers.) Hara, and *R. indica* (L.) Hiern in the second edition of Flora of Taiwan (Ying, 1996). Shen (1996) verified *R. globosa* (Turcz.) Hayek distributed in central and southern Taiwan which was recorded by Henry (1896), Matsumura and Hayata (1906), Hayata (1913) and Sasaki (1928), but not treated by Liu and Ying (1976) and Ying (1996). Chen and Wu (1989) reported a weed species *R. palustris* (L.) Besser newly naturalized in the lowland land of northern Taiwan (Chen and Wu, 1989; Yang *et al.*, 1997).

Recently, an additional adventive species, *R. sylvestris* (L.) Bess., a species of the Brassicaceae widespread in SW Asia and Europe, was recently found naturalized at ca. 1500 m altitude in central Taiwan.

TAXONOMIC TREATMENT

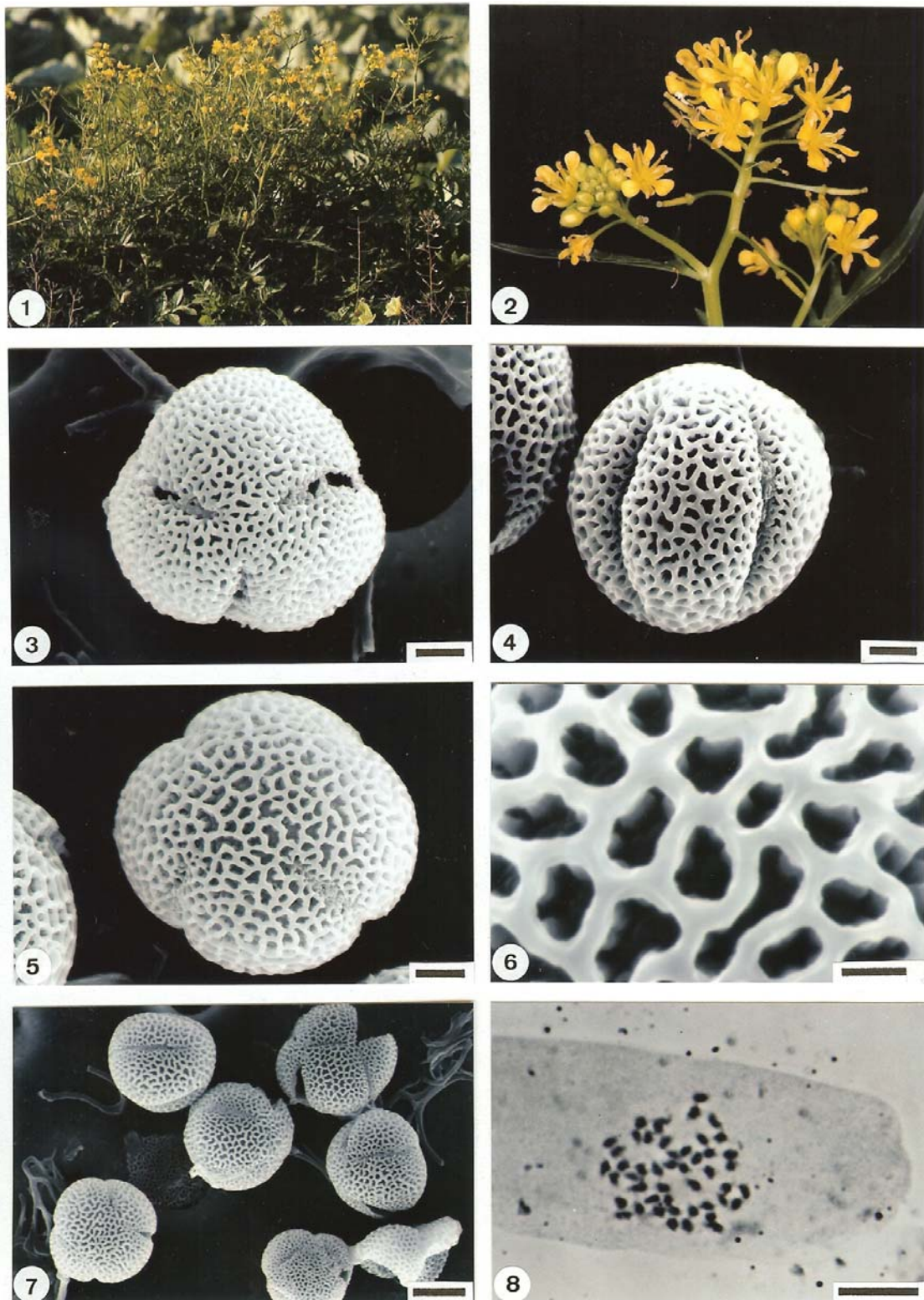
***Rorippa sylvestris* (L.) Besser, Enum. Pl. 27. 1822; Guo, Fl. Reip. Popul. Sin. 33: 301. 1987; Cheo, Fl. China 8: 132. 2001. 歐亞葶藶 Figs. 1-9**

Sisymbrium sylvestre L. Sp. Pl. 2: 657. 1753.
(The description based on plants in central Taiwan)

Herbs, perennial, 30-50 cm tall, glabrous or sparsely pubescent. Stems ascending, or suberect, branched mainly basally. Rosette leaves soon withered, similar to cauline leaves. Cauline leaves deeply pinnatifid; petiole not auriculate; leaf blade 3.5-15 × 1-4.5 cm; lateral

1. Department of Biological Science and Technology, National University of Tainan, 33 Shu-Lin St. Sec. 2, Tainan 700, Taiwan.

2. Corresponding author. Email: thhsieh@mail.nutn.edu.tw



Figs. 1-8. *Rorippa sylvestris* (L.) Bess. 1: Habit. 2: Inflorescences. 3-7: Pollen grains showing 3-, 4- or pantocolpate pollen grains with reticulate sexine. 8: Chromosome number showing $2n = 48$. Scale bar = 3 μm in 3, 4, and 5; except 1 μm in 6 and 10 μm in 7 and 8.



Fig. 9. *Rorippa sylvestris* (L.) Bess. 1: Habit. 2: Sepal. 3: Petal. 4: Stamens. 5: Ovary.

lobes 3-6 on each side of midvein, sublinear, lanceolate, oblong, elliptic, or ovate, margin dentate or serrate, sometimes subentire; uppermost leaves with 1-3 lateral lobes or not lobed, often sessile. Fruiting pedicels 8-12 mm, slender, divaricate. Sepals green or yellow, oblong, 1.8-3(-3.5) × 0.7-1.5 mm, ascending or spreading. Petals yellow, spatulate, 2-5 × 1-2 mm, apex rounded. Fruits linear, 0.5-1 cm. Fl. and fr. May-Sep. $2n = 48$.

Distribution: China (Xinjiang, Liaoning), India, Japan, Kashmir, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; introduced in North and South America (Cheo *et al.*, 2001). Taiwan, in wet places and at edges of vegetable fields.

Specimens examined: Taichung Co.: Wuling, Hoping Farm, 1500 m, Jul. 24, 2005, T. H. Hsieh 3001 (Herbarium of National University of Tainan).

Notes: This species resembles *R. palustris*, both having deeply pinnatifid leaves, but can be distinguished from *R. palustris* by similar size pinnules, slender pedicels in fruiting stage (8-12 mm) and linear fruits. On the other hand, *R. palustris* has bigger terminal pinnules than lateral pinnules, short pedicels in fruiting stage (3-5 mm) and oblong fruits. The chromosome number of *R. sylvestris* was reported $2n = 32, 40, 48$ (Mulligan 1984), but only $2n = 48$ was counted from the naturalized plants in Taiwan (Fig. 8). *Rorippa* is believed to have a base number of $x = 8$, therefore, the naturalized plants of Taiwan are hexaploid.

Pollen grains are 3-, 4- or pantocolpate, isopolar, spheroidal to prolate- spheroidal in equatorial view, circular in polar view, sexine reticulate and lumina irregular, circular or polygonal (Figs. 3-6). Although the pollen grains have different types, the ornamentation and size of pollen grains are similar (Fig. 7).

This species was naturalized in wet places and at edges of vegetable fields at ca. 1500 m altitude in central Taiwan.

ACKNOWLEDGEMENTS

This work was supported by a grant from the National Science Council (NSC 93-2311-B-024-001).

LITERATURE CITED

- Chen, S.-H. and M.-J. Wu. 1989. *Rorippa palustris* (L.) Besser, a new naturalized species for the flora of Taiwan. *J. Natl. Hualien Teachers Coll.* **3**: 257-263.
- Cheo, T.-Y., L. Lu, G. Yang, I. Al-Shenbaz and V. Dorofeev. 2001. Brassicaceae. In: Wu, Z.-Y. and P. H. Raven (eds.), *Flora of China* 8: 1-193. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis, USA.
- Guo, R.-L. 1987. *Rorippa*. In: Cheo, T.-Y. (eds.), *Flora Reip. Popu. Sin.* 33: 300-311. Science Press, Beijing, China.
- Hayata, B. 1913. *Icones Plantarum Formosanarum* 3: 17-21. Bureau Prod. Industr., Govt. Formosa, Taihoku (Taipei), Taiwan.
- Henry, A. 1896. A list of the plants from Formosa with some preliminary remarks on the geography, nature of the flora and Economic Botany of the island. *Trans. Asiat. Soc. Jap.* **24**, Suppl. 1-118.
- Liu, T.-S. and S.-S. Ying. 1976. Cruciferae. In: Li, H.-L. *et al.* (eds.), *Flora of Taiwan* 2: 675-700. Epoch Publishing Co., Ltd., Taipei, Taiwan.
- Matsumura, J. and B. Hayata. 1906. *Enumerato Plantarum Formosanarum*. *J. Coll. Sci. Uni. Tokyo, Japan.* pp. 22-25.
- Mulligan, G. A. 1984. Chromosome numbers of some plants native and naturalized in Canada. *Le Naturaliste Canadien* **111**: 447-449.
- Sasaki, S. 1928. List of plants of Formosa. *Nat. Hist. Soc. Form. Taihoku (Taipei), Taiwan.* pp. 75-78.
- Shen, R.-C. 1996. Taxonomic studies of the Brassicaceae in Taiwan. *J. Expt. Forest of NCHU.* **18**: 1-44.
- Yang, Y.-P., H.-Y. Liu, and S.-Y. Lu. 1997. *Manual of Taiwan vascular plants*. 2: 210-216. Council of Agriculture, The Executive Yuan of Taiwan, Taiwan.
- Ying, S.-S. 1996. Cruciferae. In: Huang, T.-C. *et al.* (eds.), *Flora of Taiwan*, 2nd. ed. 2: 745-769. Editorial Committee, Dept. Bot., NTU, Taipei, Taiwan.

台灣新歸化十字花科植物 — 歐亞葶藶

謝宗欣^(1,2)

(收稿日期：2005 年 7 月 15 日；接受日期：2005 年 8 月 19 日)

摘 要

歐亞葶藶 (*Rorippa sylvestris* (L.) Bess.) 為廣泛分布於亞洲西南部和歐洲之十字花科植物，最近新歸化於台灣中部武陵地區。本文描述其分類特徵、花粉形態、染色體數目、分布、生長環境。並與相關種濕生葶藶 (*Rorippa palustris*) 做比較。

關鍵詞：歐亞葶藶、十字花科、分類學、台灣。

1. 國立台南大學生物科技學系，台南市 700 樹林街 2 段 33 號，台灣。
2. 通信作者。Email: thhsieh@mail.nutn.edu.tw