

Rorippa apetala: A new species of *Rorippa* Scopoli. (Brassicaceae) from Korea

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섬강개갯냉이: 한국에서 발견된 개갯냉이속(배추과)의 1신종

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ABSTRACT: Herein is described a new species of *Rorippa* (*R. apetala*, Brassicaceae) discovered on the River Seom-gang in Wonju-si, Gangwon-do, Korea. The new species is distinct from the closely-related species, *R. palustris* and *R. globosa*, by having adventitious buds on the surface of rhizome-type roots during the fruiting season, usually absent or rarely 1–4, if present then atrophy petals, obpandurate fruits, and seeds usually empty or rarely 1–2 per locule. The key to these species is provided.

Keywords: Brassicaceae, *Rorippa* Scopoli., new species, *Rorippa apetala*

적 요: 개갯냉이속(배추과)의 신종인 섬강개갯냉이가 한국의 강원도 원주시 섬강에서 발견되어 기재하였다. 신종은 결실기 때 근경에 생기는 부정아, 일반적으로 무관화이거나 드물게 1–4개의 축소된 화판, 도제금형의 열매, 종자가 대부분 결실하지 않거나 드물게 실당 1–2개를 가짐으로써, 근연종인 속속이풀(*R. palustris*) 및 구슬갯냉이(*R. globosa*)와 뚜렷하게 구별되었다. 본 연구에서 이 종들의 검색표를 제시하였다.

주요어: 배추과, 개갯냉이속, 신종, 섬강개갯냉이

Brassicaceae are one of the largest angiosperm families, comprising approximately 340 genera and more than 3,350 species (Cheo et al., 2001; Ilim, 2008). The family is divided into 10-19 tribes (Schulz, 1936; Janchen, 1942; Al-Shehbaz, 1984; Onyilagha et al. 2003). The genus *Rorippa* Scopoli. belongs to the tribe Arabideae and has approximately 70–80 species distributed throughout all the continents except for Antarctica (Stuckey, 1972; Cheo et al., 2001). Five taxa have been recorded in Korea (Park et al, 2003; Oh, 2007).

In this study, one uncertain species, which was collected from the Gangwon Province in 2008, is described as a new species, *Rorippa apetala*.

Rorippa apetala Y.Y. Kim & B.U. Oh, sp. nov. (Figs. 1, 2, 3)
Haec species *R. palustris* (L.) Besser. et *R. globosa* (Turcz.)

Hayek. similaris, sed, gemmae adventitiae ad radicalis, petala absens vel raro 1–4, fructus obpanduriformis, semina cassus vel raro 1–2.

Holotype: KOREA. Province Gangwon-do, Wonju-si, Jijeong-myeon, Anchang-ri, Seomgang, A gravelly- or a sandy-fields in the riverside, alt. 57 m, 37°20'06.69N, 127°49'04.38E, 2 Jun. 2009, B.U. Oh et Y.Y. Kim, 090602-004 (CBU)

Isotypes: CBU.

Paratypes: B.U. Oh et Y.Y. Kim, 080624-001 to 080624-004, B.U. Oh et Y.Y. Kim, 080701-001 to 080701-008 (CBU).

Herbs perennial, usually with hirsute or rarely glabrous, 30–150 cm tall. **Roots** taproots, rootlets fibrous. **Stems** erect, green to purple, usually branching upper parts. **Leaves** basal and cauline. Basal leaves rosulate during the autumn, petiole up to 4.0 cm long, simple, 3–9-pinnatisect, withered during the winter; Cauline leaves alternate, sessile, simple, 1–9-pinnatisect except for the

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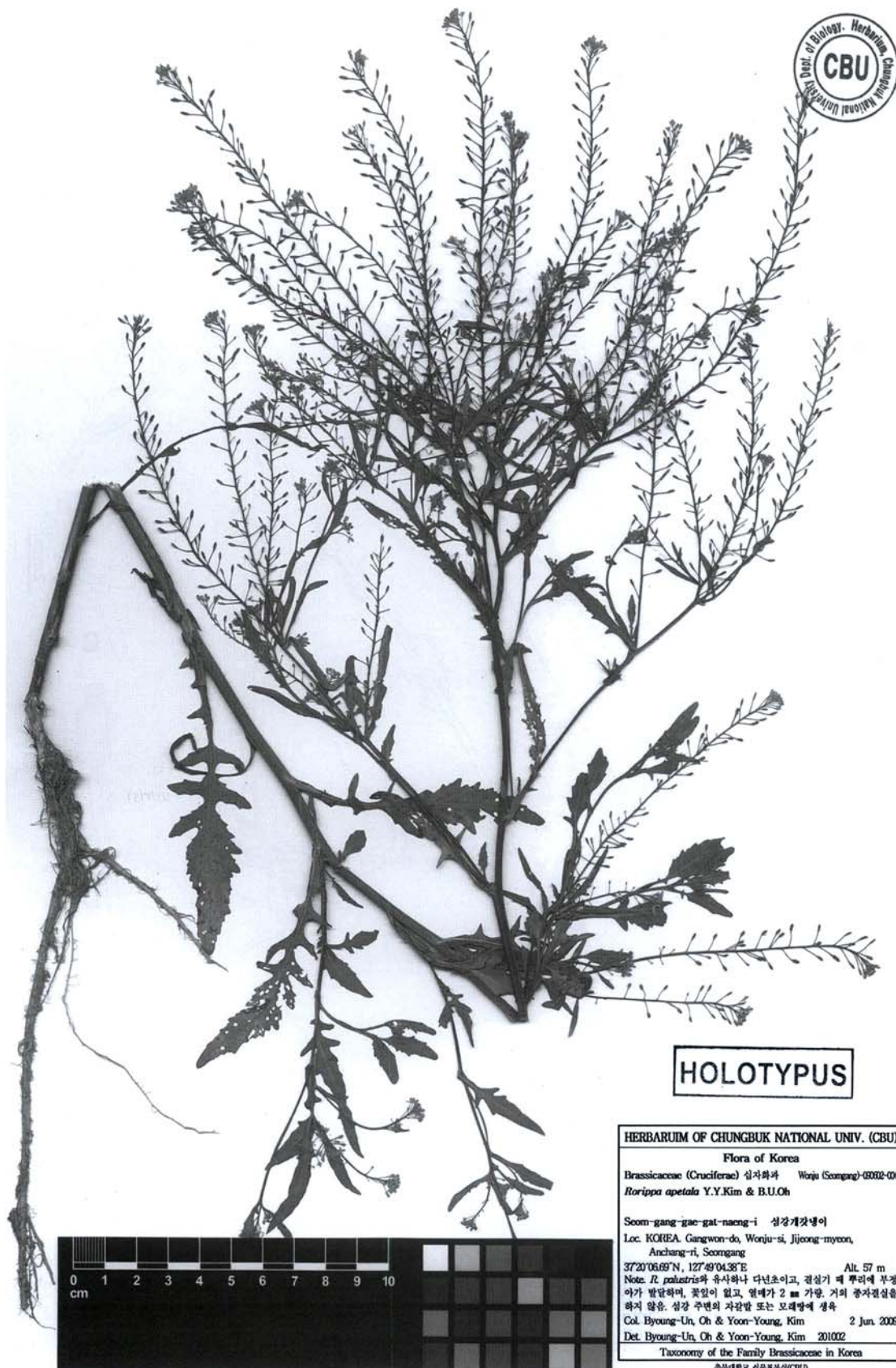


Fig. 1. Holotype of *Rorippa apetala* Y.Y. Kim & B.U. Oh.

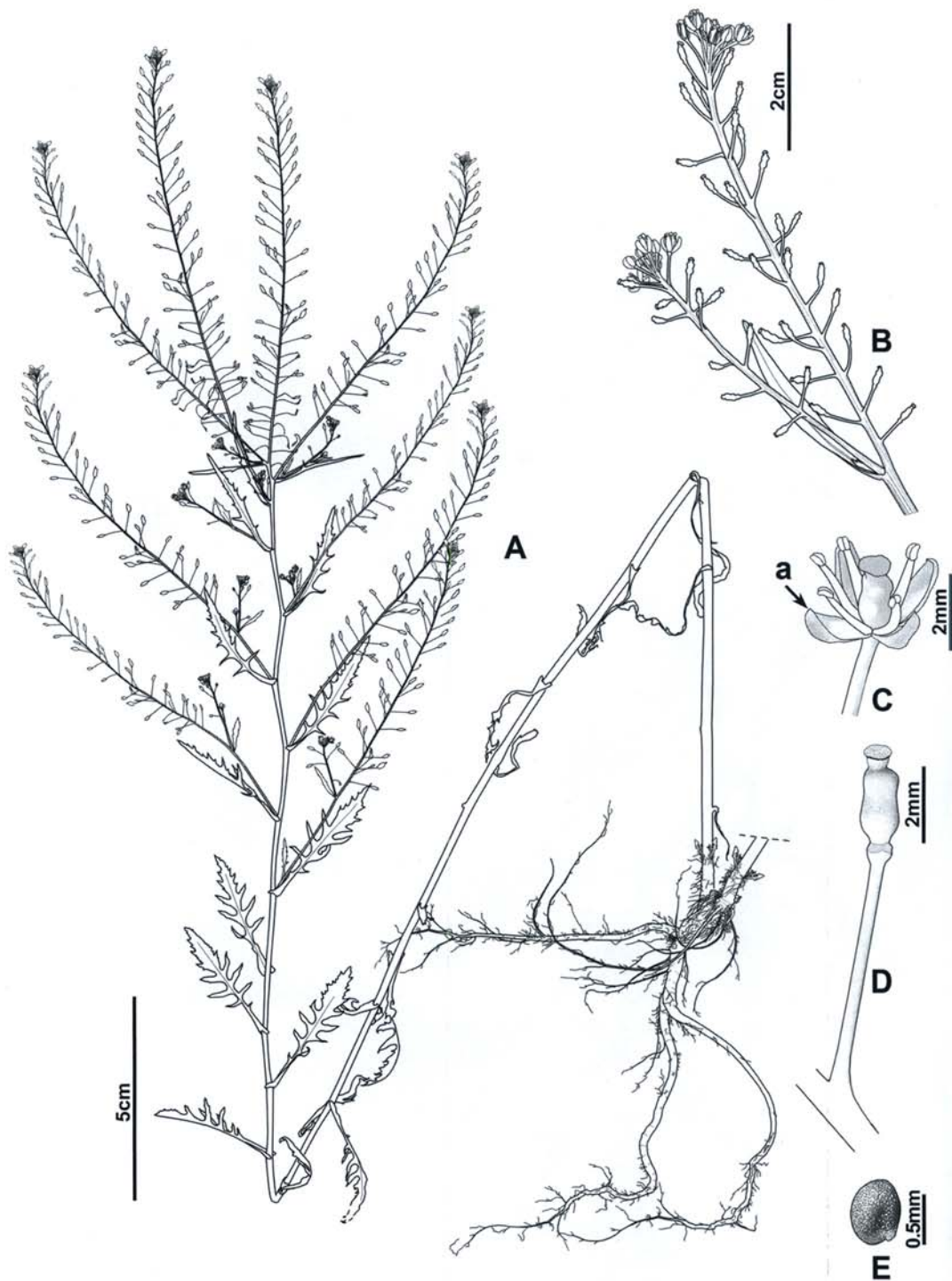


Fig. 2. Illustration of *Rorippa apetala* Y.Y. Kim & B.U. Oh. A. Habit; B. Inflorescence; C. Flower (a: sepal); D. Fruit; E. Seed.

terminal leaves; leaf blades lyrate-pinnatifid or lanceolate at the terminal, up to 25 cm long, up to 8 cm width, apex obtuse or acute, margin irregularly dentate or crenate, base auriculate. **Inflorescence** racemose; peduncles green to purple, 1–4 each branching, erect or ascending, 2.0–20.0 cm long, glabrous; pedicels

green, 2.7–4.2 mm long; ebracteate. **Flowers** yellow to greenish yellow. **Sepals** 4, yellow to greenish yellow, elliptical, 1.0–1.8 mm long, 0.4–0.6 mm wide. **Petals** absent or rarely 1–4, yellow, atrophy, spatulate, up to 1.6 mm long, 0.4–0.5 mm wide. **Stamens** 5–7, superior ones 5–6, 1.4–1.8 mm long, inferior one usually

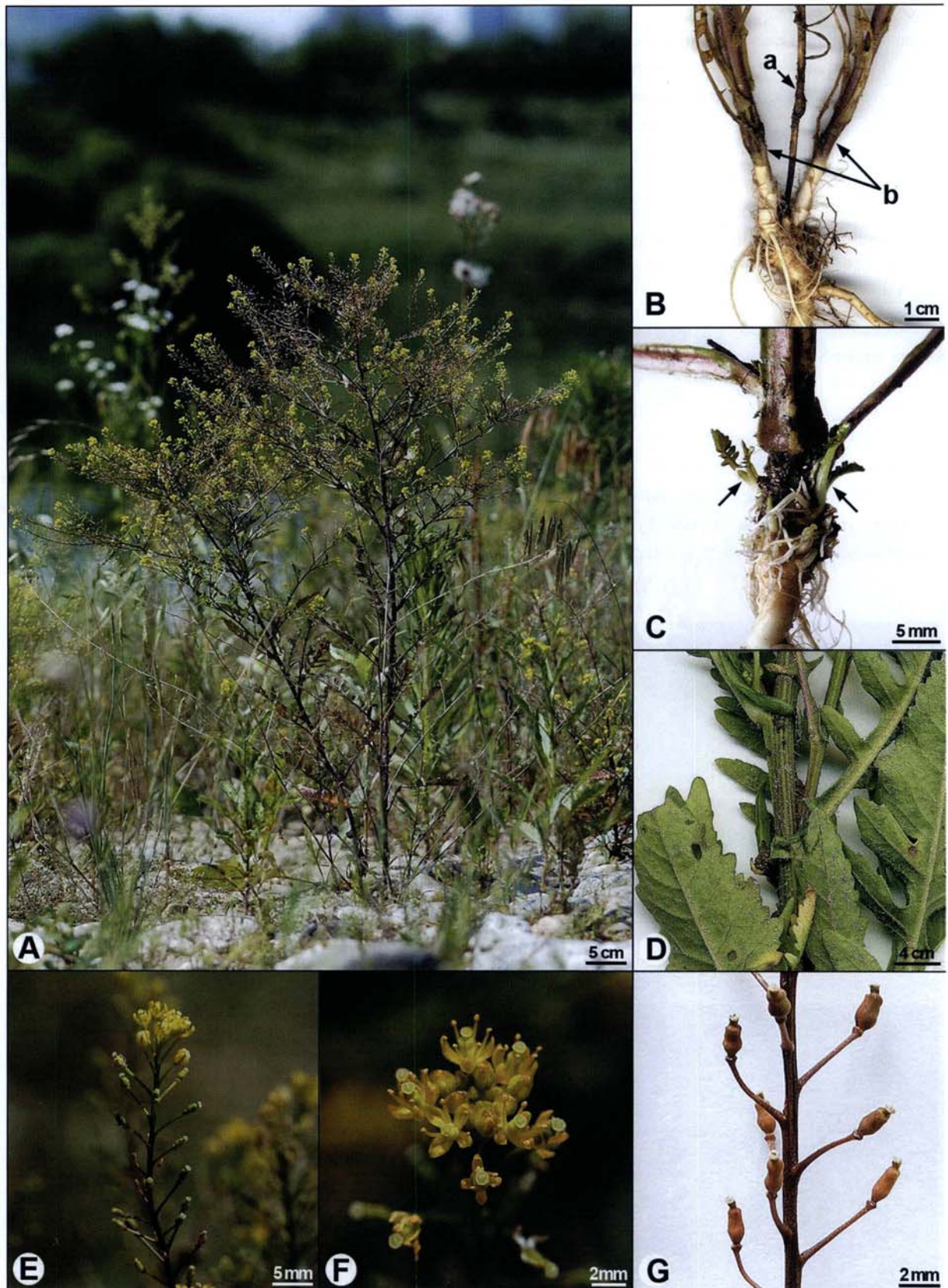


Fig. 3. Photographs of *Rorippa apetala* Y.Y. Kim & B.U. Oh. A. Habit; B. Stems (a: stem from last year, b: stems from this year); C. Adventitious buds on rhizome (arrows); D. Hirsute on stems and leaves; E. Inflorescence; F. Flowers; G. Fruits.

absent or rarely 1, atrophic, up to 0.7 mm long; filaments yellow, linear; anthers yellow, versatile, superior ones oval, ca. 0.3 mm long, ca. 0.2 mm wide, inferior one atrophic. **Pistil** 1; ovary yellowish-green, oblong-cylindrical to obpandurate-cylindrical, 1.2–1.4 mm long, ca. 0.7 mm wide; ovules 20–30 per locule; style ca. 0.4 mm long; stigma truncate, papillate. **Fruits** silicles, brown to reddish brown, obpandurate, 1.6–2.3 mm long, 0.8–1.2 mm wide, valves not veined; style ca. 0.4 mm long. **Seeds** empty or rarely 1–2 per locule, brown, oval, ca. 0.7 mm long, ca. 0.5 mm wide, faveolate. **Flowering** May to July. **Fruiting** June to July.

Korean name: Seom-gang-gae-gat-naeng-i (섬강개갯냉이)

Morphologically, *Rorippa apetala* resembles to *R. palustris*, by having deeply pinnatifid leaves, and *R. globosa*, by having the same flowering season and, similar size of fruits. However, it is distinct from *R. palustris* and *R. globosa*, which are supposed to be two of the most closely-related species, by having adventitious buds on the surface of rhizome type roots during the fruiting season,

usually absent or rarely present only one petal, and obpandurate fruits (Table 1, Figs. 4, 5). Meanwhile, *R. dubia* has apetalous

Table 1. Diagnostic characters of *R. palustris*, *R. globosa* and *R. apetala*.

Characters	<i>R. palustris</i>	<i>R. globosa</i>	<i>R. apetala</i>
Herbs	glabrous	hirsute	hirsute or rarely glabrous
Buds	axillary	adventitious	adventitious
Petals	4	4	absent or rarely 1–4
Stamens	6	6	5–6 (7)
Ovaries	ovate 0.8–1.0 × 0.5–0.6 mm	globose to subglobose 0.8–1.4 × 0.7–1.0 mm	oblong-cylindrical to obpandurate-cylindrical 1.2–1.4 × 0.7 mm
Ovules	15–40 per locule	20–40 per locule	20–30 per locule
Fruits	ellipsoid to oblong-ovoid 2.5–10.0 × 1.5–3.5 mm	globose to subglobose 2.0–3.5 × 1.5–3.0 mm	obpandurate-cylindrical 1.6–2.3 × 0.8–1.2 mm
Seeds	15–40 per locule ovate to oval	20–40 per locule broadly ovate	0 (1–2) per locule oval
Flowering	Apr.–Jul., Oct.–Nov.	May.–Jul.	May.–Jul.



Fig. 4. Flowers of *Rorippa apetala* and those of the closely-related species. A. *R. palustris*, B. *R. globosa*; C. *R. apetala*.

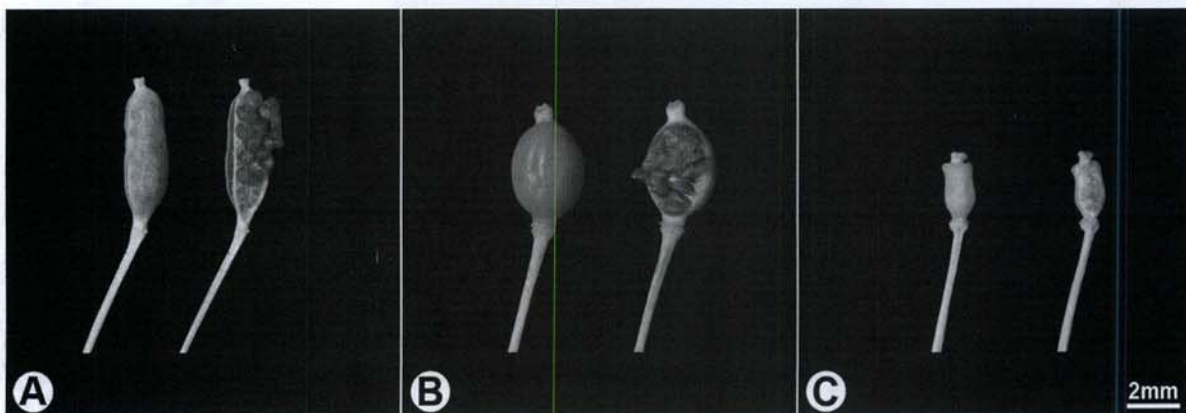


Fig. 5. Fruits of *Rorippa apetala* and those of the closely-related species. A. *R. palustris*; B. *R. globosa*; C. *R. apetala*.

flowers, but one has been recorded as a closely-related species of *R. indica* (Cheo et al, 2001). The habitat of *R. apetala* is a gravelly- or sandy-fields on the riverside, and the community of the new species is often affected by floods. Individual plants are scattered along more than 60 km of the Rivers Seom-gang and Namhan-gang. This species grows with other species such as *Rorippa palustris*, *R. globosa*, *R. cantoniensis*, *Persicaria hydropiper* var. *hydropiper*, *Oenothera biennis*, *Conyza canadensis*, *Erigeron annuus*, and *Phragmites japonica*.

Key to *Rorippa apetala* and related species of *Rorippa* Scop.

1. Basal leaves lyrate-pinnatifid or undivided; fruits linear or rarely linear-oblong, length longer than four times the size of width.
 2. Petals 4, longer than sepals; fruit curved or rarely straight, 10–25 mm long, 1–2 mm wide. Seeds biseriolate *R. indica*
 2. Petals absent or rarely present, if present then shorter than sepals; fruit straight, 15–40 mm long, 0.7–1 mm wide; seeds uniseriate *R. dubia*
1. Basal leaves pinnatisect; fruits oblong to oblong-ovoid, globose to subglobose, obpandurate-cylindrical, length shorter than three times the size of width.
 3. Ovary ovate, shorter than 1.0 mm; style shorter than 0.3 mm *R. palustris*
 3. Ovary globose to subglobose or oblong-cylindrical to obpandurate-cylindrical, longer than 1.0 mm; style longer than 0.3 mm.
 4. Petals 4; stamens 6; ovary globose to subglobose; fruit globose to subglobose, 2.0–3.5 mm long, 1.5–3.0 mm wide; seeds 20–30 per locule *R. globosa*
 4. Petals absent or rarely 1–4; stamens 5–6 or rarely 7; ovary oblong-cylindrical to obpandurate-cylindrical; fruit obpandurate-cylindrical, 1.6–2.3 mm long, 0.8–1.2 mm wide; seeds empty or rarely 1–2 per locule *R. apetala*

Acknowledgments

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