

SHORT COMMUNICATION

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Two new records of entolomatoid fungi associated with rosaceous plants from Japan

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Abstract Two entolomatoid species associated with rosaceous plants, *Entoloma saepium* and *E. clypeatum* f. *hybridum*, are reported as new records from Japan, and their morphological characters are described and illustrated.

Key words *Entoloma clypeatum* f. *hybridum* · *Entoloma saepium* · Entolomatoid fungi · Rosaceae · Taxonomy

Several species of the genus *Entoloma* (Fr.) P. Kumm. can be found in the vicinity of rosaceous plants from various geographic regions in the world. In Europe, four species are known to fruit strictly from spring to early summer under several rosaceous genera, i.e., *E. clypeatum* (L.) P. Kumm. (including one variety, var. *defibulatum* Noordel., and three forms, f. *pallidogriseum* Noordel., f. *xanthophyllum* Noordel., and f. *hybridum* (Romagn.) Noordel.), *E. saepium* (Noulet & Dass.) Richon & Roze, *E. saundersii* (Fr.) Sacc., and *E. niphoides* (Romagn.) P. D. Orton (Romagnesi 1947; Noordeloos 1981b; Moser 1983). These fungi belong to subgenus *Entoloma*, section *Nolanidea sensu* Noordel. (Noordeloos 1981b). In North America, *E. clypeatum* f. *hybridum* was once recorded from the drip zone of an apple tree, which was not vernal but autumnal in fruiting season (Largent 1994). In China, *E. clypeatum* was found on the ground near rosaceous plants in summer to autumn (Mao 2000).

In Japan, two entolomatoid fungi, i.e., *E. clypeatum* (Matsuura 1932; Imai 1938; Imazeki and Hongo 1957, 1987;

Ito 1959) and *E. prunuloides* (Fr.) Quél. (Kawamura 1954), have been recorded in the vicinity of rosaceous plants in the spring season. Noordeloos (1981b) pointed out that the chemical test with guaiac tincture is one of the key characters for identification of *Entoloma* species associated with rosaceous plants. According to Noordeloos (1981b), *E. clypeatum* f. *hybridum* and *E. saepium* are guaiac positive, whereas *E. clypeatum* is guaiac negative, excepting f. *hybridum*. The chemical test has not yet been reported in the Japanese descriptions. Because dried specimens cannot be used for the guaiac test, Japanese records of *E. clypeatum* are uncertain. Therefore, the taxonomy of Japanese entolomatoid fungi associated with rosaceous plants should be reexamined with fresh materials.

During the course of mycorrhizal studies on these entolomatoid fungi in Japan (Kobayashi and Hatano 2001; Kobayashi and Yamada 2003), we have tested the guaiac reagent on fresh basidiomata in addition to morphological characterization for identification. According to descriptions by Noordeloos (1981b), the specimens were identified as *E. clypeatum* f. *hybridum* and *E. saepium* as new records from Japan. The morphological terms applied were referred to Noordeloos (1981a) and color nomenclature to Kornerup and Wanscher (1978).

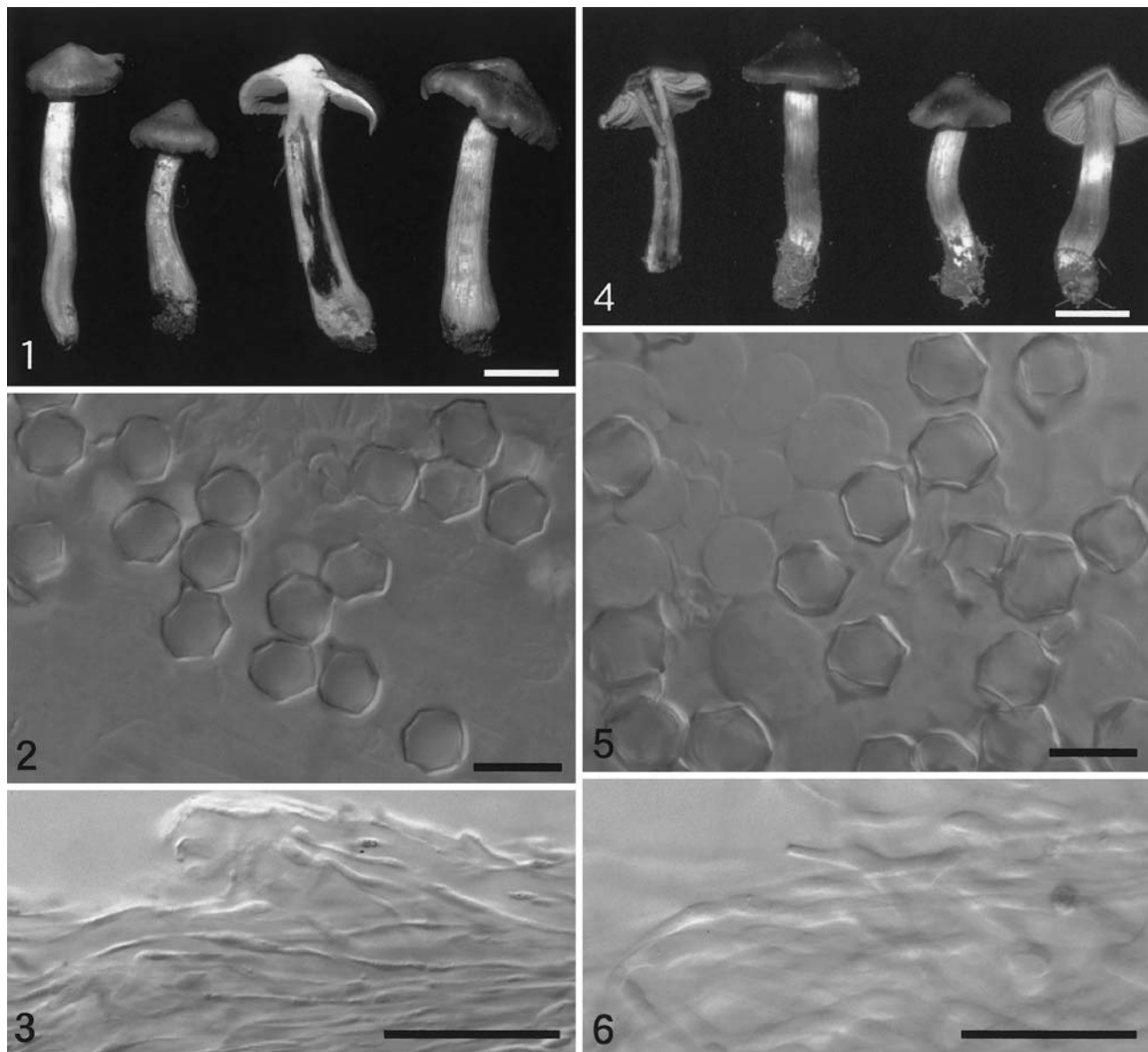
Entoloma saepium (Noulet & Dass.) Richon & Roze, Fl. Champ. Com. Vén. 92. 1880. Figs. 1–3

Pileus 20–100 mm in diameter, plano-convex to campanulate with age, with umbonate center and involved to reflexed margin with age, weakly hygrophanous, brown (5D-E3-4) when dry, fibrillose, splitting with age, slightly viscid. Lamellae moderately crowded, transvenose, segmentiform, narrowly adnate, with eroded edge, when young, turning pale to greyish-orange (6A-B3) with age. Stipe –100 × 7–17 mm, straight, firm, solid, tapering upward, not viscid, white when young, turning pale to greyish-yellow (4A-B3) when old. Flesh in pileus and stipe thick, white, turning reddish when bruised, farinaceous, guaiac reaction positive.

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Figs. 1–3. *Entoloma saepium*. **1** Fruiting bodies. **2** Spores. **3** Pileipellis. Bars **1** 1 cm; **2** 10 μm; **3** 50 μm

Figs. 4–6. *Entoloma clypeatum* f. *hybridum*. **4** Fruiting bodies. **5** Spores. **6** Pileipellis. Bars **4** 1 cm; **5** 10 μm; **6** 50 μm

Spores $8.5\text{--}11.0 \times 6.5\text{--}8.5\mu\text{m}$, subisodiametric, 5–7 angled in side views. Basidia 4-spored, clamped. Lamella edge fertile. Cystidia absent. Pileipellis an ixocutis composed of narrow and cylindrical clamped hyphae, 3–10 μm in diameter. Pigment of hyphae brown, intracellular.

Specimens examined: OSA-MY 5001, in orchard of *Prunus mume* Sieb. & Zucc., Naka-machi, Ibaraki-ken, April 29, 1999, collected by A. Yamada; OSA-MY 5002, in *P. mume* orchard, Kyoto-shi, Kyoto-fu, April 25, 1995, collected by H. Kobayashi; OSA-MY 5003, in *P. mume* orchard, Nagaokakyo-shi, Kyoto-fu, May 2, 1995, collected by H. Kobayashi.

Notes: *Entoloma saepium* is characterized by flesh that turns a reddish color when bruised and is strongly positive to guaiac reagent. Although our specimens coincide with

this taxon as reported by Noordeloos (1981b), the reagent turned dark blue within a minute for all tissues of the basidimata, i.e., flesh of pileus and stipe, and lamellae.

Entoloma prunuloides (Fr.) Quél. was once recorded in spring in the vicinity of rosaceous plants by Kawamura (1954); however, in Europe and North America this species is known to fruit in the autumnal season on grasslands (Noordeloos 1981b) and on soil under various species of oaks (Largent 1994). Moreover, the spore size in Kawamura's description ($8\text{--}10 \times 8\mu\text{m}$) is larger than those of European and American records [$6.8\text{--}8.0$ (-8.6) \times $6.4\text{--}8.0\mu\text{m}$ in Noordeloos (1981b); $6.4\text{--}8.6\mu\text{m} \times 5.1\text{--}7.0\mu\text{m}$ in Largent (1994)]. *Entoloma prunuloides sensu* Kawamura could possibly be *E. saepium*, although the specimens examined by Kawamura were unfortunately lost (Doi 2002).

Entoloma clypeatum (L.) P. Kumm. f. *hybridum* (Romagn.) Noordel., Persoonia 11:173, 1981. Figs. 4–6

Pileus 12–70 mm in diameter, obtusely conical, plano-convex to campanulate with age, with subumbonate to umbonate center and involved to straight margin with age, hygrophanous, brown (6-7E4-6) when dry, dark brown (6F4-6) when moist, fibrillose-tomentose, slightly viscid. Lamellae fairly crowded, transvenose, ventricose, narrowly adnate, with irregular edge, greyish-orange (5B3) when young, turning greyish-red to brownish-orange (7-8B-C4) with age. Stipe –110 × 5–10 mm, straight, fistulose, tapering upward, not viscid, white, brownish-orange when old (5-6B3-4). Flesh in pileus and stipe thin, white, farinaceous, guaiac reaction positive.

Spores 9.0–11.0 × 7.5–11.0 μm, subisodiametrical, 5–8 angled in side views. Basidia 4-spored, clamped. Lamella edge fertile. Cystidia absent. Pileipellis an ixocutis composed of narrow, cylindrical, and clamped hyphae, 2–8 μm in diameter. Pigment of hyphae brown, intracellular.

Specimens examined: OSA-MY 5000, on the ground near *Rosa multiflora* Thunb., Kumamoto-shi, Kumamoto-ken, April 7, 1996, collected by H. Kobayashi; OSA-MY 5004, on the ground near *R. multiflora*, Kyoto-shi, Kyoto-fu, April 11, 1995, collected by H. Kobayashi.

Notes: According to Noordeloos (1981b), the guaiac reaction clearly distinguishes *Entoloma clypeatum* f. *hybridum* from *E. clypeatum* f. *clypeatum*: type forma of *E. clypeatum*; while the former is guaiac positive, the latter is guaiac negative. *Entoloma clypeatum* f. *hybridum* differs from *E. saepium* in its thin and white flesh that does not turn a reddish colour when bruised (Noordeloos 1981b). Furthermore, the positive guaiac reaction of Japanese specimens of *E. clypeatum* f. *hybridum* is distinctly different from that of *E. saepium*, i.e., the reagent turned dark blue at the base of the stipe and light blue at other tissues of the basidiomata within several minutes. In addition, *E. clypeatum* f. *hybridum* and *E. saepium* were collected under different plant species, *Prunus* and *Rosa*, respectively, which could be a diagnostic character.

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