

Puccinia bornmuelleri on cultivated *Levisticum*

Cătălin Tănase^{1*}, Halvor B. Gjørnum² & Ovidiu Constantinescu³

¹University 'Al. I. Cuza', Faculty of Biology, Department of Plant Biology, Bd. Carol I no. 20A, RO-6600 Iași, Romania

²Bioforsk Plant Health and Plant Protection Division, Høgskoleveien 7, N-1432 Ås, Norway

³Museum of Evolution, Botany Section, Evolutionary Biology Centre, Uppsala University, Norbyvägen 16, SE-752 36 Uppsala, Sweden

Received 24 October 2006 / Accepted 8 February 2007

Abstract. A *Puccinia* fungus parasitic on cultivated *Levisticum officinale* was found in various areas of Romania starting in 2000. The fungus is described, illustrated, and identified as *Puccinia bornmuelleri*, a species previously known from Iran and Afghanistan.

Key words: Iran, *Levisticum officinale*, *Puccinia bornmuelleri*, Romania

Introduction

Levisticum officinale Koch is a common crop in Romania, mostly cultivated on small plots and home gardens. In September 2000, an attack of a *Puccinia* fungus on this plant was first detected at a home garden located in the north-eastern part of the country, in Iași City (Fig. 1a). In 2001 and 2002 further collections were made in the same area. In July 2002 the fungus was also found in the southern Romania. Because no *Puccinia* had been recorded and described on this plant in Romania, the morphological characters of the fungus were investigated and compared with morphologically similar species parasitic on wild Apiaceaeous plants.

Description

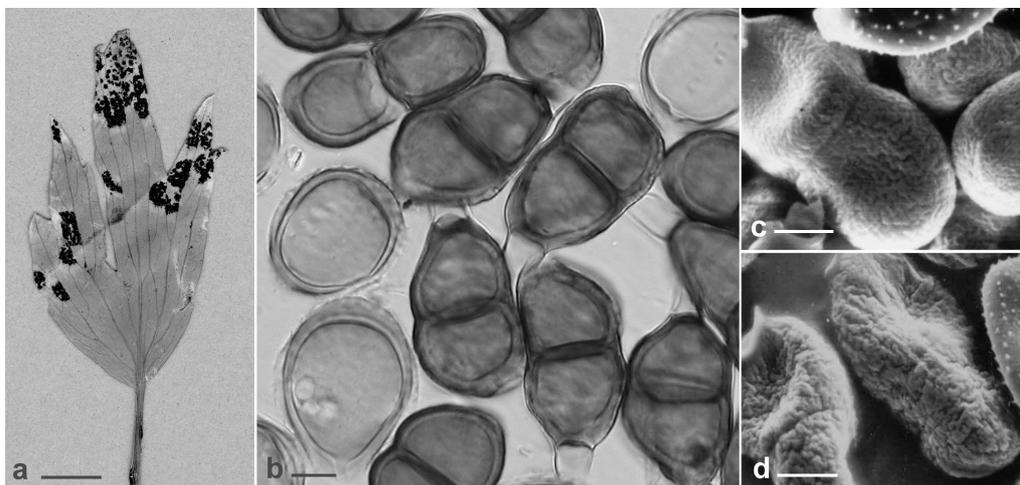
Spermogonia and **aecia** unknown. **Uredinia** hypophyllous, golden brown, circular, 0.3–1 mm diam, larger when coalescing, first covered by epidermis, later exposed, often also on pedicels and/or stems, spreading as 4–9 mm long streaks; the upper face of the leaves opposite the sori becoming yellowish; **urediniospores** (31–) 33–36.5 (–38) × (21–) 22.5–25 (–28) μm ($n = 36$), ellipsoid to obovate; the wall 1.5–2 μm thick, 3–5 μm thick at the apex, yellowish brown, echinulate, echinulae

2.5–3 μm apart, germ pores (2–) 3 (–4), equatorial or slightly subequatorial; the pedicel 25–30 × 4.5–5 μm, the wall thin, deciduous (Fig. 1b). **Telia** replacing the uredinia, chestnut-brown, paraphysate; **teliospores** (34–) 36.5–44 (–51) × (17–) 19.5–23 (–31) μm ($n = 41$), clavate, ellipsoid, to almost oblong, slightly constricted at the median septum; the wall (1.5–) 2 (–3.5) μm, up to 4–6 μm at the apex, chestnut-brown, surface covered with small, irregular crests, germ pore in the upper cell apical, in the lower cell basal, rarely lateral, sometimes obscure; pedicel persistent, yellowish, (6–) 9–11 (–13) μm long, 7–10 μm wide at the place of insertion (Figs 1b–c).

Specimens examined (all on cultivated *Levisticum officinale*): **ROMANIA:** Iași Co., Iași City, garden on M. Kogălniceanu street, no. 6, 47°10' N, 27°35' E, alt. 80 m, 25 Sep 2000, C. Tănase (I 97 196, UPS F-120 441); ditto, M. Kogălniceanu street, no. 36, 12 May 2001, C. Tănase (I 101894, UPS F-120 442); ditto, 19 May 2001 (I-101 895); 20 Jun 2001 (I-101 896); 16 Aug 2001 (I-101 897); 10 Sep 2001 (I-101 901); 15 Jun 2002 (I-108 050); 25 Sep 2002 (I-101 899); ditto, garden on George Topârceanu street, no. 11, 18 Jun 2001, C. Tănase (I-101 900); ditto, 22 Jun 2002 (I-108 084); ditto, garden of the Muzeul Literaturii 'Casa Pogor', 15 Aug 2001, C. Tănase (I-101 898); Botoșani Co., Botoșani, city public garden, 47°44' N, 26°40' E, 14 Sep 2002, leg. Angela Toniuc, det. C. Tănase (I-109 562); Argeș Co., garden in the Pitești city, 44°51' N, 24°52' E, alt. 270 m, 17 Jul 2002, Cristina Cristescu (I-109 151) (Herbaria abbreviations follow Holmgren & Holmgren 1998).

*Corresponding author: e-mail: tanase@uaic.ro

Fig. 1. *Puccinia bornmuelleri* on *Levisticum officinale* from Romania (a-c) and Iran (d): a – uredinia and telia, b – uredo- and teliospores in LM, c-d – teliospores surface ornamentation in SEM. Bars = 10 mm for a, and 10 µm for b-d. Sources: a-c – UPS F-120 441, d – BUCM 10 492



Notes

The only known *Puccinia* species that produces the telial stage on *Levisticum* is *Puccinia bornmuelleri* Magnus (1899) described on *Levisticum persicum* Freyn & Bornm. from Iran. Petrak (1966) reported this fungus on *L. persicum* from Afghanistan. The plant is now considered conspecific with *L. officinale* (Hedge *et al.* 1987). The original specimens (isotypes) were distributed in Rabenhorst, Fungi europaei no. 4213, Sydow, Uredineen no. 1572, and Kryptogamae exsiccatae Vindobonensis no. 704. The *Puccinia* fungus detected on cultivated *Levisticum* is morphologically close to *P. bornmuelleri*. Some slight differences in teliospore surface ornamentation were detected in SEM (Figs 1c-d), but they were considered not significant enough to separate the fungus from *P. bornmuelleri*.

The fungus found in Romania was contrasted with other *Puccinia* species that from the telial stage on *Apiaceae*, particularly with those on the plants closely related to *Levisticum*. Of these, the fungus mostly resembles *Puccinia oreoselini* (F. Strauss) Körn. parasitic on *Peucedanum oreoselinum* (L.) Moench. Nevertheless, in the latter species the wall of teliospores is pitted rather than tuberculate.

We made no inoculation attempts to transfer this *Puccinia* to other hosts and thus refrain from statements about its host range. Gäumann (1959) reported lack of success to infect *Levisticum officinale* with *P. oreoselini*.

The occurrence of *Puccinia* on cultivated *Levisticum* seems to be a typical case of parasitic fungi detected relatively recently, on plants cultivated for very long period of time. Particularly when these fungi produce on their hosts symptoms that could hardly be overlooked, the possibility that they represent new taxa should be carefully considered. Most probably these 'new' parasites are fungi commonly present on related, wild hosts, and are now in the course of expanding their distribution area by 'jumping' on a new, cultivated host (Savile 1971). Nevertheless, an accidental introduction of *P. bornmuelleri*, as documented by Weber *et al.* (2003 and references therein) in the case of *Puccinia distincta* McAlpine and *P. lagenophore*

Cooke, cannot be ruled-out. In fact, several rusts, like *Puccinia absinthii* DC., *P. hieracii* (Schumacher) Mart., *P. punctiformis* Dietel & Holway, *P. graminis* Pers., and *P. helianthi* Schwein., reported from Iran (Ershad 1995), occurs also in Romania (Săvulescu 1953) and/or Europe (Gäumann 1959).

Acknowledgements. We are indebted to an anonymous reviewer for pertinent comments that significantly improved the text, and to D. Răileanu for the SEM pictures.

References

- Ershad, D. 1995. Fungi of Iran. 2nd edn. Agricultural Research, Education and Extension Organization, Teheran.
- Gäumann, E. 1959. Die Rostpilze Mitteleuropas. – Beiträge zur Kryptogamenflora der Schweiz 12: 1-1407.
- Hedge, I.C., Lamond, J.M. & Reehinger, K.H. 1987. *Umbelliferae*. – In: K.H. Reehinger [ed.]. Flora Iranica. Vol. 162. 1-555. Akademische Druck und Verlagsanstalt, Graz.
- Holmgren, P.K. & Holmgren, N.H. 1998. Onwards (continuously updated) Index Herbariorum. New York Botanical Garden (<http://sciweb.nybg.org/science2/IndexHerbariorum.asp>).
- Magnus, P. 1899. J. Bornmüller, Iter Persico-turcicum 1892/93. Fungi, Pars II. Ein Beitrag zur Kenntnis der Pilze des Orients. – Verhandlungen der Kaiserlich-Königlichen zoologisch-botanischen Gesellschaft in Wien 49: 87-103.
- Petrak, F. 1966. Kleine Beiträge zur Ustilagineen- und Uredineenflora von Afghanistan und Pakistan. – Sydowia 20: 278-287.
- Savile, D.B.O. 1971. Coevolution of the rust fungi and their hosts. – Quarterly Review of Biology 46: 211-218.
- Săvulescu, T. 1953. [Monograph of the *Uredinales* from Romanian People's Republic]. Vol. 2. Editura Academiei Republicii Populare Romane, Bucureşti. (In Romanian)
- Weber, R.W.S., Webster, J. & Engel, G. 2003. Phylogenetic analysis of *Puccinia distincta* and *P. lagenophorae*, two closely related rust fungi causing epidemics on *Asteraceae* in Europe. – Mycological Research 107: 15-24.