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Pyrenopeziza plantaginis new to North America

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Abstract: *Pyrenopeziza plantaginis* is reported from leaves of *Plantago lanceolata* from remnant native prairie sites in Benton Co., Oregon which harbor the endangered Taylor's checkerspot. The butterfly uses *P. lanceolata* as a pre-diapause larval host. The fungus is associated with a leaf blight of *P. lanceolata* and may impair restoration of populations of Taylor's checkerspot.

Key words: Dermateaceae, *Euphydryas editha*, *Plantago lanceolata*, Prairie, Willamette Valley

Introduction: Apothecia of *Pyrenopeziza plantaginis* Fuckel (= *Mollisa plantaginis* (Fuckel) W. Phillips) (Ascomycota, Dermateaceae) are commonly associated with

necrotic spots on leaves of *Plantago lanceolata* L. (English plantain, narrow-leaved plantain) (Ellis and Ellis 1997). Leaf necrosis associated with *P. plantaginis* develops in the late fall and early

winter in Europe, primarily spanning the months of December to March (Ellis and Ellis 1997). *Plantago lanceolata* is an exotic but widely distributed invasive European weed in North America (Wolff and Schaal 1992). Although considered common on this host in Europe, *P. plantaginis* appears not to have been reported previously from North America.

Examination of symptomatic leaves of *P. lanceolata* collected in Mar-May, 2011 from remnant native grasslands near Corvallis, Oregon, revealed the presence of minute apothecia partly embedded in necrotic host tissue (Fig. 1). The characteristics of the apothecia agreed in all respects with descriptions of *P. plantaginis*. Details of the apothecia, asci and ascospores of *P. plantaginis* from Oregon are shown in Fig. 1.

Materials and Methods: Voucher specimens from an Oregon population were collected from necrotic leaves of *P. lanceolata* at Bald Hill Natural Area, Corvallis, Benton Co., Oregon on 22-April-2011, Beazell Memorial Forest, Benton Co., OR on 1-May-2011, Cardwell Hill, Benton Co., OR on 1-May-2011, and deposited in the Oregon State University Herbarium (OSC #140,925, 140,926, 140,927).

Material was examined with the aid of a Leica MZ6 stereomicroscope and Zeiss Axioskop compound microscope and images were recorded with a Leica DFC 320 camera. Freehand cross sections of apothecia were mounted in lactoglycerol and examined under bright field and DIC optics at 100x – 630x. Measurements of 20 asci and 40 ascospores from five apothecia from the Oregon material were made at 630x using the integral measurement functions in the Leica Applications Suite v 3.6 (Leica Microsystems). Morphological characteristics of the specimens was compared with the descriptions of *P. plantaginis* in Ellis and Ellis (1997), Hütter (1958) and Nannfeldt (1932).

Results: *Pyrenopeziza plantaginis* Fuckel.

Figure 1. **Apothecia** erumpent, partly embedded in host tissue 0.1 – 0.3 mm diam., black with narrow, white fimbriate margin (Fig. 1 A–C); **asci** 8- spored, biseriate, 45 – 50 µm x 7 – 8 µm, with minute apical pore, faintly I+ without KOH pretreatment (Fig. 1D); **paraphyses** filiform, straight 35 – 44 µm x 1.5 – 2.5 µm; **ascospores** hyaline, fusiform, biguttulate, 9 – 15 x 2.5 – 3.3 µm (Fig. 1 E–H).

Discussion: *Pyrenopeziza* is a relatively large genus with 33 species listed from North America (Farr and Rossman 2011) occurring on a wide variety of herbaceous plants, grasses, sedges, and woody Angiosperms and Gymnosperms, but none are listed from *Plantago* spp. All species of *Pyrenopeziza* have narrow host ranges; Dennis (1981) suggests that each host genus has at least one species of *Pyrenopeziza* peculiar to itself, although morphological differences may be difficult to discern. Species of *Pyrenopeziza* traditionally have been differentiated mainly on the basis of apothecial dimensions, aspects of the marginal excipulum, ascospore size, shape and septation, and substrate (Nannfeldt 1932, Hütter 1958). *Pyrenopeziza plantaginis* is distinguished by its small apothecia with thin, ca. 15 µm thick excipulum composed of isodiametric cells, small, fusiform, aseptate, biguttulate ascospores, and its only reported hosts are *Plantago* spp.

The presence of *P. plantaginis* on *P. lanceolata* was first noticed because *P. lanceolata* is an important pre-diapause larval feeding host of the endangered Taylor's checkerspot (*Euphydryas editha taylori* Edwards). Observation of diseased *P. lanceolata* in sites harboring *E. editha* near Corvallis, Oregon (Severns and Warren 2008), and concern about the possible adverse effects on larval survival led to the identification of *P. plantaginis*. Over half the known Taylor's checkerspot populations in Oregon, Washington, and British Columbia are dependent upon *P. lanceolata* as a pre-diapause larval host plant

(Severns and Warren 2008, Severns and Grosboll 2011). The fungus is also suspected of being present in several remnant Puget Sound prairies near Olympia, Washington but satisfactory voucher specimens have not yet been obtained. Observations by biologists working with Taylor's checkerspot butterflies in Washington (P. Severns and D. Grosboll unpubl. 2011) report "top kill" of *P. lanceolata* leaves in the winter (M. Linders and D. Hays Washington Department of Fish and Wildlife pers. com.), which is consistent with the reported timing of *P. plantaginis* caused leaf necrosis in Europe (Ellis and Ellis 1997). While *P. plantaginis* may not commonly result in *P. lanceolata* mortality, infection and necrosis of *P. lanceolata* leaves from January through March simultaneously occurs with the feeding activity of post-diapause checkerspot larvae. It is possible that *P. plantaginis* may have a negative effect on Taylor's checkerspot populations but this interaction requires further study.

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Figure 1. *Pyrenopeziza plantaginis*. A. Apothecia on *P. lanceolata* leaves in early March. Scale = 1 mm; B. Detail of apothecia. Scale = 0.5 mm; C. Cross section through apothecium. Scale = 20 μm ; D. Ascus showing I+ apical pore. Scale = 10 μm ; E-H. Ascospores. Scale = 10 μm .