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First report of rust of *Sidalcea malviflora* (dwarf checkerbloom) caused by *Puccinia sherardiana* in Washington State

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Abstract: *Puccinia sherardiana* is first reported on *Sidalcea malviflora* in Washington State. The rust occurs on many other taxa in the Malvaceae in numerous geographic locales, and seeds of *S. malviflora* are widely available for gardeners, but reports of the rust on *S. malviflora* are rare.

Key words: checkerbloom, checkermallow, dwarf checkerbloom, 'Else Heugh,' *Puccinia sherardiana*, rust, *Sidalcea malviflora*

Introduction: *Sidalcea* is a genus of approximately twenty-five species (checkerbloom, checkermallow) endemic to western North America. All are native, non-invasive forbs with attractive flowers in shades of white to pink, magenta or purple depending on the species. A plant of *Sidalcea* was observed growing in Pullman, Washington, with abundant sori typical of rust infection. Because *Sidalcea* is one of the genera maintained in the National Plant Germplasm System collections at the Western Regional Plant Introduction Station, the host and rust were examined for identification.

Materials and Methods: The specimen was collected at Lawson Gardens, Pullman, Whitman County, Washington on 29 July 2010 by the first author. Identification of the host was on the basis of information provided by garden staff, by comparison with photographs and drawings from USDA Plants (n.d.), consultation of keys and descriptions in Hitchcock (1957), Hitchcock and Cronquist (1973), Jepson (1993), and Roush (1931), and comparison of the specimen with collections in the Ownbey Herbarium. Measurements and photomicrographs of teliospores of the rust mounted in 85% lactic acid were taken with an Olympus BH-2 compound microscope equipped with a Nikon D5000 digital camera. The rust was compared to keys and descriptions in Arthur (1962) and Hotson (1934).

Results and Discussion: The host plant is perennial, ca. 0.7 meter tall, stems fistulose, inflorescences racemose with 1-2(-3) racemes per stem, with pinkish-magenta flowers (purple on drying, with pale lines in the ca. 12 mm long, subtly emarginate petals), leaves and stems \pm glabrous, basal leaves crenate, slightly lobed higher on stem, with upper leaves lobed and finally highly incised toward the apex, calyces ca. 5 mm long, overlapping, moderately hirsute with sometimes stellate bristles on swollen pads, carpels (immature) nearly smooth. Staff at Lawson Gardens indicated the original material

was purchased from Van Bourgondien (Virginia Beach, Virginia) as *Sidalcea*, prairie mallow, variety 'Else Heugh.' Horticulturists assign this variety to species *Sidalcea malviflora* (DC) A. Gray ex Benth., (e.g., www.hortincopia.com). We use the specific epithet *malviflora*, but indicate its orthographic variant as '*malvaeflora*' as appropriate in given literature.

We checked species assignment of host in the keys and descriptions above. Allowing for variation in stem and leaf hairs of *S. malviflora* (most collections with hairs, but with "almost glabrous" forms in this "very polymorphic species," Roush 1931), and accepting the opinion of Roush (1931) that for *S. 'malvaeflora'* "young carpels [are] glabrous," *S. 'malvaeflora'* was the most consistent determination in Hitchcock (1957) and Jepson (1993). Hitchcock and Cronquist (1973) do not include *S. malviflora* except as *S. virgata* Howell (syn. *S. malviflora* ssp. *virgata* (Howell) C.L. Hitchc.). For illustrations in keys, our specimen most closely resembled those in Plate 11, Figs. 1-2 (*S. 'malvaeflora'*) in Roush (1931), then *S. 'malvaeflora'* ssp. *purpurea* C. Hitch. in Jepson (1993). Of illustrations and descriptions in guides to western wildflowers, that for *S. 'malvaeflora'* in Ferris (1970) is a good match to our specimen. *Sidalcea malviflora* is common, a "highly variable intergrading complex with many local variants," and intergrades with other species (Jepson 1993, Kruckeberg 1957) with which it has close relationships based on internal and external transcribed spacer regions (ITS and ETS) sequences (Andreasen and Baldwin 2003a, 2003b). Morphological comparison with several species of *Sidalcea* in the Ownbey Herbarium confirmed variation in *S. malviflora*, but some accessions of that species closely matched our specimen.

For the rust, telia on stems, and mostly adaxial on leaves, were erumpent, (0.5-)1-2(-3) mm, elliptical to irregular in outline, sometimes

confluent, and blackish-brown (Fig. 1). Teliospores (32-)36.5-60(-63) x (17-)21-25(-26.5) μm had persistent pedicels ca. 85-150 μm long and smooth lateral walls ca. 2.0-3.5 μm thick (Figs. 2, 3). The rust keyed to *Puccinia sherardiana* Körn in Arthur (1962), and to that same species in Hotson (1934). Teliospores were congruent with Arthur's (1962) description but somewhat shorter than those in Hotson (1934). The rust lacks aecia and uredinia, i.e., it is microcyclic (Arthur 1962). No nucleotide sequences or other records are available for *P. sherardiana* in GenBank (www.ncbi.nlm.nih.gov/genbank/), and the rust was identified on the basis of host and morphology. The rust is previously recorded on *S. malviflora* from California and Nevada, and is documented on other members of the Malvaceae, mostly in North America (Farr and Rossman n.d.). The specimen is deposited with the recently dedicated Charles Gardner Shaw Mycological Herbarium at Washington State University as WSP 71857.

Although *Sidalcea* spp. are hosts to several rusts (Arthur 1962, Farr and Rossman n.d., with synonyms for rusts and hosts), they are in general less susceptible to rust than common hollyhock, *Alcea rosea* L., a related species in the Malvaceae (Beckerman and Lerner 2009).

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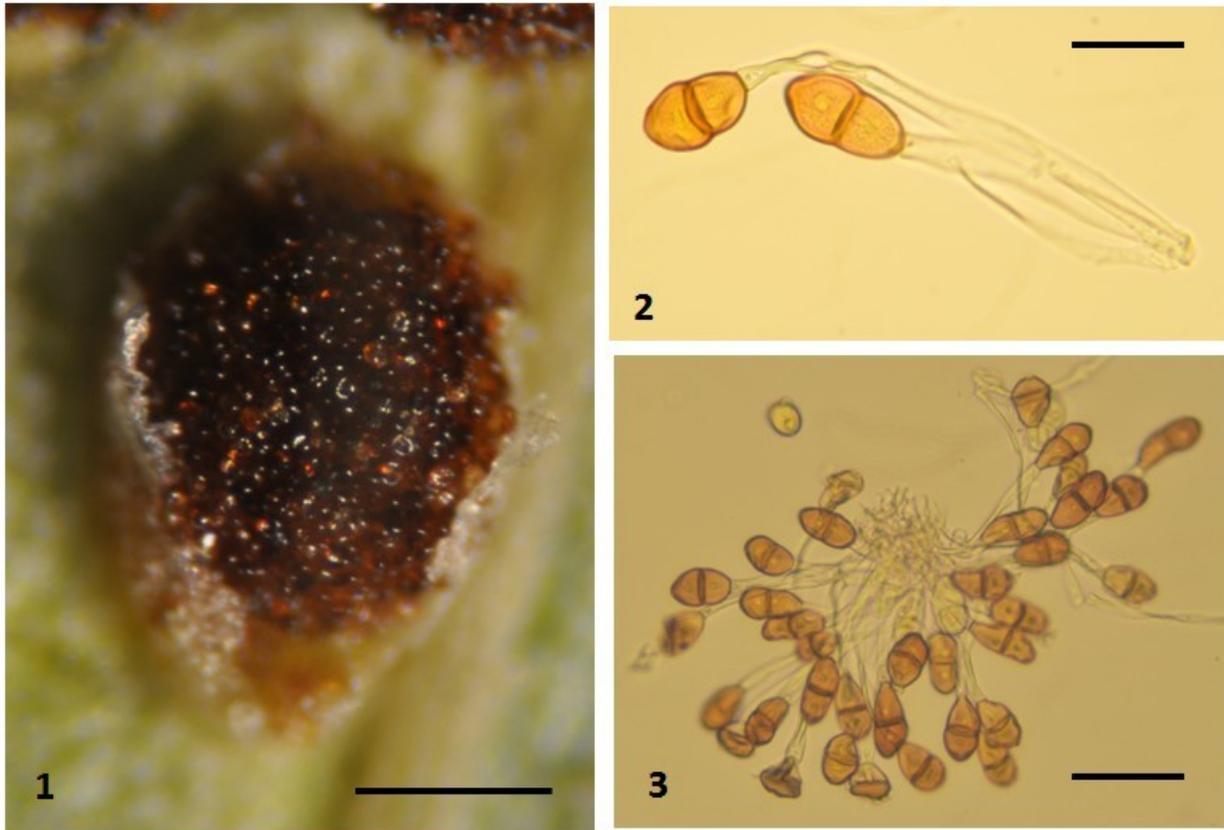
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Figs. 1-3. *Puccinia sherardiana* on *Sidalcea malviflora*. 1. Erumpent telium. Bar = 1 mm. 2. Two teliospores with pedicels. Bar = 45 μ m. 3. Mass of teliospores. Bar = 90 μ m.