

NEW DISEASE REPORT

First report of late leaf rust on raspberry caused by *Aculeastrum americanum* in New Zealand

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KEYWORDS

Pucciniastrum americanum, *Rubus*

In April 2023 and 2024, rust symptoms were detected on a small number of red raspberry (*Rubus idaeus*) plants growing on two residential properties in Auckland, New Zealand (Fig. 1). Nearly all leaves of the affected host plants were infected, displaying symptoms of rust disease ranging from mild to severe. Further examination showed yellow to orange rust pustules (uredinia) scattered on the lower leaf surface (Fig. 2).

Microscopic examination revealed obovoid to ellipsoid echinulate urediniospores ($n = 30$), measuring $19.5 \times 13.3 \mu\text{m}$ ($14.8\text{--}23.6 \times 9.8\text{--}17.7 \mu\text{m}$), with yellow to orange pigmented contents, and cell walls measuring $1\text{--}1.5 \mu\text{m}$ (Fig. 3). In addition, knob-like aculeate ostiolar cells were found, measuring up to $30 \mu\text{m}$ in diameter, with spikes up to $5 \mu\text{m}$ long (Fig. 4). These morphological characters differed from the rust fungi known to infect *Rubus* in New Zealand and aligned with those of *Aculeastrum americanum* (syn. *Thekopsora americana*, *Pucciniastrum americanum*) (Laundon & Rainbow, 1969). No telia or teliospores were found.

For molecular identification, DNA was extracted from the uredinia and the internal transcribed spacer region 2 (ITS2) and partial ribosomal RNA large subunit (LSU) were amplified and sequenced using primers Rust2inv / LR6 (Aime 2006; Vilgalys & Hester 1990). BLAST analysis confirmed the initial morphological identification with 99.8–100.0% identity to sequences of other *A. americanum* isolates (e.g. MG907237). Specimens were deposited in the New Zealand Fungarium as vouchers PDD 121369 and PDD 124516. The sequences from this study were deposited in GenBank (Accession Nos. PP795360 (PDD 121369); PP795362 (PDD 124516)).

Aculeastrum americanum uredinal stage causes late yellow rust or late leaf rust mainly on red and purple raspberry (*R. idaeus* and *R. x*



FIGURE 1 Rust disease symptoms caused by *Aculeastrum americanum* on a leaf of raspberry (*Rubus idaeus*) from a domestic garden in Auckland, New Zealand

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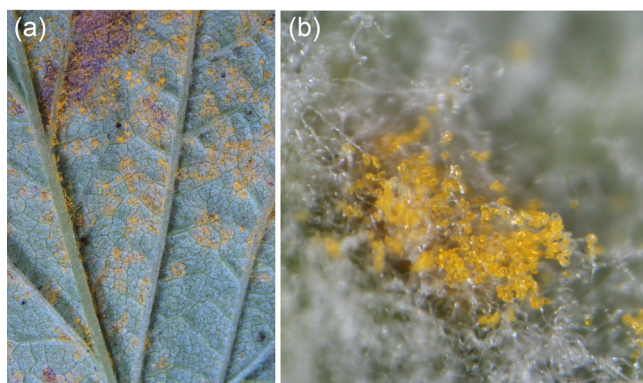


FIGURE 2 Uredinia of *Aculeastrum americanum* on (a) the underside of *Rubus idaeus* leaves and (b) a close-up of an uredinium

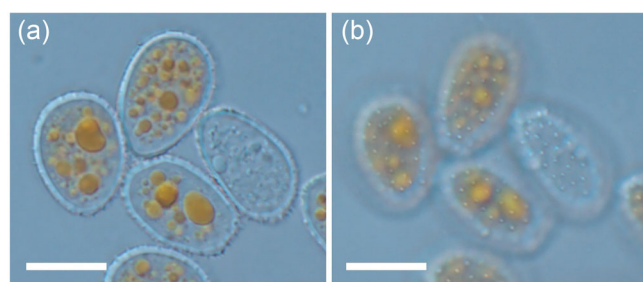


FIGURE 3 Urediniospores of *Aculeastrum americanum*, showing (a) the cell walls and (b) echinulate surface. Bar = 10 µm

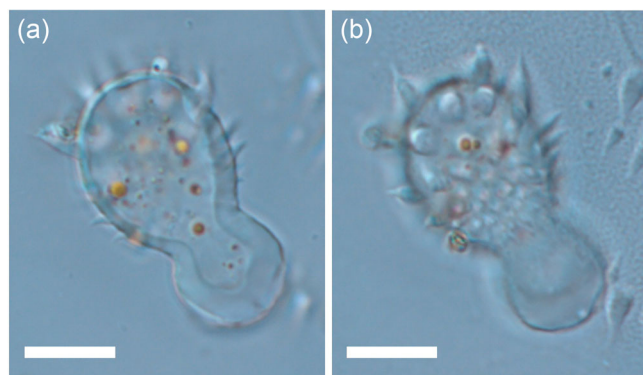


FIGURE 4 Knob-like spiny ostiolar cells of *Aculeastrum americanum*, showing (a) the cell wall and (b) aculeate surface. Bar = 10 µm

neglectus, respectively). Other *Rubus* species reported to be susceptible are *R. leucodermis*, *R. occidentalis* and *R. ursinus*. Infection can occur on all aerial plant parts and leads to premature leaf drop and defoliation. The disease can have a significant impact as symptomatic fruit is deemed unmarketable (Martin et al., 2017). The management of the disease is reported to be difficult (Delisle-Houde et al., 2020). If host alternation occurs, the aecial stage of *A. americanum* forms on white spruce (*Picea* spp.), causing needle rust (Martin et al., 2017).

The pathogen has been reported from Argentina, Brazil, Canada, Japan, Mexico and the USA (USDA, 2024). The infected plants detected in Auckland in 2023 were removed as an urgent biosecurity measure to attempt to stop the spread of the pathogen (Bleach, 2023). The subsequent detection of *A. americanum* in a different area of Auckland in 2024 suggests that the fungus is distributed in the region. It is also possible that the pathogen has been present for some time but overlooked due to its macroscopic similarity to other *Rubus* rusts in New Zealand. *Aculeastrum americanum* was regarded as a regulated and unwanted organism in New Zealand during the time of these detections. Its unwanted organism status was revoked in September 2024 as the rust fungus is considered to be present in the country.

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