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First Report of *Phakopsora neocherimoliae* on Chirimoya (*Annona cherimola*) in Peru

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Chirimoya (*Annona cherimola*) is an important crop cultivated for its sweet fruit. It is distributed in tropical and subtropical regions of America, Africa and Asia, and is also grown in the south of Europe (Jamkhande et al. 2017). In the Amazonas department, Peru, the species also grows wild in forests along the upper Utcubamba river basin. Between 2022 and 2023, rust-infected leaves were observed on *A. cherimola* in wild forests in the Montevideo and Leimebamba districts, as well as in private plantations in Achamaqui, Amazonas (Figure 1). There were insufficient data to estimate disease incidence in cultivated plantations but in the wild, all the plants observed were infected. Specimens from these observations were deposited in the Kuelap Herbarium at UNTRM-A, Peru, and the Arthur Fungarium at Purdue University, USA (KUELAP-422-H [PURN24183], KUELAP-423-H [PURN24188], KUELAP-424-H, KUELAP-425-H and KUELAP-426-H).

Uredinia were present on the abaxial surface of the leaves of the herbarium specimens, pale brown in colour, occurring scattered or in small groups in chlorotic areas (Figure 2A,B). Urediniospores were ovate to subglobose; 17.78–29.58 × 14.88–21.17 µm, avg. 23.63 × 18.20 µm, hyaline to pale yellow, urediniospore wall 1.04–1.77 µm thick, avg. 1.36 µm thick ($n = 20$), densely and finely echinulate ornamentation (Figure 2C,D). Teliospores were not observed in the examined specimens. Our morphological observations are consistent with previous descriptions of *Phakopsora neocherimoliae* (Cummins) (Beenken 2014; Buriticá and Hennen 1994). To confirm the species identity, the 28S ribosomal DNA large subunit was sequenced using the rust-specific primers and protocols of Aime (2006). All sequences were deposited in GenBank (Accession Nos. PX127637–41). The sequences of our specimens shared 99.7% (655/657 bp), 99.69% (646/648 bp), 99.79% (932/934 bp), 99.66% (889/892 bp) and 99.76% (830/832 bp) identity with *P. cherimoliae* (KF528012.1, Beenken 2014). Additionally, our sequences shared 99.8% (656/657), 99.5% (645/648), 99.4% (928/934), 99.2% (885/892) and 99.5% (828/832) identity with a specimen in RustHUBB (Kaishain et al. 2024).

P. neocherimoliae has been reported previously in Argentina, Brazil, Colombia, Ecuador and Venezuela in South America, as well as in Central America and the Caribbean (Costa Rica, Honduras, Cuba, Guatemala, Mexico) and the Philippines (Beenken 2014; Ferrari et al. 2004). This species is mainly associated with *A. cherimola*, although other hosts within *Annona*, such as *A. reticulata*, *A. squamosa* and *Annona* hybrids, have also been documented as hosts. To our knowledge, this is the first confirmed record of *P. neocherimoliae* in Peru.

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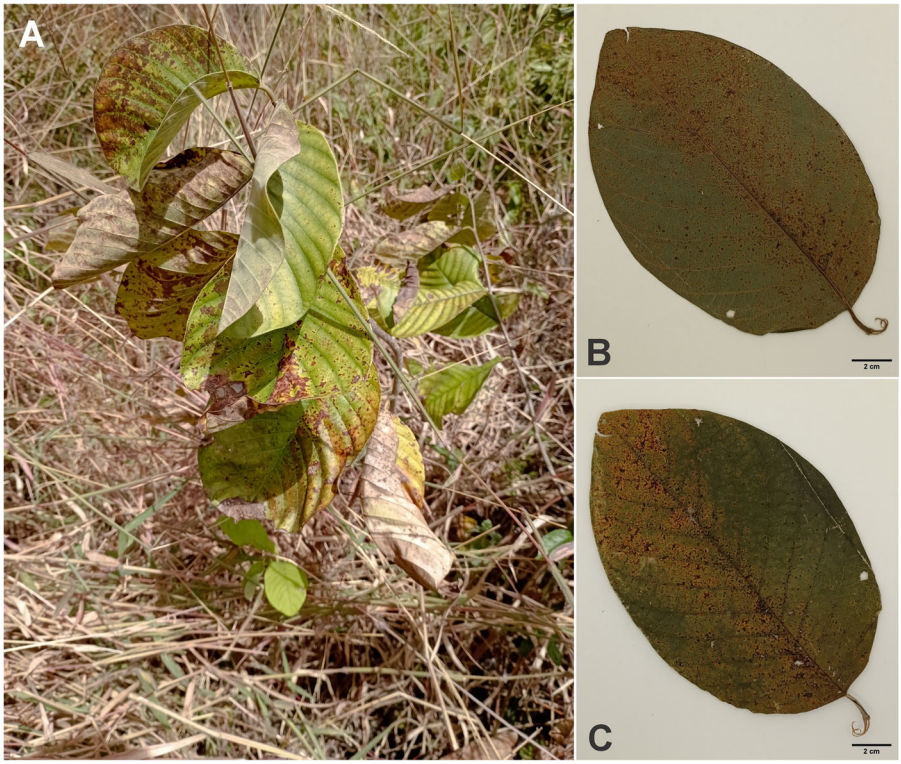


FIGURE 1 | (A)Young plant of *Annona cherimola* infected by the rust fungus *Phakopsora neocherimoliae* in the wild; (B) abaxial and (C) adaxial side of diseased leaf of *A. cherimola*.

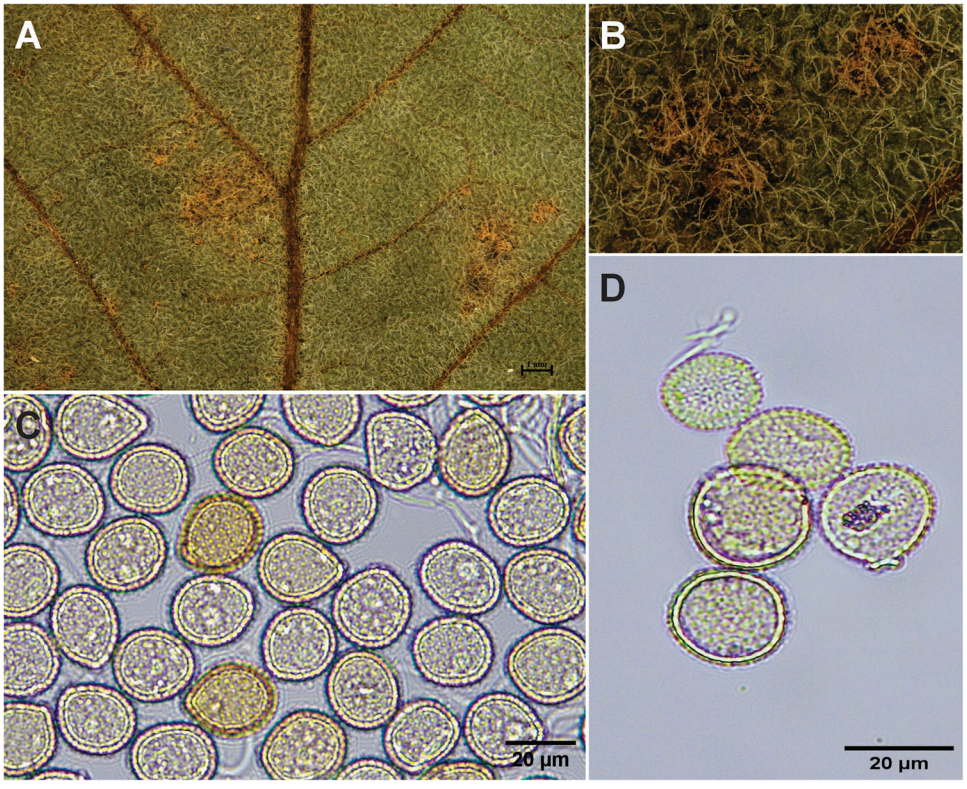


FIGURE 2 | *Phakopsora neocherimoliae* on *Annona cherimola*: (A, B) uredinia on the abaxial surface of the leaves, (C) urediniospores in median view, and (D) urediniospores in median and superficial view.

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