

HYPOPARASITIC FUNGUS *TUBERCULINA PERSICINA* (DITM. EX FR.) SACC., AS BIOCONTROL AGENT FOR RUSTS

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The biological control of plant diseases has recently been gaining appreciable importance to plant pathologists. Intensive research has been done in this field to avoid the hazardous impact of pesticides and agro-chemicals on ecosystem. The biological agents, the mycoparasites have also attained a significant position. It has been suggested that efforts should be made to investigate the biological control of plant diseases through parasitism and predation. *Tuberculina* spp. are well-known mycoparasite and lot of research has been done on mycoparasitism of this fungus. *Tuberculina persicina* is contact parasite forming neither haustoria nor other intercellular structures. However, at contact areas between *T. persicina* and its hosts, distinct interfungal interactions are observed. The host cells are dissolved at the point of contact.

Present study was made to evaluate the antagonistic efficiency and mycoparasitic activity of *Tuberculina persicina* (Ditm. ex Fr.) Sacc. against rust fungi *Puccinia thawitesii* Berk. on leaves of *Justicia gendarussa* L. and *Uromyces appendiculatus* (Pers.) Unger on *Vigna sinensis* L. In total ten samples were examined for each host. Freshly collected samples were used for microscopic observation of fungal structures. The samples were also placed in moist chamber following "Blotter method" for further investigations. Organisms from infected area were mounted on slides with lactophenol and cotton blue. Spore colour was examined on slides with water as mounting fluid. Digital and photomicrographs were made for each of the samples. Identification of the fungus was made following the relevant literatures.⁽¹⁻²⁾ Samples were deposited in the Mycological Herbarium of Botany Department, University of Dhaka, Bangladesh.

Specimen examined: 1. *Puccinia gendarussa* (Acantheceae), Srimongal, Sylhat, S. Shamsi 2031 July 20, 2007. 2. *Vigna sinensis* L. (Leguminosae), S. Shamsi 2135, 24 January 2009, Botanical Research Garden, Curzon Hall Campus. 3. *Vigna sinensis* L. (Leguminosae), S. Shamsi 2149, 27 January 2009, Botanical Research Garden, Curzon Hall Campus. 4. *Vigna sinensis* L. (Leguminosae), S. Shamsi 2155, 11 February 2009.

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Tuberculina spp. are cosmopolitan and world-widely distributed, living in association with more than 150 rust species from at least 15 genera. Among 38 species, three species of *Tuberculina* are hypoparasites on rust fungi. These species are *T. maximus*, *T. persicina* and *T. sbrozii*.⁽³⁾ Other species of *Tuberculina* are reported as non pathogenic. After controversial discussions whether *Tuberculina*-like

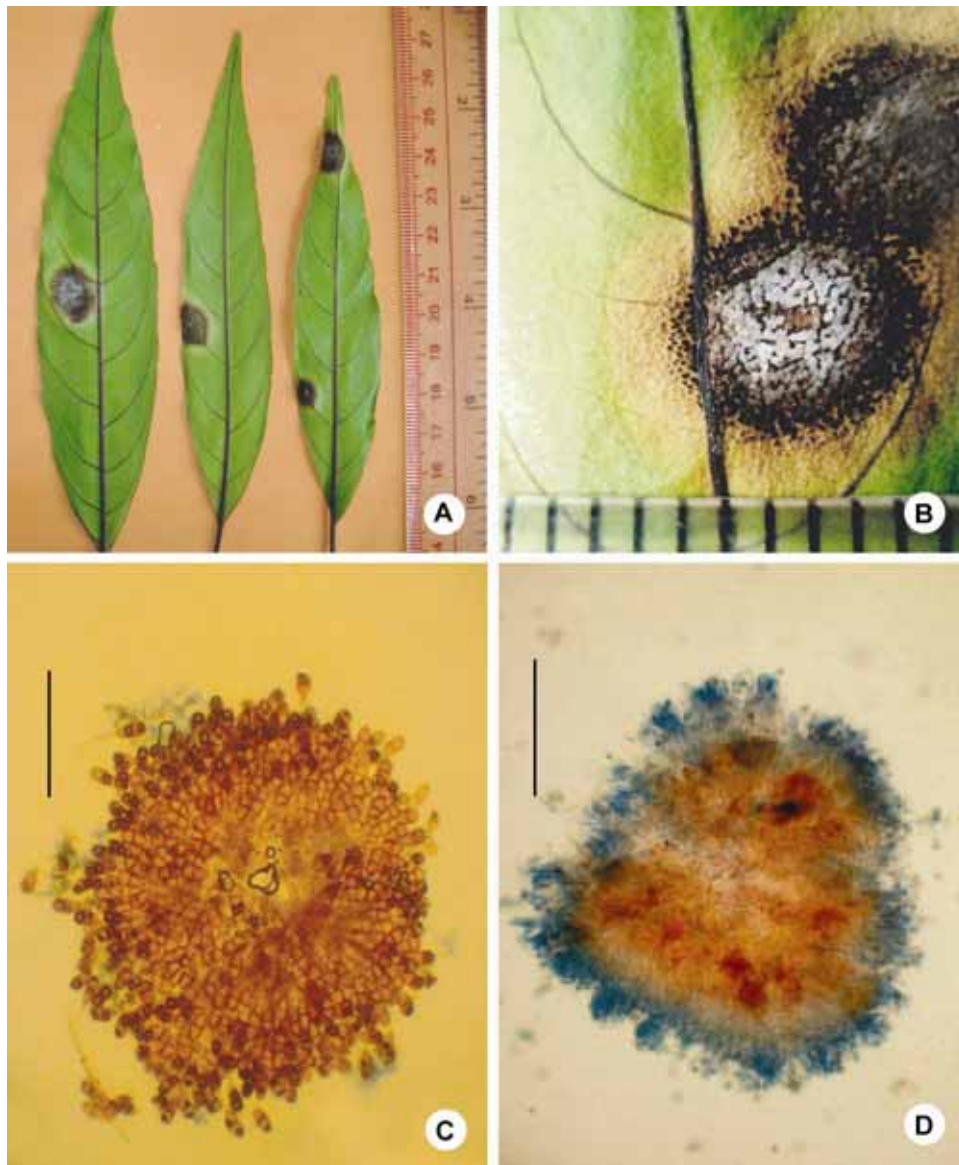


Fig. 1. A. Rusty pustules of *Puccinia thwaitesii* on *Justicia gendorusa*. B. Rust pustule surrounded by *Tuberculina persicina*. C. Teleospore of *Puccinia thwaitesii* and D. Teleospore of *P. thwaitesii* surrounded by *Tuberculina persicina*. (Bar = 50 μ m).

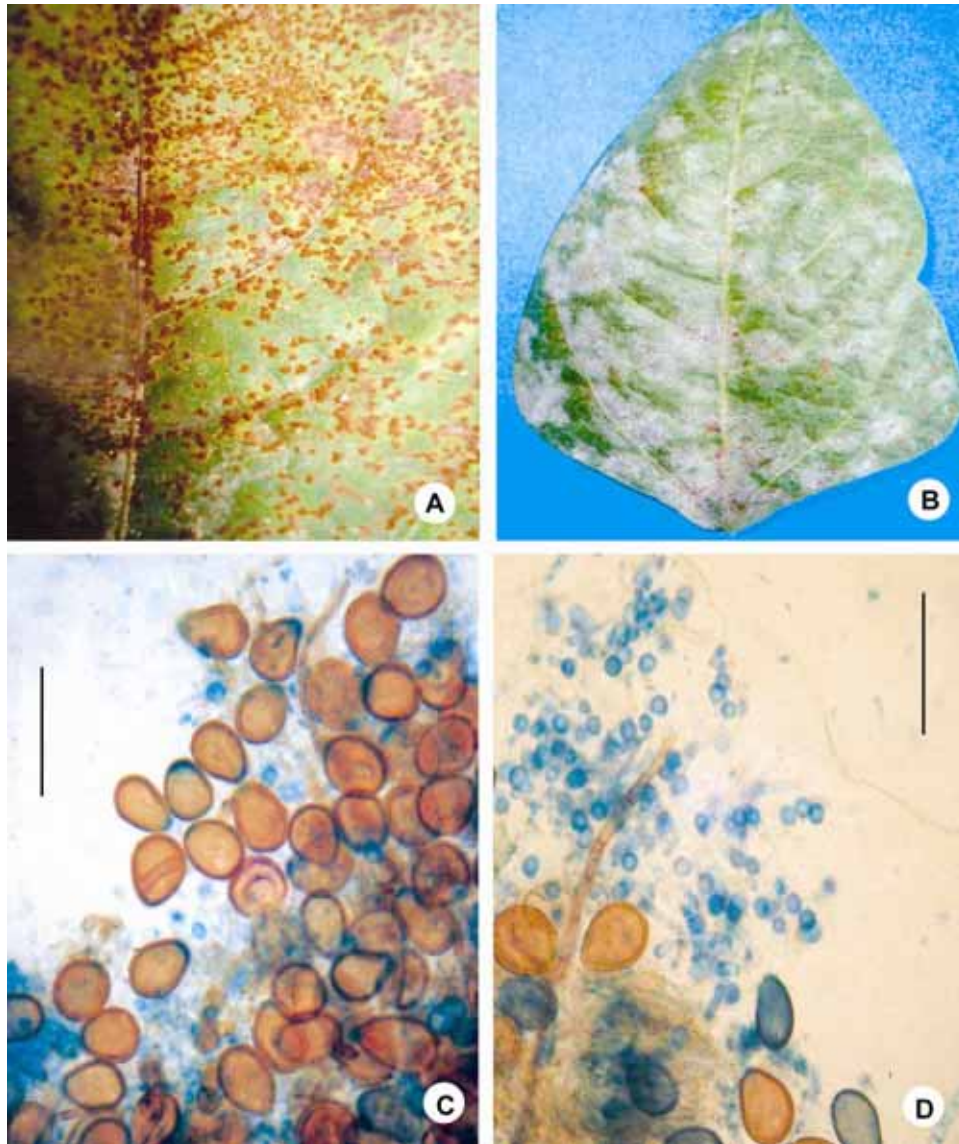


Fig. 2. A. Rusty pustules of *Uromyces appendiculatus* on *Vigna sinensis*. B. Rust pustules suppressed by *Tuberculina persicina* colonies. C. Urodeospore of *U. appendiculatus* and D. Urodeospores of *U. appendiculatus* suppressing by *T. persicina*. (Bar = 50 μ m).

fungi should be treated as smuts, rusts, ascomycetes or hymenomycetes or hymenomycetes, the genus presently is assigned mostly to the fungi imperfect because no stages of sexual reproduction are known. *Tuberculina* are characterized by the formation of hemispherical lilac to violate sporodochia. They consist of palisade-like arrangement, short, moderately thick conidiogenous cells, each of which bears one globose, smooth conidium at the tip. The sporodochia break through the

surface of higher plants and emit a powdery mass of the conidia.⁽⁴⁾ In addition, *Tuberculina* is known to exist only in association with rusts as first postulated by Saccardo.⁽⁵⁾ In Bangladesh *T. persicina* was found associated with rusty pustules of *Puccinia thwaitessi* Ber.⁽⁶⁾

In the present study *T. persicina* was found associated with teliosorus and teliospores and plant cells infected with rust fungi. The hyphae of *T. persicina* grew between teleospore making contact with them and finally causing degradation of affected spores. The hyperparasite was occasionally seen to penetrate the plant tissue and appeared to cause rapid killing of plant cells infected with rust. The destruction of teliospore by *T. persicina* is probably the result of fungus enzymes action. At maturity pustules of *P. thwaitessi* were entirely surrounded by *T. persicina*. Teliospores of the rust fungi were completely destroyed by mycoparasite (Fig. 1A-D).

During the third week of January 2009, leaflets of *Vigna sinensis*, were severely attacked by rust fungus *Uromyces appendiculatus*. The fungus is a biotrophic pathogen with an autoceous, macrocyclic life cycle. The most common symptom is small (up to 2 mm) reddish-brown raised pustules (uredinia) on both surfaces of the leaf-lets. Numerous pustules covered the entire leaflets. The leaflets collapses turning yellow, drying out, and dropping prematurely. From 27 January, 2009 *T. persicina* started to infect the leaflets and within seven days it destroyed uredosorus of the rust fungi. Sporodochia of *T. persicina* was ruptured near the rust sorus and gradually destroy the uredosorus of *U. appendiculatus*. (Fig. 2A-D).

At late stage plants completely died. This investigation reveals that along with *Trichoderma* spp. and *Trichothecium roseum*, *Tuberculina* spp. are playing significant role in nature as biocontrol agents. This study is an excellent examples of mycoparasitism.

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