

A contribution to Uredinales of Northern areas of Pakistan

***Muhammad Asim Sultan¹, Ikram-ul-Haq¹, A.N. Khalid²
and Hamid Mukhtar¹**

¹*Department of Botany, G. C. University Lahore, Pakistan and* ²*Department of Botany, University of the Punjab, Lahore, Pakistan.*

*E-mail: asim418@yahoo.com

Abstract

During the uredinological survey of Northern areas of Pakistan, *Coleosporium lycopi*, *Puccinia argentata* and *Gymnosporangium clavariaeforme* have been found infecting different plant species. Among these *C. lycopi* and *argentata* are reported for the first time from Northern areas of Pakistan. With this addition, the rust flora of Northern areas of Pakistan amounts to 83 taxa.

Keywords: *Coleosporium*, *Gymnosporangium*, *Puccinia*, Northern Areas of Pakistan, rust fungi

Introduction

The term Rust is used to designate a group of fungi as well as the rust-colored symptoms of the diseases resulting from these fungi (order Uredinales). More than 7000 species of rust fungi distributed into 14 families and 163 genera are known world wide (Kirk *et al.* 2001; Anonymous, 2005).

These are distributed all over the world and are most diverse in the tropics. Rusts are most prevalent obligate parasites of many vascular plants and attack nearly all kinds of plants i.e. ferns, gymnosperms and various primitive and advanced families of monocots and dicots (Laundon, 1965; Hennen and Buritica, 1980).

The Northern Areas of Pakistan are well known for their biodiversity. Most parts of Northern Areas lie within the watersheds of the Himalaya, Hindukush and Karakoram mountain ranges. The main watershed runs southwards, draining into the river Indus. Climatic conditions vary widely in the Northern areas ranging from the monsoon-influenced moist temperate zone in the western Himalaya, to the semi-arid cold desert in the Northern Karakoram and Hindu Kush (Sugong, 1990; Jacobose, 1993; Government of Pakistan, 1994).

The Northern Areas of Pakistan have not been thoroughly surveyed uredinologically and only a few rust records have been published to date (Ahmed, 1956; Gjaerum and Iqbal, 1969; Kaneko, 1993; Ahmed *et al.*, 1997; Sultan *et al.*, 2006).

This paper documents rust fungi collected from Tatu-Fairy Meadow Track, Nalter and Byal Camp of northern areas of Pakistan during July-September, 2001-2003. The host plants are common in Hazara, Gilgit, Murree, Dir, Chitral, Swat and Kashmir and

found growing from an altitude of 2000-8000 (Stewart, 1972).

Description of taxa

1: *Coleosporium lycopi* H. et P. Sydow, 1913.
= *Coleosporium campanulaeb* H. et P. Sydow.
Plate: 1, A-C

Spermogonia and aecia not found. Uredinia hypophyllous, cup shaped, yellow-orange, grouped or scattered, pulverulent; urediniospores globose, subglobose, oval, ellipsoid, hyaline, densely annulate verrucose, 21-26 × 16-18 μm. Telia not found.

On *Campanula benthamii* Wall. from roadside near Nalter Valley, August 30, 2003, I, # AS 06.

The Uredinial stage of this fungus has already been reported by Ahmed (1956a), Joerstad and Iqbal (1967) and Kaneko *et al.* (1990) from Kaghan Valley, Pakistan on *Campanula cashmeriana*, *C. colorata* and *C. benthamii*. This fungus is first time reported on *C. benthamii* from Nalter, Northern Pakistan.

Spermogonial, aecial and telial stages of this fungus have not so far been reported from Pakistan.

2: *Puccinia argentata* (Schultz.) Wint. In Hedwigia 19 : 38, 1880.

Plate: 1, D-E

Spermogonia and aecia unknown. Uredinia hypophyllous, scattered, on yellowish spots, pulverulent and irregular in shape. Urediniospores globose, broadly ellipsoid, finely echinulate, yellowish brown, 21-27 × 18-23 μm. Telia similar to uredia but dark brown. Teliospores ellipsoid or subclavate, rounded at both ends, apex provided with a colorless papilla, hardly constricted at septum, smooth, pale brown, 30-35 X 21-24 μm, pedicel

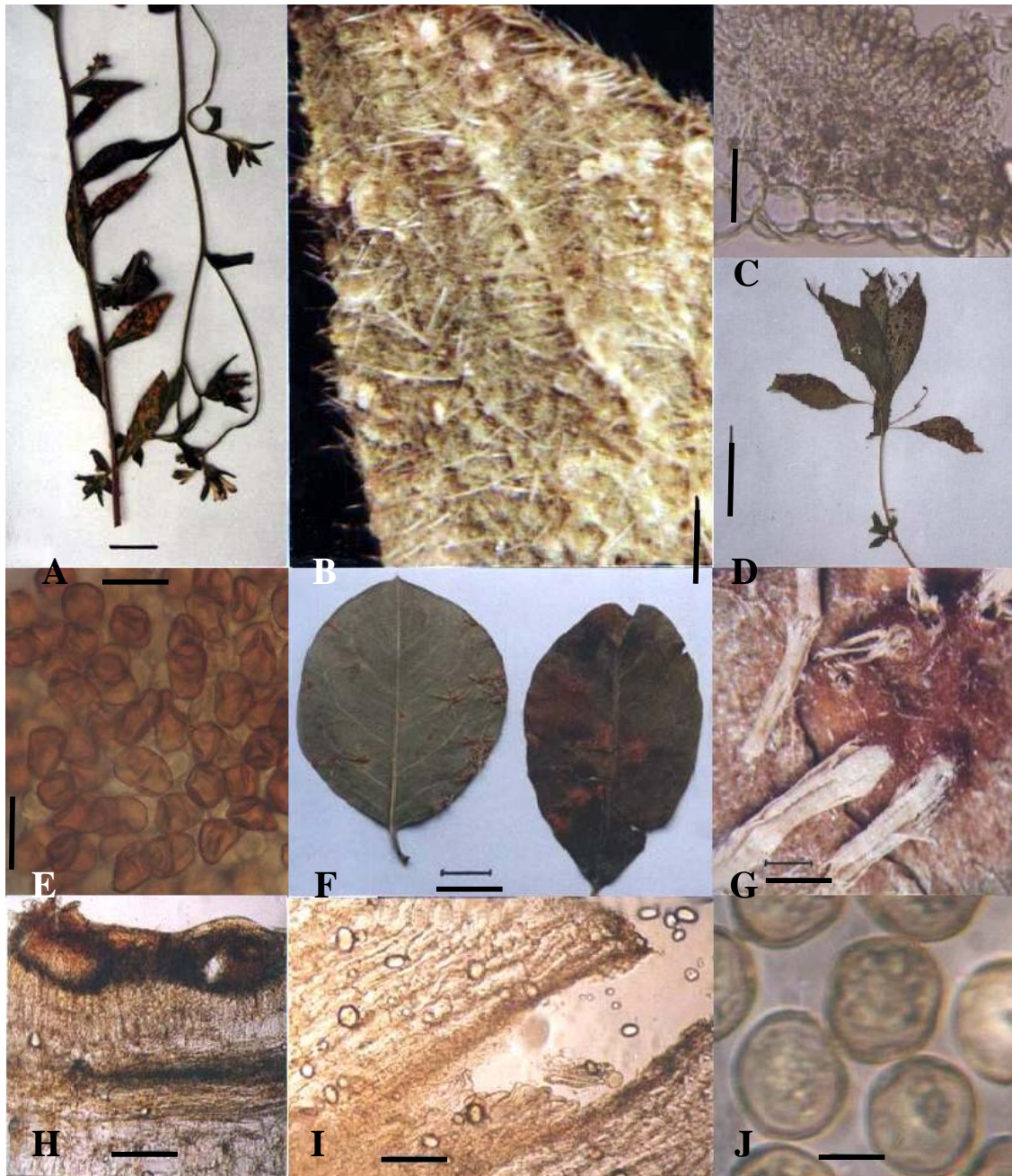


Plate: 1 **A:** Infected *Campanula benthamii*. Bar = 4cm. **B:** Close up infected leaf showing scattered and grouped uredia. Bar = 1.0cm **C:**, Cross section of infected leaf showing uredinium containing urediniospores. Bar = 56 μ m. **D:** Infected *Impatiens brachycentra*. Bar = 3cm. **E:** Cross section of infected leaf showing urediniospores and teliospores. Bar = 56 μ m. **F:** Infected *Cotoneaster bacillaria*. Bar = 2.0cm. **G:** Close up of infected leaf showing horn like aecium. Bar = 0.12cm. **H:** Cross section of infected leaf showing Pycnia. Bar = 116 μ m. **I:** Cross section of infected leaf showing Roestelia type aecidium. Bar = 152 μ m. **J:** Aeciospores. Bar = 28 μ m.

hyaline and short.

On *Impatiens brachycentra* Kar. & Kir., from Fairy Meadow- Byal Camp, Northern Pakistan July 22, 2001, II and III, # AS 14.

According to Wilson and Henderson (1966) spermogonia and aecia of *Puccinia argentata* are confined to *Adoxa moschatellina* while uredia and telia are confined to *Impatiens* spp.

This fungus has already been reported from Swat Valley, Pakistan on *Impatiens brachycentra* by Ahmed (1956a) but first time reported from Northern areas of Pakistan.

The spermogonial and aecial stages have not so far been reported from Pakistan.

3: *Gymnosporangium clavariaeforme* (Jacq.) DC., Fl. Fr. 2 : 217, 1805.

Plate: 1, F-J

Spermogonia epiphyllous, subcuticular, 138-182µm high and 145-184µm wide. Aecia amphigenous, mostly hypophyllous, 562-570µm high and 263-280µm wide, Roestelia-type; aeciospores globose, broadly ellipsoid, subglobose, oval, minutely verrucose, 24-31 × 24-26 µm, yellowish brown and germ pores scattered. peridial cells rugose. Uredia wanting and telia not found.

On *Cotoneaster bacillaris* Wall. from Tatu valley, Northern areas of Pakistan July, 21, 2001, O and I, # AS 07.

This fungus has already been reported from AJ&K and Swat, Pakistan on *Cotoneaster integerrima*, *C. nummularia* Fisch. and Meg. and *Crateaeagus oxyacantha* L. by Ahmed (1956a,b).

Kaneko (1993) also reported it on *C. bacillaris* from Diامر, Northern Pakistan.

The aecial stage is confined to members of the family Rosaceae. Uredia are wanting in all species of *Gymnosporangium* except one, telia are found on members of Juniperaceae and Cupressineae (Arthur, 1934; Ahmed, 1956a).

This fungus is first time reported from Tatu Valley, Northern areas of Pakistan. However, no telia were found during the present study.

Acknowledgement

We sincerely thank Prof. Dr S.H.Iqbal, Herbarium, Department of Botany University of the Punjab for his help in identification of rust fungi and his valuable comments for improving manuscript. We extend our thanks to Mr.A.R.Niazi Department of Botany University of the Punjab for helping in Lab work.

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