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## New Record of *Phakopsora arthuriana* on *Jatropha curcas* L. in Thailand

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The rust *Phakopsora arthuriana* was collected on *Jatropha curcas* L., commonly called Physic Nut or Barbados Nut, from northern Thailand. The identification was based on the morphology of uredinial stage. This is the first report of this rust fungus in Thailand where *J. curcas* L. is often cultivated as a biofuel crop.

**Keywords:** Rust Disease, *Phakopsora arthuriana*, Physic Nut, *Jatropha curcas*

### Introduction

Physic nut (*Jatropha curcas* L.) is now being cultivated in industrial plantations in many countries. The seeds suitable for biodiesel production because it's contain 31-37% oil content (Gubitz *et al.*, 1999; Heller, 1996). *Jatropha* biodiesel was produced from physic nut seed. When this fuel is not polluted in the atmosphere, because the product from combusted is carbon dioxide (Heller, 1996).

The rust fungi are very interesting organisms in terms of biology. The information about the diversity of rust fungi in Thailand is still not complete, and presently only few species have been reported. Rust disease of *Jatropha curcas* caused by *Phakopsora arthuriana* Buriticá and Hennen (Hennen *et al.* 2005) belongs to the phylum Basidiomycota, class Pucciniomycetes. It is characterized by uredinia hypophyllous, occasionally epiphyllous, in small groups opening by a pore, surrounded by numerous not septate paraphyses that project outside the host; urediniospores, ellipsoid, to obovoid, sessile, closely and finely echinulate, germ pores obscure; telia hypophyllous, subepidermal in origin, closely around the uredinia; teliospores irregularly arranged, cuboid, ellipsoid to polygonal (Hennen *et al.* 2005)

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## **Materials and methods**

### ***Survey and collection the rust fungi in Chiang Mai Province***

Rust fungi sample was collected from different locations and Record information including: host plant name, location and collection date.

### ***Isolates and Morphological studies***

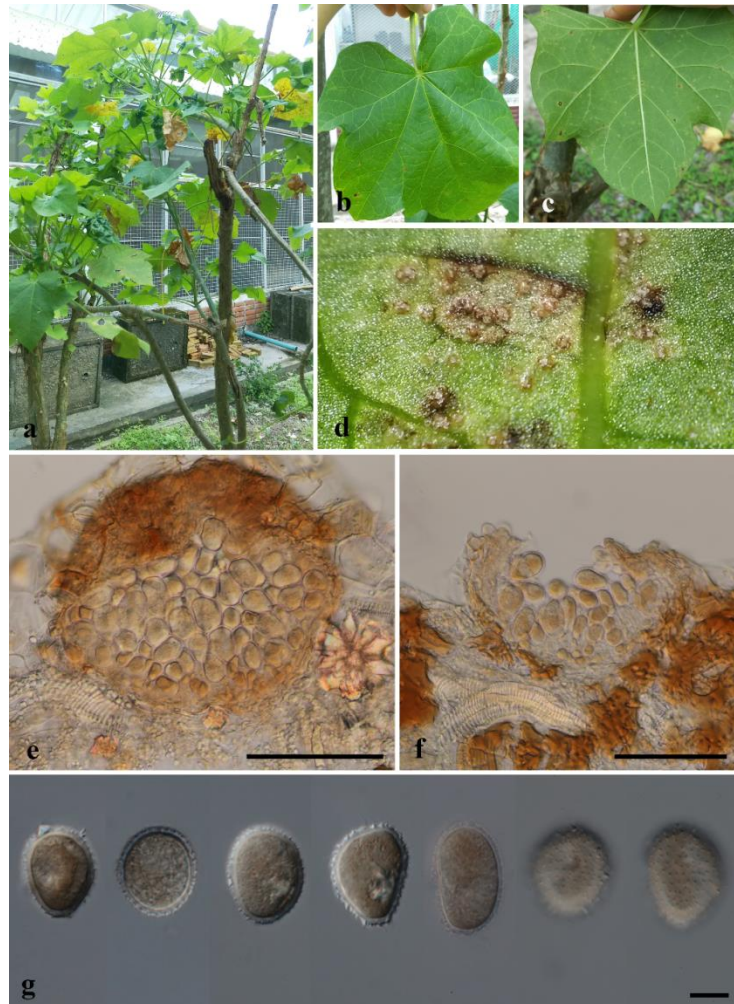
Specimen with rust disease symptoms was collect in the field and taken to the laboratory. Infected leaves were examined directly under a stereo microscope to observe. Sections through infected leaves, mount in lactoglycerol, the rust fungal structures and host tissue was gently heated to aid soaking. Examined the reparations with compound microscope. The cell was used to measure spores and details of the spore ornament. Measurements comprise the size range and the arithmetic mean for usually 40–50 but at least 30 spores.

## **Results**

The symptoms manifest in the leaves, initially in the form of small chlorotic points on the upper surface, which correspond to the underside of the leaf, and then small protruding pustules, which after breaking, release a powdery mass of uredospores, giving a ferruginous aspect. In severe infections, pustules coalesce to form necrotic spots, which are reddish brown and irregularly shaped and can destroy the leaf. Uredinia subepidermal in origin, erumpent, with peripheral paraphyses, incurve  $175\text{--}255 \times 75\text{--}150 \mu\text{m}$ . Urediniospores are almost sessile, obovoid to broadly ellipsoid, spore borne singly, wall echinulate, brownish,  $22\text{--}32 \times 17\text{--}21 \mu\text{m}$ .

## **Discussions**

The first report about rust disease in *Jatropha curcas* caused by *Uredo jatrophiicola* Arthur was described (Arthur, 1915). In Brazil, this disease was first found in 1936 in São Paulo (Viégas, 1945). In 1996 Buritica and Pardo was reported on *J. curcas* in Columbia (Buritica and Pardo, 1996). In 1998 Pardo was reported on *J. gossypifolia* in Columbia (Pardo, 1998). In 1999 Buritica also reported this fungus on *J. angustifolia* and *J. gossypifolia* in Cuba, on *J. canescens* in Mexico (Buritica, 1999). In 2002 reported on *J. gossypifolia* in Columbia (Salazar *et al.*, 2002). In 2005 Hennen also repoted on



**Figure 1** *Phakopsora arthuriana*. (a) Host *Jatropha curcas* L. in leaf, (b-c) Symptom of rust fungi on upper and lower leaf surface, (d) Uredinia on the lower surface of leaf, (e-f) Uredinium in section (bar = 30 µm), (g) Urediniospores (bar = 10 µm)

*J. canescens*, *J. curcas*, *J. gossypifolia*, *J. pohliana* and *Jatropha* sp. in Brazil. The fungus that causes this disease was previously classified as *Phakopsora jatrophiicola* Arthur and Cummin; however, it was reclassified as *Phakopsora arthuriana* Buritic á & Hennen (Hennen *et al.* 2005). In 2005 was reported in *J gossypifolia* in Guyana (Hernandez *et al.*, 2005). In 2006 Piepenbring was reported on *J gossypifolia* in Panama (Piepenbring, 2006). Currently, it is widely spread throughout Brazil and several other countries in South America. (Dias *et al.* 2007)

Physic Nut have the origin in Middle America and comes to Thailand by Portugal's merchant to extract oil from its seed. Nowadays Physic Nut can grow everywhere in Thailand. (Chansuwan, 2008)

Spermogonia, aecia and telia unknown. Uredinia subepidermal in origin, erumpent, with peripheral paraphyses, incurve,  $62.5\text{--}85 \times 125\text{--}200 \mu\text{m}$ . Urediniospores are almost sessile, obovoid to broadly ellipsoid, spore borne singly, wall echinulate, brownish,  $22\text{--}27 \times 13\text{--}20 \mu\text{m}$  as previously reported by (Hennen *et al.* 2005)

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