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Original Research Article

Rust Disease of Teak Leaf Caused by *Olivea tectonae* in Jabalpur, India

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A b s t r a c t

This study showed the occurrence of teak leaf rust *Olivea tectonae* on *Tectona grandis* tree in Jabalpur region, India. This rust severely affects the leaves of teak plants and damages the activity of leaves. In this region this rust was found in abundance and it is very harmful for this precious host plant. Occurrence of this rust in this region is a gesture of a great loss of *T. grandis*, which is very useful plant for human beings. The severely infected teak plant may die and causes loss to our environment directly as loss of these trees are harmful to the environment. This plant has the capacity to absorb green house gases, which pollute the environment also, the amount of oxygen gas, released by these plants during photosynthesis, is affected.

K e y w o r d s

Abundance

Olivea tectonae

Teak leaf rust

Introduction

Teak (*Tectona grandis* L.f.) was found in India and China (Gradual et al., 1999). It is also found in Burma and Thailand. It is fairly adaptable but grows best in warm, moist tropical climate with plenty of rain. Teak trees need plenty of space, light and a good soil. They are often found near rivers and can grow enormously tall.

Teak trees are economically beneficial for men. It is used to manufacture furniture, boat decks and other articles. In ship building teak is practically irreplaceable due to its resistance to sun, heat, cold, rain and sea water (Cabral et al., 2010).

Teak leaf rust, is caused by *Olivea tectonae* (Ramakr. & Ramakr, 1949). Indian teak trees were grown for its beautiful wood. Although historically this rust was known throughout Asia, and has recently been discovered in the Caribbean, Central America and Australia on cultivated teak trees (Perez et al., 2008). The fungus was collected on a teak plant of more than 15 years old in Jabaplur region. Jabalpur is located at 23°-10'to24°-5´N latitude and 79°-56'to 80°55´E longitude. It has an average elevation of 411 meters (1,348 feet) from mean sea level. It has a humid sub-tropical climate, typical of North-Central (Madhya Pradesh and Southern Uttar Pradesh) India.

The symptoms of this rust were observed on upper surface of the leaves as grey to brown necrotic areas. In more severe condition the lesions enlarged and coalesced and form large necrotic areas. The necrotic areas corresponded to many subepidermal areas of erumpent uredinia on the leaf surface. The lesions were also observed on twigs of the plant. In severe condition, the growth and production ability of host plant affected and sometimes the plant die.

Materials and methods

On the basis of vegetational composition and climate, floristically rich site of Dumna air port area of Jabalpur, was selected for the collection of rust fungi. The infected specimens were collected monthly from the selected site from September, 2014 to April, 2015. Since, most of the rust fungi are prevalent in winter season, several collections were made during this season. The infected materials (Fig. 1) were collected in brown paper bags on the spot and brought to laboratory for further studies.

The specimens were also preserved in formalin, absolute ethanol, acetic acid and water at the ratio of 10:49:2:39 (Soni et al., 2011) for further study. Thin micro-sections were cut with the help of razor blade and stained with lactophenol cotton blue reagent (Pagvi and Singh, 1969). By using light microscope the morphology of spores were examined. Permanent slides were made using DPX mounting medium and identified with the help of published literature and confirmed by consulting several experts, working on the rust fungi in TFRI, JNKVV, Jabalpur (M.P.).

Results and discussion

The symptoms of this rust was observed on upper surface of the leaves as grey to brown necrotic areas. In more severe condition the lesions enlarged and coalesced and form large necrotic areas. The necrotic areas corresponded to many subepidermal areas of erumpent uredinia on the leaf surface. The lesions were also observed on twigs of the plant. In severe condition, the growth and production ability of host plant affected and sometimes the plant die.

The microscopic study showed that Uredinia paraphyses, urediniospores produced singly, pedicillate, 18.0-26.0 ×16.0-21.0 µm. in size. The urediniospores were produced singly on a pedicle, subglobose, mostly hyaline, brown to grey. Teliospores were not found (Fig. 2).

O. tectonae is known throughout Asia; mainly in Bangladesh, Myanmar, China, India, Indonesia, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam (Boedijn, 1959; Lorsuwan et al., 1984; Kobayashi and Guzman, 1988; Kaneko et al., 2007).

Recently the fungus was identified in Australia, Central America (specifically in Cuba, Mexico, Costa Rica and Panama) (Arguedas, 2004; EPPO, 2005; Daly et al., 2006) and South America (Ecuador) (EPPO 2005). *Chaconia tectonae* Ramakr. & Ramakr. 1949 (as *Olivea tectonae*) is valid as an anamorph combination. Minnis et al. (2008) discussed the problem with the nomenclature of this species and proposed to conserve the name *O. tectonae*. It is possible that the pathogen arrived in this region from abroad via spores being carried by wind.

Fig. 1: Leaf of teak showing symptoms of teak leaf rust disease (*O. tectonae*). Patches of rust spores. Uerdiniospors present on the upper surface of leaf.

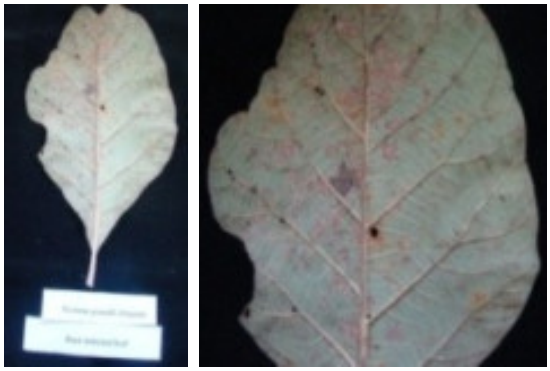
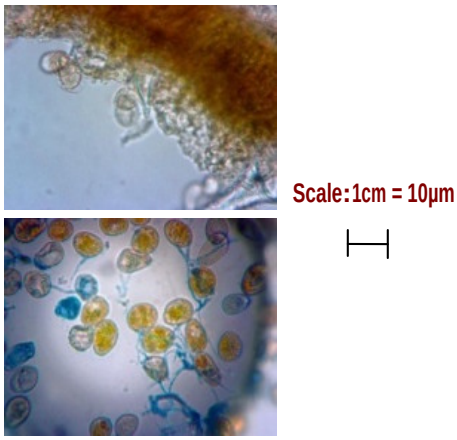


Fig. 2: (a) Uredia, urediniospores and uredial paraphyses. (b) Subglobose and ellipsoid uredospores.



Conclusion

The work showed that the rust caused by *O. tectonae* is very dangerous for teak plant. Sometimes after severe infection lots of teak plants may die, and this is not good for our environment, because the teak plant can absorb CO_2, CO, HNO_3, CFC, SO_2, SO_3 etc. gases from the environment which are called harmful gases and pollute the environment. The oxygen percent in air also decreases as this plant may die. So it is necessary to protect the teak plant from such fungal infection and save our environment.

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