WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.990
Volume 4, Issue 5, 1941-1947. Research Article ISSN 2277– 7105

# A NEW WILT AND ROOT ROT DISEASE OF *PTEROCARPUS MARSUPIUM* IN CENTRAL INDIA

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Article Received on
02 March 2015,

Revised on 25 March 2015,
Accepted on 15 April 2015

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## ABSTRACT

A new wilt and root rot disease of *Pterocarpus marsupium* caused by *Fusarium solani* in nursery at Jabalpur, Madhya Pradesh is reported. The average disease occurrence during rainy season (July-September) in central India is 13.2%. Application of fungicide (0.1% ridomil) and managing moisture content of soil during rainy season fully control the disease.

**KEYWORD:** *Bija sal, nursery disease, Fusarium solani, ridomil.*

## INTRODUCTION

Bija-sal (*Pterocarpus marsupium* Roxb.) is also known as Vijaysar in India and Indian Kino in foreign countries. It is native to India, Nepal and Sri Lanka. In India it occurs in parts of the Western Ghats in the Karnataka-Kerala region and also in the forests of Central India (Patil et al. 2001). It is used in preparation of many Ayurvedic medicines apart from wooden tumblers for drinking water stored overnight by diabetic patients (Reddy et al. 2008).

The seedlings of the species in nursery beds as well as in polythene containers suffer many diseases (Sehgal, 1983) causing mortality and affecting the health and vigour of plants (Harsh and Gupta, 1993; Harsh et al., 1992). Root rot caused by *Fusarium* spp. are common in forest nurseries in moist as well as dry climates. Root rots were recorded in *Eucalyptus glogulus*, *Eucalyptus* hybrid, *E. tereticornis* (Jamaluddin et al., 1997), *E. grandis* and *E. tereticornis* (Sharma et al., 1985), *Acacia* spp. (FAO 1981), *A. auriculiformis* and *A. nilotica* (Bagchee 1945), *L. leucocephala, Sesbania, Ailanthus triphysa* (Sharma et al., 1985). Root diseases caused by *Rhizoctonia solani* (Mohanan, 1999), *Macrophomina phaseolina*, *Sclerotium*

*rolfsii* (Jamaluddin et al., 1997) *Fusarium solani* (Bagchee 1945, 1958) *Fusarium oxysporum* and *F. moniliforme* var. *subglutinans* (Bandara 1987), *Cylindrocladium curvatum* (Sharma et al., 1985) were also reported. In *Pterocarpus marsupium* many diseases were recorded for example, leaf blight by *Sclerotium rolfsii* (Mohanan et al., 2005; Mohamed, 1993), leaf spot by *Glomerella cingulata* (Nair et al., 1991) but root rot by *Fusarium solani* was not reported, therefore, it constituted a new record from central India.

## MATERIAL AND METHOD

### Study area

Tropical Forest Research Institute, Jabalpur is situated between 23°5'37" to 23°6'10"N latitude and 79°59'49" to 79°59'42"E longitude. The area falls under basaltic landscape and the soil texture is more than 55% clay content (Totey and Gupta, 1993).

### Collection of sample

The seedlings of bija-sal were raised by forest biotechnology and genetic division, at Tropical Forest Research Institute, Jabalpur and some of them were found to have been affected by root rot. The samples were collected in third week of July, 2014. The wilt and root rot affected seedlings were carefully observed in seed beds inside the green house or from the groups of seedlings placed in open area outside the green house in polyethylene bags and counted (Fig. 1). The pathogen was isolated from disease affected roots (Fig. 2) on potato dextrose agar (PDA) medium. After 5 days of incubation at 28±2°C, whitish wooly growth of fungal colony appeared in Petri dishes.

### Identification of pathogen

Diagnosis and identification of causal organism were done in laboratory. The culture of pathogen is deposited in the mycology culture collection, Tropical Forest Research Institute, Jabalpur under Acc. No. TFC59 while the dried specimen studied was deposited in the Mycology Herbarium, of the institute with Acc. No. 3843 on 21.7.2014. The pathogen was identified after cultural and microscopic study and by consulting literature (Booth, 1971 and 1977, Nagmani et al., 2006; Verma et al., 2008).

### Pathogenicity test

The pathogenicity was proved as per Koch's postulates by inoculating the healthy seedlings with fungal spore suspension. The spore suspension of pathogen was prepared ($4\times10^3$cfu/ml) from 15d-old culture and each replicate of 30 healthy seedling having 6-8 cm height was

poured on the soil with 25 ml of fungal spore suspension. The same pathogen was re-isolated from inoculated affected seedlings in pure form and identified as *Fusarium solani*.

**Control**

The seedlings were fortnightly treated with 0.1% ridomil (ridomil Gold, Make Syngenta) and controlled watering schedule to avoid excess soil moisture during rainy season for management of the disease.

## RESULTS AND DISCUSSION

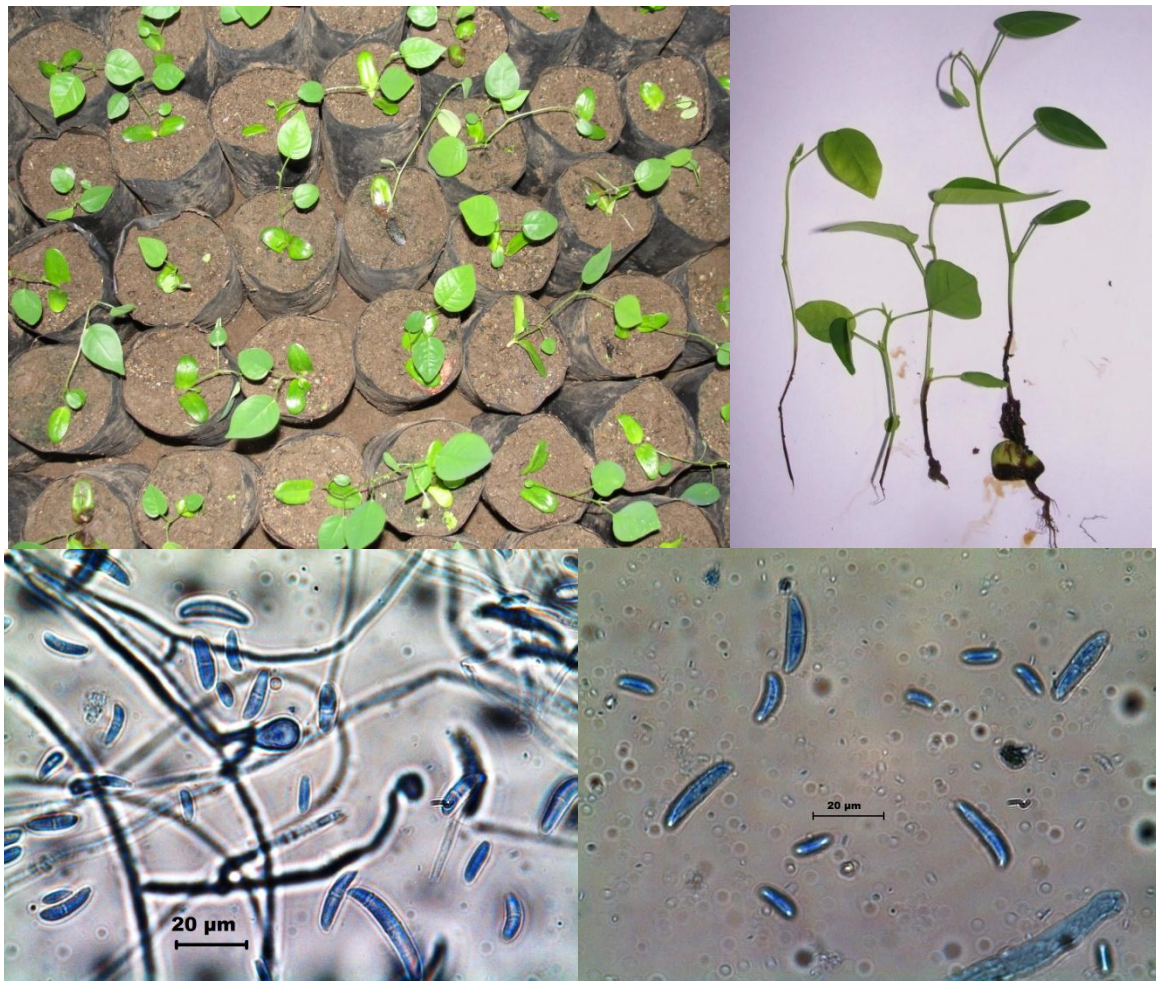
The causal organism of bija-sal root rot was identified as *F. solani* as follows Mycelium striate, sparse, floccose, grey white agar develops brownish pinkish discoloration. Micro-conidia develop abundantly after 2-3 days, aseptate hyaline 8-15 x 3-5 µm phialide 40-70 x 2.5-3 µm. macroconidia develop after 4-7 days from short multibranched conidiophores, which may form sporodochia, fusoid, 1-3 septate, 28-38 x 5-8 µm. Chlamydospore develop after 7-14 days, globose oval, smooth rough walled terminal or intercalary (Figs. 3-4).

The affected seedlings showed root rot and damping off symptoms just after one month of seed germination. The disease was controlled by fortnightly drenching of soil with fungicide, 0.1% ridomil and managing excess soil moisture around root zones of seedlings during rainy season. Damage caused the disease ranges from 3 to 33% in different beds which was on average 13.2% at Jabalpur, Madhya Pradesh (Table 1).

*Fusarium oxysporum* has been reported on several tree seeds where it causes seed decay, germination reduction and seedling wilt (Ali and Sharma, 1996). Singh et al., (2002, 2003), Soni et al. (2005) recorded 8-15 percent incidence of wilt disease in *Dalbergia sissoo*, *Tectona grandis*, *Gmelina arborea* and *Buchnania lanzan* seedling. A new vascular wilt by *Fusarium solani* causing 2.5 – 16% damage in nurseries of aonla (*Emblica officinalis*) and its management was also reported (Soni and Verma, 2010). Recently a new disease of another important medicinal plant, maida chhal (*Litsea glutinosa*) has been reported from central India (Verma and Verma, 2015). The disease is reported as new disease record from India.

**Table 1. Occurrence of wilt and root rot disease of bija sal in nursery**

| Bed/group No. | Total number of seedlings examined | Root rot affected seedlings | Disease % |
|---|---|---|---|
| 1. | 20 | 3 | 15.0 |
| 2. | 15 | 2 | 13.3 |
| 3. | 25 | 4 | 16.0 |
| 4. | 10 | 2 | 20.0 |
| 5. | 10 | 1 | 10.0 |
| 6. | 15 | 5 | 33.3 |
| 7. | 40 | 2 | 5.0 |
| 8. | 18 | 3 | 16.7 |
| 9. | 22 | 4 | 18.2 |
| 10. | 30 | 1 | 3.3 |
| **Avg.** | **20.5** | **2.7** | **13.2** |




**Figs. (1-4) Wilt and root rot of *Pterocarpus marsium* seedlings in nursery. (1-2) affected seedlings showing root rot symptoms caused by *Fusarium solani*, (3) mycelium conidia and chlamydospore, micro and macro conidia of the pathogen.**

## CONCLUSION

A new nursery wilt and root rot disease of bija sal is recorded for the first time which cause damage up to 13.2% and can be controlled by application of fungicide (0.1% ridomil) and managing moisture content of soil during rainy season.

## ACKNOWLEDGEMENT

Authors are thankful to Dr. U. Prakasham, Director TFRI Jabalpur for providing necessary facilities during course of study and Head, Genetics and Plant Propagation Division for providing bija sal seedlings for the study.

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