

STUDIES ON DISEASES OF INDIAN MEDICINAL PLANTS-IV

BY

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An account of rust disease (*Ravenelia emblica* Syd.) of Amla (*Embelica officinalis* Gaertn.); leaf rust (*Aecidium adhatodae* Syd.), leaf spot by *Septoria adhatodae* Chona and Munjal of Vasaka (*Adathoda vasiea* Nees); and root rot (*Sclerotium rolfsii* Sacc.), leaf blight (*Alternaria alternata*) of datura (*Datura innoxia* Mill, *D. stramonium* Linn.) and diseases of *Solanum khasianum* is given.

INTRODUCTION

This report is the fourth in the series. The diseases of medicinal plants are listed and a brief description of each of them with control measure practices are presented here.

Amla

Botanical name : *Embelica officinalis* Gaertn.

Family : Euphorbiaceae

It is a native of India, Sri Lanka, Malaya and China. *E. officinalis* is found as wild or cultivated, throughout the greater part of India.

A small or medium sized deciduous tree. The fruit is green when tender changing to light yellow or brick red when mature. The fruit is probably the richest known natural source of vitamin C. It has medicinal value. It is also used for making special preparations of pickles etc.

Rust

Ravenelia emblica Syd.

The rust appears to be first reported by Cooks (1880 a, b.) under the name *Ravenelia aculifera*. Cunningham (1871) reported the occurrence of a rust which he later in 1889 identified as *Ravenelia emblica* and considered *R sessilis* to be

the synonym of *R. emblica* Syd. Only the uredostage has been observed by Sydow and Butler (1906). Uredosori are produced on both the surface of leaves. They are circular to semicircular, red in colour, 2-5 mm in diameter, solitary gregarious. The uredosori rupture the epidermis and uredospores are exposed. The paraphyses are ellipsoid to oblong, with apex rounded to acute, finely echinulate, light brown, measuring $25-35 \mu\text{m} \times 8-12 \mu\text{m}$. Teleutospores have not yet been found. No further information is available.

Besides *R. emblica*, *Phakopsora phyllanthi* Dist has also been reported. The fungus was previously described from *Phyllanthus disticus* by Sydow and Butler (1912).

Vasaka

Botanical name : *Adhatoda vasica* Nees

Family : Acanthaceae

A small ever green shrub, occurring throughout the plains of India and sub-Himalayan range.

A. vasica is used for preparation of some well known drugs in the Ayurvedic medicine and used for a variety of ailments such as bronchitis, asthma, fever and jaundice. Syrup preparations containing extract of vasaka leaves are used as expectorant.

Leaf-rust

Accidium adhatodae Syd.

This disease was first noted on leaves of basak in Dehra Dun by Butler (1904) and was described by Sydow and Butler (1906). The aecidium is found on the undersurface of leaves, where it forms densely crowded round to orbicular spots, 2-5 mm in diameter. The aeciospores are liberated by the rupture of the epidermis. They are cut off in chains angularly globose, finally verrucose, greyish and $16-20 \mu\text{m}$ in diameter.

The disease does not appear to be serious in any way and the life history of the fungus is now known.

Greasy rust

Chnoospora butleri Diet and Syd,

Greasy rust was collected by Butler from Dehra Dun and was described by Sydow and Butler in 1906. Only the teleutospores have been found. They are hyphophy-

lous and cinnamon coloured although the corresponding area on the undersurface may appear yellowish. The teleutospores are cylindrical to clavate, single celled, rarely two celled, grey coloured, measuring $30-35\ \mu\text{m} \times 10-15\ \mu\text{m}$. An account on the report of occurrence of this fungus on the host is noted. No other information regarding the disease is available.

Leaf spot

Septoria adhatodae Chona and Munjal

The fungus has been described by Chona and Munjal (1955), on living leaves of basak collected from New Delhi. The fungus produces dark brown slightly raised irregular spots measuring 5-10 mm in diameter. The spots appear on both the surfaces of leaves and at first isolated but later on coalesce with each other, covering large areas which when mature have ash coloured centres. The pycnidia appear as small dots. They are sub-epidermal, thick-walled, globose, dark-septate, rarely 2-3 septate, and $50-63\ \mu\text{m}$ in diameter. The pycnidiospores are hyaline, one septate, rarely 2-3 septate, variously curved cylindrical, ends rounded or bluntly pointed and measure $18-40\ \mu\text{m} \times 3.5\ \mu\text{m}$.

The pathogenicity of the fungus has not been established. The disease has not been investigated in detail.

Mosaic

This disease was reported by Verma (1974). The infection is carried only by grafting and confined to *Adhatoda vasica* only. The first infection of the plant occurs on top leaves. Further leaves produced after primary infection invariably show the symptoms. The disease appears as profuse mottling and puckering of leaves.

Datura

Botanical name : *Datura innoxia* Mill. *D. stramonium* Linn.

Family : Solanaceae

All plants belonging to the genus *Datura* are poisonous. There are about 10 species which are found in India, of which *D. innoxia* and *D. stramonium* are important drug yielding species. Scopolamine used as a pre-anaesthetic in surgery and child birth, in ophthalmology and prevention of motion sickness, are being extracted from these two species.

Root rot

Sclerotium rolfsii Sacc. : *Macrophomina phaseolina* (Maubl) Ashby.

S. rolfsii caused 15-20 per cent loss of *D. innoxia* in Jammu in 1967-68. Thakur and Sastri (1970) reported the disease only, no detailed work has been worked out. Similarly Gangopadhyay and Issar (1972) reported the presence of *Macrophomina phaseolina* in root and collar region. No detailed work has yet been carried out for these diseases.

Leaf Blight

Alternaria alternata Fr. Keissler.

Janardhanan and Hussain (1972) reported the disease for the first time from India. Disease caused 90 per cent infection with a serious damage to the crop in 1969 in Jammu.

Disease appears first as water soaked circular spots on the leaves. In advanced stage the spots coalesce, become dull yellow and then turn to light brown due to the death of infected tissue. Concentric rings appear on the dead tissue of the old spots. A single spot on a leaf is sufficient to cause curling of entire leaf in advanced stages of infection.

No detailed work has been done on this disease.

Solanum khasianum

Botanical Name : *Solanum khasianum*

Family : Solanaceae

S. khasianum has recently come into prominence for its high steroidal alkaloid content. Steroidal alkaloid extracted mainly from fruits is used for the production of solasodine, a nitrogen analogue of diosgenin and one of the starting materials for the synthesis of corticosteroids and other steroidal hormones.

Plant is a stout, much branched undershrub upto 1.5 m tall with almost straight prickles. Species is the native of Khasi, Jaintia and Naga hills of Meghalaya and Nagaland and is found to grow upto an altitude of 1850 m.

Diseases

A number of fungal, bacterial and virus diseases have been reported on this host. Among these sclerotial root rot caused by *Sclerotium rolfsii* Sacc. (Upadhyay and

Bordoloi, 1977), wilt caused by *Fusarium oxysporum* (Bordoloi *et al.* 1971), leaf spot caused by *Colletotrichum capsici* (Laxminarayan *et al.* 1977) and mosaic (Verma *et al.* 1972) are important. Recently a leaf spot caused by *Alternaria alternata* causing severe damage has been reported from West Bengal (Hait *et al.* 1983).

The first symptoms of leaf spot caused by *Alternaria alternata* are indicated in the seveling and abaxial curling of young leaves and appearance of yellowish spots at the interveinal regions of mature leaf lamina, which rapidly spread to the entire lamina. This is followed by the development of small necrotic areas. Plant growth is affected and the stunted plants die with defoliation of mature leaves. The disease is most severe and lethal at the beginning of dichotomous branching, which preceedes transition to the flowering stage.

Conidiophores of the pathogen arise singly or in groups, simple or branched, straight or flexuous, sometimes geniculate, pale to mid olivaceous or golden brown, smooth, upto 50 μm long and 3-6 μm thick with 1 or several conidial scars. Conidia are formed in long, often branched chains, oblongate, obpyriform, ovoid to ellipsoidal, often with a short conical or cylindrical beak, sometimes upto, but not more than, one third of the length of conidium, pale to mid-golden brown, smooth or verruculose, with upto 8 transverse and usually several longitudinal or oblique septa, overall length 20-63 (37) μm , 9-18 (13) μm thick in the broadest part, beak pale, 2-5 μm thick.

F. oxysporum has been isolated from infected roots and stem bases of the host. Wilt is significantly higher in transplanting seedlings than in a directly sown crop. It appears particularly in the flowering and fruiting stages with upto 50% death (Bordoloi *et al.* 1971). A similar wilt caused by *Fusarium solani* has recently been reported from West Bengal (Ghose *et al.* 1983).

Wilting has been reported to be severe resulting in death of mature plants. The roots become brittle and brown and xylem vessels also show browning.

At $28 \pm 1^\circ\text{C}$ the pathogen produces thick walled macroconidia (curved, 1-6 septate rounded at the tips 15-85 μm long and 3.5-8.5 μm wide), microconidia (hyaline, one celled, straight or slightly curved, 4.5-12 μm long and 2-6 μm wide) and chlamydospores (5.5-12 μm in diameter, either terminal or intercalary).

A mosaic mottling and stunting of the plants was first observed in Calcutta in 1966 (Verma *et al.* 1972). The virus—a hitherto unknown strain of tobacco mosaic, is transmitted by sap and seed and cause a typical symptoms on *Gynandropsis pentaphylla*, *Heliotropium supinum*, *Kochia indica* and *Solanum* sp. and local lesions on several other hosts. The new strain is serologically related to the common TMV Str.

and has dilution end point between 1 : 100000 and 1 : 1000000, retains infectivity at 100°C and remains viable after 1 year in sap at 25-30°C and in callus cultures at 20-25°C. The virus particles are rigid rod, of 304×15 nm. (Verma *et al* 1972). Rangaraju and Chenulu (1974) described another virus causing mosaic to *Solanum khasianum*. Virus is transmitted by *Myzus persicae*, *Aphis gossypii* and *Rhopalosiphum maidis* at the rate of 50, 30 and 10 per cent respectively. The host range is restricted to Solanaceae only. The purified virus is a flexuous rod measuring 755×15 nm.

A wilt of *S. khasianum* caused by *Meloidogyne incognita* (Kofoid & White) Chitwood has also been reported from West Bengal (Majumdar *et al*, 1977).

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