

## Studies on fungal diseases of *Adhatoda zeylanica* Medic

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### SUMMARY

The present investigation deals with the fungal diseases of *Adulsa* (*Adhatoda zeylanica* Medic). *Adulsa* is an important medicinal plant used in traditional as well as modern systems of medicines. Its major biochemical contents especially in leaves are vasicine and vasicinone *i.e.* alkaloids. These are effective in cold, cough, respiratory diseases, hypertensive activity, asthma, dysentery, rheumatic pains and nervous disability. The fungal diseases are responsible for decrease in amount of alkaloids.

### Key words :

Adhatoda,  
Alkaloids,  
Diseases, DSI,  
Pathogenicity,  
Vasicine,  
Vasicinone

**A**dulsa is an important medicinal plant *i.e.* *Adhatoda zeylanica* Medic belonging to family Acanthaceae. Its leaves are used alone or in combination with other drugs for preparation of expectorants. It is used by Ayurvedic physicians, as it possess important medicinal properties. Leaves are used in rheumatism, gonorrhoea and cough. Dried leaves are used in cigarette preparation, against asthma, diarrhea and dysentery. Flowers improves circulation of blood an useful in bronchitis, ophthalmic and antispasmodic quantities. Roots are diuretic, useful in asthma, vomiting, sore eyes, gonorrhoea and malarial fever. Whole plant is useful in excessive phlegm, snake bite, loss of memory, leucoderma, jaundice, tumors, leprosy, blood impurities, thirsts, heart troubles etc. It is also reported as expectorant (Atal, 1980), abortifacient (Wakhloo *et al.*, 1979) antimicrobial (Doshi *et al.*, 1983) and anticancerous (Kulkarni, 1998). Detailed pharmacological studies were carried out on important biochemical contents of leaves including vasicine and vasicinone as given in Indian Herbal Pharmacopoeia 2002. These are effective in bronchodilatory, respiratory stimulant, hypotensive uterotonic and abortifacient activities. Such commercially important plant is infected by different pathogens *viz.* responsible for decrease in active ingredient *i.e.* vasicine and vasicinone. Hence present investigation has been undertaken to know the fungal diseases.

### MATERIALS AND METHODS

The isolation, purification and identification of fungal pathogens was carried out by the method given by Dhingra and Sinclair (1995). Fresh leaves of *Adhatoda* showing typical zonate necrotic brown spots were collected (Plate 1). Leaves were collected from two

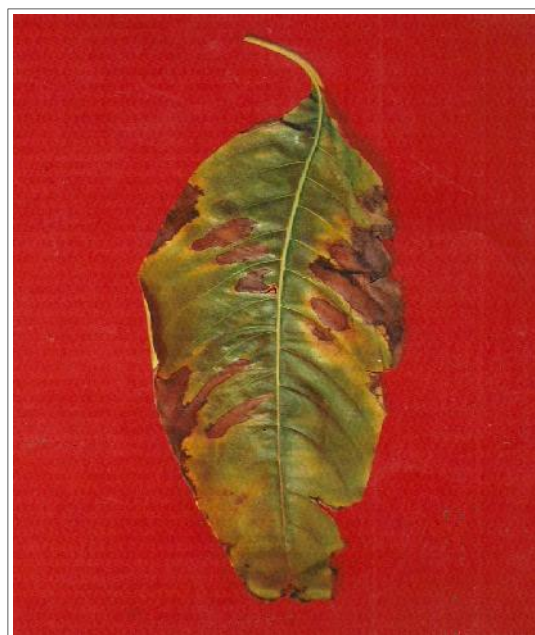


Plate 1 :

districts *i.e.* Parbhani and Nanded in the month of August 2008. Infected leaves were used in the form of bits of 1x2mm from necrotic area for isolation. 20% alcohol and aqueous solution of 0.1% HgCl<sub>2</sub> was used for surface sterilization of leaves. Further leaf bits were

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washed by giving three changes of sterile distilled water to remove traces of alcohol and  $HgCl_2$  and dried on blotter paper. These bits were inoculated on solidified PDA media in Petriplates under aseptic conditions. These plates were incubated at  $27^\circ C$  for 8 days. Well developed mycelial growth was obtained. Pathogens were purified by single hyphal tip method (Dhingra and Sinclair, 1995). These purified pathogens were transferred on to PDA slants for further studies. The different fungal pathogens and diseases were identified by referring standard literature *i.e.* Introduction to fungi by Webster (2007) and Introductory Mycology by Alexopoulos (1962).

Pathogenicity was proved by simple detached leaf technique (SDI) (Mayee *et al.*, 1978). For this purpose well developed leaves were surface sterilized using 70 per cent absolute alcohol and given 4 washings in distilled sterile water. The leaves were placed on moist filter paper in Petriplates in such a way that the dorsal side of the leaflets were exposed to inoculation. Fungal pathogen cultures were applied to the leaves with the help of zero number brush and inoculated leaves were incubated for 7 days at  $27^\circ C$  and then exposed to normal laboratory condition. Periodical watering was done to maintain wetness and turgidity. The inoculated leaves shows the same symptoms from where it was isolated. For the determination of disease severity index (DSI) 5 point scale was used (Mayee *et al.*, 1978). For this purpose, 100 leaves were collected from bottom, middle and top region of the plant and categorized into five groups on the basis of per cent infection *i.e.* 0-25, 26-50, 51-75 and 76-100%, respectively (Plate 2).



Plate 2 :

DSI of two districts *i.e.* Parbhani and Nanded was calculated by using formula and ratings as shown below

$$\text{Disease severity index (DSI)} = \frac{\sum \text{ of all ratings} \times 100}{\text{No. of observations} \times (\text{all ratings} - 1)}$$

## RESULTS AND DISCUSSION

On the basis of culture, characters, reproductive structures and symptoms, the different fungal pathogens and diseases are identified *i.e.* follows:

### *Alternaria alternata* (leaf spot):

The pure culture appears violet to blackish color on PDA medium. Microscopically, mycelium is short, septate, branched, light brown violet colored. The colonies are woolly. Conidiophores dark, broader than hyphae with geniculations. Conidia are muriform. Leaves shows brownish to blackish spots over its surface (Plate 3 and 4).



Plate 3 :

Plate 4 :

### *Colletotricum capsici* (Anthracnose):

The fungus shows whitish velvet like structure. The mycelium is septate and branched. Conidia are hyaline and single rarely chained (Plate V and VI). Leaves shows characteristic symptoms with limited lesions.

### *Aecidium adhatodae* (leaf rust):

Aecidium is found on the undersurface of leaves. It forms crowded round to orbicular spots *i.e.* 2-5 mm in diameter on cultural medium. It appears in grayish color. Aeciospores are liberated by rupture of epidermis.

**Table 1 : Fungal disease severity index of Adulsa (*Adhatoda zeylanica* Medic) of Parbhani and Nanded district**

Sr. No.	Grade	Grade Infection		% Infection		DS	
		Parbhani	Nanded	Parbhani	Nanded	Parbhani	Nanded
I	0 %	23	41	23 x 0	41 x 0	00	00
II	1-25%	27	22	27 x 1	22 x 1	27	22
III	26-50%	19	13	19 x 2	13 x 2	38	26
IV	51-75 %	14	15	14 x 3	15 x 3	42	45
V	76-100%	17	09	17 x 4	09 x 4	68	36
						= 175	129

DSI of Parbhani = 43.75 %

DSI of Nanded = 32.25 %



Plate 5 :

Plate 6 :

***Phoma vasicae* Shreemali (leaf spot):**

On culture plates it appears as patches of dark black color with wavy outline. Generally it occurs on dry stem but rarely found on green leaves. Conidia area unicellular surrounded by slim layer of appendages. On leaf it shows symptoms as whorls and leaf spots.

These pathogens are responsible for causing diseases. Disease severity is studied, which shows variations in different locations of Parbhani and Nanded districts of Marathwada region of Maharashtra state. Diseases severity is more in Parbhani district than in Nanded district, as given in Table 1. the fungal infection is responsible to decrease in active ingredients of Adulsa. Therefore fungal disease are responsible for decrease in yield of plant. However, Butler and Sydow (1906 a) studied *Aecidium adhatodae* causing leaf rust, *Chnoospora butleri* (1906 b) causing greasy rust infecting to this plant in the region of Dehradun. Chona

and Munjal (1955) also described leaf spot disease caused by *Spetoria adhatodae* in Delhi.

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