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***Research Article***

# EFFECT OF AQUEOUS LEAF EXTRACTS OF *DATURA* SP. AGAINST TWO PLANT PATHOGENIC FUNGI

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## ABSTRACT
Aqueous leaf extract of four different species of *Datura viz. D.stramonium* L., *D. innoxia* Mill.Gard, *D. metal* L. and *D. ferox* L. Amoen were tested for their antifungal activity against phytopathogenic molds in terms of mycelial growth of *Alternaria solani and Fusarium oxysporum* f.sp. *udum* causing early blight of tomato and wilt of pigeonpea respectively. The extract of *Datura* sp. at 5, 10, 15 and 20% concentrations were incorporated in glucose nitrate medium. The leaf extract of *D. stramonium* and *D. innoxia* at 20% concentration was found more inhibitory activity against *F. oxysporum udum*, while the extract of *D. stramonium* at 20% concentration was inhibitorier against *A. solani*.

***Key Words:*** *Datura sp., Antifungal Activity, Pathogenic Fungi*

## INTRODUCTION
*Datura* also known as thorn apple, a member of the family Solanaceae. *Datura* is a genus with nine species of which four sp. are found in Marathwada (M.S.). All the species are woody, stalked leafy annuals and short lived perennials which can reach up to two meters in height. The leaves are alternate, 10-20 cm long and 5-18 cm broad with lobed are toothed margin. The flowers are 5-20 cm long and 4-12 cm broad at the mouth colors vary from white to yellow, pink and pale purple. The fruit is spiny capsule. The following species are reported from Marathwada (Naik, 1998) *Datura ferox* L. Amoen, *D. metel* L., *D. inoxia* Mill.Gard and *D. stramonium* L. Nearly all of them are used in local medicine. All *Datura* plants contain tropane alkaloid such as hyoscyamine, scopolamine and atropine in the seeds and the flowers. Besides its hallucinogen activity, *Datura* reported to have antimicrobial activity (Rajesh and Sharma, 2002; Kaushik and Goyal, 2008)

Fungi rank second only to insects as a cause of plant diseases, which result in heavy loss of plant products. Pathogenic fungi alone cause 20% reduction in the yield of major food and cash crops (Agrios, 2000). To avoid the implication of yield losses due to plant diseases, variety of control measures presently are in use. The chemical compounds are most commonly used for the controlling of plant diseases. No doubt the use of chemicals has been found very effective in controlling plant fungal diseases but some major problems threaten to limit the continued use of fungicides. The toxic effect of synthetic chemicals can be overcome, only by persistent search for new and safer pesticides accompanied by wide use of pest control methods, which are eco-friendly and effective (Mohana *et al.,* 2011).

Green plants represent a reservoir of effective chemotherapeutants and can provide valuable sources of natural pesticides (Balandrin *et al.,* 1985; Hostettmann and Wolfender, 1997). Plant metabolites and plant based pesticides appear to be one of the better alternatives as they are known to have minimal environmental impact and danger to consumers in contrast to synthetic pesticides (Varma and Dubey, 1999). Extracts of many higher plants have been reported to exhibit antifungal properties under laboratory trails (Parekh *et al.,* 2006; Buwa and Staden, 2006; Mohana *et al.,* 2008). The aim of the present study were to evaluate the potential of aqueous leaf extracts of four species of *Datura* to *in-vitro* control of the two pathogenic fungi *viz. Fusarium oxysporum* f. sp. *udum* and *Alternaria solani* causing wilt of pigeonpea and early blight of tomato respectively.

## MATERIALS AND METHODS

### *Collection of Plant Material*

Fresh healthy leaves of four species of *Datura viz. Datura ferox* L. Amoen., *D. metel* L., *D. inoxia* Mill.Gard and *D. stramonium* L. were collected from different locations of Nanded city, washed with tap water; surface sterilized with 2% sodium hypo chlorite for 5 min and washed thoroughly 2-3 times with sterile distilled water then shade dried. Dried leaves were pulverized in electric blander to obtain fine powder.

### *Preparation of Plant Extracts*

The powdered leaves extracted with sterile distilled water at room temperature at different level of concentrations (5, 10, 15 and 20%) i.e. 5 g in 100 ml, 10 g in 100 ml, 15 g in 100 ml and 20 g in 100 ml. Then extracts were filtered through double layered muslin cloth and finally through Whatman filter paper No.1. Extracts were stored at 4°C in pre-sterilized flasks until use.

### *Plant Pathogenic Fungi*

*F. oxysporum udum* Butler a wilt pathogen and *A. solani* (Ellis & Mart.) Sorauer a leaf blight pathogen were isolated from diseased parts of host plants (roots of pigeonpea and leaves of tomato) and pure cultures were maintained on PDA slants.

### *Bioassay of Plant Extracts*

Bioassay was carried out in glucose nitrate (GN) liquid medium. 10 ml of leaf extract was mixed with 10 ml of double strength GN liquid medium (1:1) in conical flasks and sterilized in autoclave for 15 min at 121°C. Control received the same quantity of water. To avoid bacterial contamination, antibacterial substance streptomycin was used. Inoculum discs of 5 mm diameter, obtained from 7 day old healthy growing fungal cultures of *F. oxysporum* and *A. solani* were transferred to flasks containing medium with and without plant extracts aseptically. The flasks were incubated at 25±2°C for 7days. On incubation the mycelium biomass from triplicate samples for each treatment was collected on pre-weighed filter paper. The dry weight yield was determined after 24 h oven draying at 60°C and the percentage of inhibition was calculated by the formula

$$\% \text{ of inhibition} = \frac{\text{wt. of mycelium in control - wt. of mycelium in treatment}}{\text{wt. of mycelium in control}} \times 100$$

## RESULTS AND DISCUSSION

Aqueous extracts of four *Datura* sp. found to be effective in reducing the growth of two plant pathogenic fungi *F. oxysporum* f. sp. *udum* and *A. solani* at 10%, 15% and 20% concentration levels. Extracts at low concentration i.e. 5% enhanced the growth of pathogenic fungi as compared to control. Extracts at 20% concentration found more effective in reducing the growth of fungi tested. Among the four *Datura* sp. leaf extract of *D. stramonium* and *D. innoxia* found to be more effective in reducing the growth of fungi (Table 1 and 2). Results from the present study could be correlated with the studies made by Mughal *et. al.* (1996) with leaf extracts from *Allium sativum*, *Datura alba* and *Withania somnifera* against *Alternaria alternata, A. brassicola* and *Myrothesium rodium*; Shinde and Dhale (2011) with leaf extracts from *Ocimum tenuiflorum* and *Datura stramonium* against *Fusarium oxysporum* and *Rhizopus stolonifer*; Jalander and Gachande (2011) with plant extracts from *Tinospora cordifolia* against *Fusarium oxysporum* and *Alternaria solani*.

The similar results were obtained by Ranaware *et. al.* (2010), they screened seven plant species against *Alternaria carthami*, among these *Allium sativum, Datura metal* and *Ocimum sanctum* were found more inhibitory activity against the pathogen. Shahnaz *et. al.* (2010) reported the inhibitory effect of *Datura Alba* against *Macrophomina phaseolina* and *Rhizoctonia solani*. Hassan *et al.,* (1992) reported that the leaf extract of *Datura stramonium* reduced the development of rust pustules on the leaves of wheat. The inhibitory effect of the plant extracts might be attributed due to the presence of antifungal compounds.

**Table1: Effect of aqueous leaf extracts of four *Datura* sp. on the growth of *Fusarium oxysporum* f.sp. *udum* Butler**

| Sr. No. | *Datura* species | Mycelium dry wt. (mg) at diff. level of concentrations | | | |
|---|---|---|---|---|---|
| | | **5%** | **10%** | **15%** | **20%** |
| 1. | *D. stramonium* | 270 (-03.84) | 140 (46.15) | 60 (76.92) | **40 (84.61)** |
| 2. | *D. metal* | 350 (-34.61) | 250 (03.84) | 210 (19.23) | 190 (26.92) |
| 3. | *D. ferox* | 300 (-15.38) | 240 (07.69) | 200 (23.07) | 180 (30.76) |
| 4. | *D. innoxia* | 280 (-07.69) | 160 (38.46) | 90 (65.38) | **60 (76.92)** |
| 5. | Control | 260 (0.00) | 260 (0.00) | 260 (0.00) | 260 (0.00) |

** Data in parentheses represents the percent of inhibition.*

**Table 2: Effect of aqueous leaf extracts of four *Datura* sp. on the growth of *Alternaria solani* (Ell. & Mart.) Grout**

| Sr. No. | *Datura* species | Mycelium dry wt. (mg) at diff. level of concentrations | | | |
|---|---|---|---|---|---|
| | | **5%** | **10%** | **15%** | **20%** |
| 1 | *D. stramonium* | 260 (-04.00) | 120 (52.00) | 80 (68.00) | **30 (88.00)** |
| 2 | *D. metal* | 280 (-11.53) | 210 (16.00) | 180 (28.00) | 150 (40.00) |
| 3 | *D. ferox* | 310 (-24.00) | 190 (24.00) | 160 (36.00) | 130 (48.00) |
| 4 | *D. innoxia* | 260 (-04.00) | 170 (32.00) | 140 (44.00) | 100 (60.00) |
| 5 | Control | 250 (0.00) | 250 (0.00) | 250 (0.00) | 250 (0.00) |

** Data in parentheses represents the percent of inhibition.*

The presence of antifungal compounds, in higher plants, has long been recognized as an important factor in disease resistance (Mahadevan, 1982). Such compounds, being biodegradable and selective in their toxicity, are considered valuable for controlling some plant diseases (Singh and Dwivedi, 1987). *Datura fastuosa* have been reported to contain compounds tigloidine (3*B*-tigloyloxytropane), 6*B*-tigloxytropane-a-ol, tropine (3a-hydroxy tropane), apoatropine, hyoscyamine, scopolamine (Shahwar *et al.,* 1995).

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