



# In Vitro Assessment Of The Effectiveness Of Specific Medicinal Plant Extraction Against *Alternaria Solani* Isolated From *Datura Stramonium* (Jimsonweed)

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## Abstract

*Alternaria* is represented by about 50 species. Several forms of species are found as saprobes on dead & decaying plant part and in soil, while some forms of species are facultative parasite infecting a large number of higher plants. The fungus was grown as a pure culture in the Culture Room. The experiment was done to determine the efficiency of anti-fungal activity of Leaf extract of selected medicinal plants. *Ricinus communis*, *Allium sativum*, *Azadiracta indica*, *Rauwolfia serpentina*, *Oscimum sanctum*, and *Withania somnifera* were used for the extraction from leaf and cloves. In present investigation different concentration 5, 10 and 15% were used in the culture. In the present study, it was observed that extract of *Azadiracta indica* at its all the three concentrations viz., 5, 10 and 15% could inhibit the radial growth of the fungus which was 78.2, 85.4 and 88% respectively. It was further observed that leaf extract of *Ricinus* had the minimum inhibitory activity at all the concentrations used, that was 65.2, 70 and 76% only. It was observed that leaf extract of *Allium sativum* inhibited the radial growth at all its three concentrations which was next to *Azadiracta* leaf extract that was 74.32, 82 and 88% respectively. This was followed by leaf extract of *Oscimum sanctum* that was 72.67, 81 and 87 respectively. As a result, extracts from the leaves and cloves of many medicinal plants demonstrated antifungal efficacy at varying quantities and levels of action.

**Keywords-** *Alternaria solani*, antifungal activity, leaf extract, culture, efficiency.

## **Introduction**

The toxic flowering plant *Datura stramonium* is often referred to as devil's trumpet, thornapple, or jimsonweed belongs to the family Solanaceae. An upright, annual herb with many branches, *Datura stramonium* grows to a height of 60 to 150 cm (2 to 5 ft). The root is whitish, fibrous, long, and thick. It has a sturdy, upright, leafy, smooth stem that is light yellow-green to reddish purple in hue. A single, upright bloom and a leaf are formed by each of the stem's numerous forks that split off into branches. The smooth, serrated, soft, and irregularly undulating leaves measure approximately 8 to 20 cm in length. The leaves have a lighter green on the underside and a deeper green on the upper surface. Even when the leaves are dried, they retain their bitter, sickening flavor, which is transferred to herb extracts. In general, *Datura stramonium* blooms all summer long. The trumpet-shaped, fragrant flowers are 6 to 9 cm long, white to creamy or violet, and have a pleasant scent. They grow on short stems from the leaf axils at the points where the branches split. The calyx is long, tubular, strongly slanted, and enlarged at the bottom. It has five sharp teeth on top. The white, funnel-shaped corolla has pronounced ribs and is folded, barely partially open. At night, the fragrant blossoms open, and nocturnal moths feed on your flowers. Either bald or coated in spines, the egg-shaped seed capsule has a diameter of 3 to 8 cm. Atropine is one of *Datura*'s main active ingredients, has been utilized for ages in traditional medicine.

The fungus *Alternaria solani*, which causes early blight in tomatoes, is also present on other Solanaceous plants, including some of the family's medicinal species. Airborne plant pathogenic microorganisms are controlled in vivo using plant extracts in the form of spray. As the disease spores touch down on the plant surface, they are either killed or rendered inactive. The aim of this work is to evaluate in vitro the potential antifungal activity of selected medicinal plant extracts at different concentrations against *Alternaria solani* which was isolated from the infected leaf of *Datura*.

## **Materials and methods-**

In the present study, six different plants which are commonly used as medicinal plants were selected. They are *Ricinus communis*, *Allium sativum*, *Azadiracta indica*, *Rauwolfia serpentina*, *Oscimum sanctum* and *Withania somnifera*. After thoroughly washing all of the plant materials under running water, they were rinsed with distilled water. Leaves were dried properly to remove the surface water. 100 grams of leaves from each plant and 100 grams of cloves of garlic was taken separately. With the aid of a pestle, these leaves were chopped and ground in a mortar with 100 milliliters of sterile water. Two layers of muslin fabric were used to filter the extract in a sanitized beaker. A 4000 rpm centrifuge was used to get rid of any remaining residue from these extracts. The stock solution was kept in a bottle with a suitable cork. 5, 10 and 15ml of stock solution of the plants was mixed with 95, 90 and 85 ml of corn dextrose agar medium. Thus for each extract the concentration became 5, 10 and 15%. Manually the culture flasks were shaken to make the solution homogeneous. Pre-sterilized petri plates were taken and 20 ml of above medium was poured into it. Medium without extract was used as control. The inoculation was a pure culture of *Alternaria*. The inoculum was made from cultures that were eight days old. All the experiments were done in the sterilized area of Laminar flow air chamber. Inoculation was done in culture plate having no extract. The inoculated Petri plates were incubated in the culture room at 26°C. These cultures were observed on alternate day and cultures showing any contamination was disposed after autoclaving.

## **Results and discussion-**

Fungitoxic efficacy of six medicinal plant's extract was tested at different concentrations against radial mycelial growth of the fungus *Alternaria solani* isolated from leaf spot of *Datura stramonium*. Here extract of cloves of garlic at its all three concentrations viz., 5, 10 and 15% inhibited the radial mycelial growth which was the maximum 78.2, 85.4 and 88% respectively. At the similar concentration extract of *Allium sativum* cloves inhibited the radial growth which was 74.32, 82 and 88% respectively. This was followed by the leaf extract of *Oscimum sanctum* that was 72.67, 81 and 87 respectively. It may be further noted that leaf extract of *Ricinus communis* at all three different concentrations inhibited the radial growth which was 65.2, 70 and 76% respectively. However, this was the lowest in comparison to the extracts of other medicinal plants at mentioned concentrations. Fungicides are chemical substances used to suppress fungal diseases. Soil and water

contamination is attributed to these fungicides. According to Pareek et al. (2012), a percentage of inhibition comparable to that of chemical fungicides was observed in *Alternaria solani* when mycelial growth and sporulation were inhibited by extracts of specific medicinal herbs. Kantwa et al.,(2014); Maria et al.,(2015); Nidhika Rani et al.,(2018) all have reported that extract taken from different medicinal plants have reported fungicidal activity. To choose the best medicinal plant and the right concentration to use as fungicides, a great deal of research is required. Because it would be an environmentally acceptable method of controlling fungal diseases, this would be advantageous for organic farming.

### **Observation table**

**Table number-1**

#### **Radial growth of A. solani in (mm) in the treated and controlled cultures**

Conc. %	<u>Ricinus</u> <u>Leaf Extract</u>	<u>Allium</u> <u>Leaf Extract</u>	<u>Azadiracta</u> <u>Leaf Extract</u>	<u>Rauwolfia</u> <u>Leaf Extract</u>	<u>Oscimum</u> <u>Leaf Extract</u>	<u>Withania</u> <u>Leaf Extract</u>
5	32	20	22	25	23	23
10	28	12	15	15	14	13
15	22	10	12	13	11	12
Control	88	88	88	88	88	88

**Table number- 2**

#### **Percentage inhibition of different concentrations of medicinal plants on mycelial growth of Alternaria solani**

Ricinus	Allium	Azadiracta	Rauwolfia	Oscimum	Withania
65.2	78.2	74.32	72	72.67	70
70	85.4	82	75	81	74
76	88	88	82	87	83

## **References-**

1. Abuley, I.K., Nielsen, B.J., Labouriau, R. (2018). Resistance status of cultivated potatoes to early blight (*Alternaria solani*) in Denmark. *Plant Pathol.* 67: 315-326. Doi: 10.1111/ppa.12744.
2. Chaerani R, Voorrips RE. *Journal of General Plant Pathology*. 2006; 72:335-347.
3. Gurjar, M.S., Ali, A.M., Singh, K.S. (2012). Efficacy of plant extracts in plant disease management. *Agricult Sci.* 3(3): 425-433.
4. Mehta, S. and Sharma, K. (2016). Natural resources: an ecofriendly and safer alternate to control plant diseases. *International Journal of Pharmaceutical Sciences and Research*, 7(11), 4327.
5. Mishra M, Tiwar SN. *Indian Phytopathology*. 1992; 45:56-61.
6. Pandey KK, Pandey PK, Kalloo G, Banerjee MK. *Journal of General Plant Pathology*. 2003; 69:364-371.
7. Prasad Y, Naik M K. 2003. Evaluation of genotypes, fungicides and plant extracts against early blight of tomato caused by *Alternaria solani*. *Indian Journal of Plant Protection* 31:49-53.
8. Ranaware A, Singh V, Nimbkar N. In vitro antifungal study of the efficacy of some plant extracts for inhibition of *Alternaria* fungus. *Indian J Nat. Products Resour.* 2010;1(3):384-386.
9. Stangarlin JR, Kuhn OJ, Assi L & Schwan-Estrada KRF (2011) Control of plant diseases using extracts from medicinal plants and fungi. In: Méndez-Vilas A (Ed.) *Science against microbial pathogens: communicating current research and technological advances*. Badajoz, Formatex Research Center. p.1033-1042.
10. Saad A. S. A, Kadous E. A, Tayeb E. H, Massoud M. A, Ahmed S. M. and Abou El- Ela A. S. A. (2014). The inhibitory effect of some antioxidants and fungicides on the growth of *Alternaria solani* and *Fusarium solani* in in vitro. *Middle East Journal of Agriculture Research*, 3(2), 123-134.
11. Sadana, D. and Didwania, N. (2015). Bioefficacy of fungicides and plant extracts against *Alternaria solani* causing early blight of tomato. *International Conference on Plant, Marine and Environmental Sciences*, 1(2), 38-42.
12. Vloutoglou I, Kalogerakis S N. 2000. Effects of inoculum concentration, wetness duration and plant age on development of early blight (*Alternaria solani*) and on shedding of leaves in tomato plants. *Plant Pathology* 49:339-345.
13. Wheeler, B. E. J. (1969). *An introduction to plant diseases*. John Wiley and Sons Limited, 54(3), 511.
14. Yadav, S. M., Singh, S. M. and Chand, R. (2014). Mass sporulation of *Alternaria solani* causing early blight of tomato. *Indian Phytopathology*, 68(1), 83-86.