



## Evaluation of Antifungal Activity of Plant Leaf Extract of *Argemone mexicana* L. against Linear Growth of *Taphrina maculans* causing leaf spot of Turmeric

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### ABSTRACT

The present investigation was carried out to observe the potential use of *Argemone mexicana* L. leaves extract against the fungus *Taphrina maculans* *in vitro* affecting turmeric. The leaf extract have antifungal activities due to presence of various chemicals such as alkaloids, tannins, quinines, phenolic compounds and phytoalexins. Different concentrations of *Argemone mexicana* leaf extract show variable effect on the linear growth of *Taphrina maculans*. As the concentration of leaf extract increases, the growth of fungus gets decreased. There is complete inhibition of growth of fungus at 4.00% concentration on the 8<sup>th</sup> day of incubation. The study was carried out by using poisoned food technique.

**KEYWORDS** : *Argemone mexicana* L., *Taphrina maculans*, Antifungal activity

### INTRODUCTION

Turmeric (*Curcuma longa* L.) commonly known as Indian saffron is a rhizomatous plant belonging to family Zingiberaceae. It is an important commercial spice crop grown in India. It is the ancient spice of India which is used in various forms such as condiment, flavoring and coloring agent. It is also used in Indian kitchens as curry powder and in Hindu religious ceremonies. Apart from these, it is also used in drug industry as an anticancer, antiviral, anti-inflammatory, anti-ulcer, anti-diabetic and anti-oxidant agent (Hamid *et al.*, 2014). It is also having strong socio-cultural ties to the people of India and its surrounding countries. In fact there is at least 6000 years of documented use of the spice (Ravindran *et al.*, 2007). The old Hindu texts described it as an aromatic stimulant and carminative.

The major turmeric producing states in India are Andhra Pradesh, Maharashtra, Tamilnadu, Orissa, Karnataka and Bihar. There is near about 99200 hectare area under turmeric cultivation and the production is 167500 tones per annum. The different varieties of turmeric show variation in the morphology, overall production and quality of rhizome. The common varieties cultivated in different states of India are Armoor, Duggirala, Tekurpeta red, Allepy, Salem, Rajapuri, Erode, Chintamani, Lokhandi and Waigaon (Indires *et al.*, 1990).

The turmeric rhizome contains tumeron, zingiberene and oleoresin. The yellow–orange colour of turmeric is due to presence of curcumin which is a part of oleoresin and it is having anti-oxidant properties (Ghosh *et al.*, 1982). Such economically and commercially important crop gets affected by *Taphrina maculans* and reducing its productivity. The quality and overall yield is decreased due to infection of this fungus. The plant leaf extract of *Argemone mexicana* is having antifungal effect due to presence of certain phytochemicals such as alkaloids, phytoalexins, phenolic compounds, tannins, quinines and coumarins (Datar, 1999). Taking in account the medicinal importance of *Argemone mexicana* L. leaf, the present work has been planned to control the *Taphrina maculans* causing leaf spot of turmeric *in vitro*.

### MATERIALS AND METHODS

By using food poisoned technique (Viswas *et al.*, 1995), the effect of *Argemone mexicana* L. leaf extract was studied against *Taphrina maculans*. The leaf extract of *A. mexicana* have antifungal activities due to presence of certain phytochemicals in them.

The fresh and healthy leaves of *Argemone mexicana* free from disease were collected from Latur region of Marathwada and washed with running water repeatedly 2-3 times. Then the leaves are dried in shed and crushed with the help of mortar and pestle by using 10% alcohol. The extract was filtered by using muslin cloth. The leaf extract was added in 100ml of 10% alcohol. The required concentration of leaf extract was obtained by adding 1.0ml, 1.5ml, 2.0ml, 2.5ml, 3.0ml, 3.5ml and 4.0ml in 100ml of warm media. The media was poured in sterilized petriplates. Then these plates were inoculated by 5mm disc of *Taphrina maculans* in the centre of Czapek-dox agar medium and the linear growth of fungus was measured in mm (Viswas *et al.*, 1995).

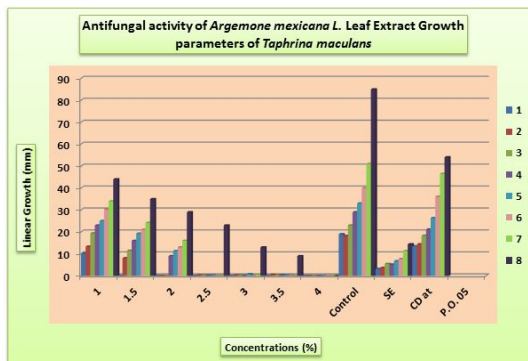
### RESULTS AND DISCUSSIONS

The antifungal effect of *Argemone mexicana* L. on the linear growth of *Taphrina maculans* was observed. Studies showed that as the concentration of *Argemone mexicana* increases, the linear growth of *Taphrina maculans* decreases. In control plate, linear growth was 85mm on 8<sup>th</sup> day of incubation. The linear growth was 44mm at 0.1% concentration, 35mm at 1.5%, 29mm at 2.0%, 23mm at 2.5%, 13mm at 3% concentration. The maximum inhibition was 9.00mm at 3.5% and the linear growth of fungus completely inhibited at 4.00% concentration. This reveals that minimum inhibition of fungus was seen at 1.0 % concentration, optimum inhibition at 2.5% and maximum at 3.5% and the fungal growth stopped completely at 4.0% concentration.

**Table No. 1: Antifungal activity of *Argemone Mexicana* L. Leaf extracts growth parameters of *Taphrina maculans***

Conc. %	Linear Growth (mm)							
	Incubation Period (Days)							
	1	2	3	4	5	6	7	8
1.0	10.2	13.35	19.4	23.00	25.00	30.28	34.00	44.00
1.5	0.00	8.05	11.45	16.00	19.29	21.00	24.12	35.00
2.0	0.00	0.00	0.00	9.00	11.33	13.00	16.00	29.00
2.5	0.00	0.18	0.14	0.10	0.09	0.06	0.05	23.00
3.0	0.00	0.15	0.12	0.11	0.8	0.06	0.5	13.00
3.5	0.00	0.5	0.3	0.3	0.2	0.1	0.00	9.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Control	19.00	18.22	23.00	29.00	33.00	39.95	51.00	85.00
SE	3.18	3.66	5.45	5.17	6.68	7.72	11.31	14.40
CD at P.O. 05	13.50	14.40	18.29	21.15	26.37	36.07	46.48	54.05

**Figure I: Antifungal activity of *Argemone mexicana* L. Leaf extracts growth parameters of *Taphrina maculans***



This study also concluded that the leaf extract of *Argemone mexicana* L. is the good alternative to chemical fungicides which are harmful to nature. It controls disease and increase the productivity.

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