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In – vitro Evaluation of Some Common Ethnobotanicals to Control the Leaf Spot and Flower blight of Marigold

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ABSTRACT

In tropical and subtropical climes, *Alternaria zinnia* causes leaf spot and blossom blight in marigolds, resulting in yield reductions of 50-60%. Chemical controls can be harmful to ecosystems, and agronomic control methods are difficult to implement. The goal of this study was to examine the efficacy of a variety of botanicals that are easily available in in-vitro situations. Eight plants extracts, including *Aloe vera, Azadirachta indica, Allium sativum, Zingiber officinale, Curcuma longa, Phyllanthus emblica, Withania somnifera,* and *Ocimum tenuiflorum,* were evaluated against the pathogen at 10% and 20% concentrations. *Allium sativum* suppressed mycelial growth the greatest at a 10% concentration, with 80.28 percent, followed by *Phyllanthus emblica* (64.32 percent), and *Curcuma longa* (64.32 percent) (54.93 percent). *Ocimum tenuiflorum*, with a 2.35 percent inhibition, was the least inhibited plant. The results at a concentration of 20% followed the same pattern as the results at a concentration of 15%. The highest level of inhibition was found in *Allium sativum* (88.26 percent), followed by *Phyllanthus emblica* (86.85 percent), and *Curcuma longa* (86.85 percent) (74.65 percent). With 11.74 percent inhibition, *Ocimum tenuiflorum* was the least inhibited. Although more research is needed, the presence of Allicin in *Allium sativum* may explain its effectiveness against marigold flower disease. Additionally, the efficacy of phytoextracts against marigold flower blight might be assessed in the field.

Key words : *Marigold, Phytoextracts, Garlic extract, Allicin, Alternaria tagetica, Flower blight*

Introduction

Marigold (*Tagetes erecta* L.), a member of the Tagetes genus in the Asteraceae family and sometimes known as gendaphool, is a native of Mexico and America. In India, there are more than fifty different varieties of annual and perennial herbaceous plants. In India, marigolds are grown on 8000-10000 hectares of land. 70,000 metric tonnes of marigold were grown Because each flower in cultivation has a longer blooming period and a gorgeous flower with a long shelf life, the flower spreads quickly, and they are also recognised for being a fast-growing and annual flowering plant. The plant can reach a height of 6 inches or 3 feet. It is mostly utilised for ornamental and therapeutic uses in India. It's used to treat a variety of ailments., including rheumatism, colds, and bronchitis.

Every part of the plant is necessary. Each portion of the plant has medical properties; for example, the leaves are frequently employed as an antibiotic, in the treatment of kidney diseases, and in the treatment of piles. The flower's composition is more ayurvedic, therefore it can help with fever, scabies,

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liver problems, and eye problems. In Mexico, tea prepared from the plant's shoots is popular. The bioactive component of the flower has insecticidal and fungicidal properties. Both the leaves and flowers have therapeutic properties due to their phenolic and antioxidant activity and are equally important in the pharmaceutical business (Tripathy and Gupta, 1991; Khalil *et al*., 2007). Marigold essential oil is in high demand in the perfume industry Dhenkanala, Koraput, Sundargard, Balasore and Sambalapur are the main marigold-growing districts in Odisha.

The most common causes of yield loss are fungus, viral, and bacterial diseases, as well as nematodes, which cause significant damage and yield loss. Fungal diseases that damage marigold plants include flower blight, wilt, and stem rot, Alternaria leaf spot, and *Fusarium* wilt. The most destructive diseases are blossom blight and leafspot which is caused by *Alternaria zinniae*.

Chemicals used to treat plant diseases have a significant negative impact on the environment. Many plants have therapeutic properties and have long been employed in traditional Ayurvedic treatment. Considering these facts, the department of Plant Psathology, Institute of Agricultural Sciences, Siksha o Anusandhan (deemed to be) university Bhubaneswar, Odisha, conducted research on "Evaluation on fungal toxic effect of certain plant extracts against plant pathogens.

Materials and Methods

Collection of Plant Samples

Eight plant extracts from garlic, neem, tulsi, turmeric, ginger, aloe vera, ashwagandha, and amla were investigated *in vitro* and *in vivo* for their antibacterial effectiveness in combating *Alternaria tagetica*. For the extraction process, fresh plant components were employed. The following are the various plant parts that are used for extraction (Table 1).

Extraction of Plant extract

Before being distilled, fresh plant materials were collected and cleansed with tap water. These leaves were left out in the open to dry naturally. In a surface-sterilized pestle and mortar, 100 grammes of fresh material were cut and then crushed with 100 ml sterile water (1:1 w/v). After that, shake for 12 hours in a Rotary Shaker. The extracts were filtered through Whatman's no. 1 filter paper. The extracts were centrifuged at 1500 rpm for 10 minutes. The obtained supernatant was then utilised to make a stock solution.

Table 1. Different plant extracts used with their common names, Scientific name and plant parts used

Treatment Number	Common Name	Scientific Name	Plant Part Used
1.	Aloe vera	*Aloe vera*	Leaf
2.	Neem	*Azadirachta indica*	Leaf
3.	Garlic	*Allium sativum*	Bulb
4.	Ginger	*Zingiber officinale*	Rhizome
5.	Turmeric	*Curcuma longa*	Rhizome
6.	Amla	*Phyllanthus emblica*	Fruit
7.	Ashwagandha	*Withaniasomnifera*	Root
8.	Tulsi	*Ocimumtenuiflorum*	Leaf

Poison Food Technique

To explore the antifungal mechanism of plant extracts in vitro, the poisoned food technique was used. 6 ml and 12 ml of the stock solution were combined with 60 and 60 ml of sterilised molten PDA medium, respectively, to generate 10 and 20% concentrations. To ensure that the extract was evenly dispersed, the medium was firmly shaken. 20 mL of medium was added to each sanitised Petri plate.

Cut 5 mm diameter discs of mycelium off the edge of an actively growing culture with a sterile cork borer disc, which were then deposited in the centre of each Petri plate. To maintain the controls, a single pathogen was cultured on PDA dishes.

Each treatment was repeated three times, with plates incubated at 28 °c until the control dishes attained their radial growth maximum. The percent inhibition over control was calculated using Vincent's formula (1947).

$$I = \frac{(C - T)}{C} \times 100$$

Where,

I = Percent inhibition of mycelium

C = Growth of mycelium in control

T = Growth of mycelium in treatment

Results and Discussion

Allium sativum suppressed mycelial growth the greatest at a 10% concentration, with 80.28 percent, followed by *Phyllanthus emblica* (64.32 percent), and *Curcuma longa* (64.32 percent) (54.93 percent).

Table 2. *In vitro* bioassay of plant extracts

Treatment Number	Scientific Name of Botanicals	Growth Inhibition	
		10% concentration	20% concentration
1.	*Aloe vera*	10.80	15.49
2.	*Azadirachta indica*	29.11	44.60
3.	*Allium sativum*	80.28	88.26
4.	*Zingiber officinale*	37.56	60.56
5.	*Curcuma longa*	54.93	74.65
6.	*Phyllanthus emblica*	64.32	86.85
7.	*Withaniasomnifera*	23.00	21.60
8.	*Ocimumtenuiflorum*	2.35	11.74
	SE (m)	**5.138**	**4.474**
	CD (0.05)	15.537	13.529

Ocimum tenuiflorum, with a 2.35 percent inhibition, was the least inhibited plant. The result at a concentration of 20% followed the same pattern as the result at a concentration of 15%. The highest level of inhibition was found in *Allium sativum* (88.26 percent), followed by *Phyllanthus emblica* (86.85 percent), and *Curcuma longa* (86.85 percent) (74.65 percent). With 11.74 percent inhibition, *Ocimum tenuiflorum* was the least inhibited. The current findings are supported by Wszelaki and Miller's (2005) findings, which showed that garlic extracts greatly reduced tomato leaf blight disease. Panchal *et al.* (2009) found that *A. alternata* has the slowest mycelial growth. In vitro, garlic clove extracts were used in the medium (10 percent). Gachande (2010) evaluated extracts of 15 plant components against *Alternaria solani* isolates' spore germination and mycelial development. The extracts of *Allium sativum* were shown to be the most effective in controlling fungal development. Chethana *et al*. (2012) tested the bioefficacy of six plant items against *Alternaria porri* (Ellis.) Cif., which causes purple blotch disease in onions.

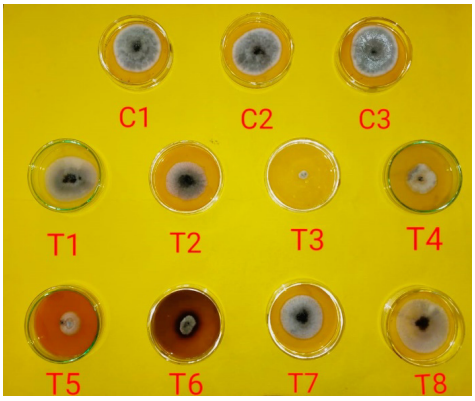


Fig. At 10 percent Concentration

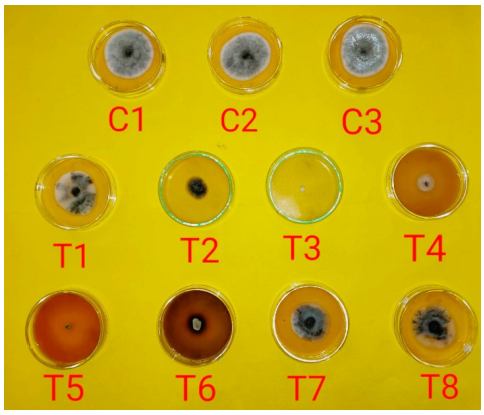
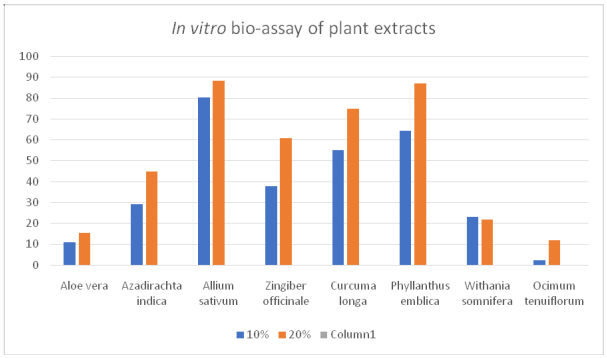


Fig. At 20 percent Concentration



Conclusion

At a 10% concentration, *Allium sativum* reduced mycelial development the most (80.28 percent), followed by *Phyllanthus emblica* (64.32 percent), and *Curcuma longa* (64.32 percent) (54.93 percent). The least inhibited plant was *Ocimum tenuiflorum*, which had a 2.35 percent inhibition. The result at a 20 percent concentration followed the same pattern as the result at a 15 percent concentration. *Allium sativum* had the highest level of inhibition (88.26 percent),

followed by *Phyllanthus emblica* (86.85 percent), and *Curcuma longa* (86.85 percent) (74.65 percent). *Ocimum tenuiflorum* was the least inhibited, with only 11.74 percent inhibition. The presence of Allicin in Allium sativum may explain its effectiveness against marigold flower blight, although more research is needed. Furthermore, the effective plant products against marigold flower blight could be evaluated in the field.

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