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RESEARCH ARTICLE

Laboratory testing of plant originated oils and oil cakes against the fungal pathogen *Alternaria alternata* - causative agent of leaf spot disease in *Aloe vera*

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SUMMARY

In *Aloe vera* (L) Burn F. Syn. *Aloe barbadensis* (Miller), leaf spot disease caused by *Alternaria alternata* is a serious fungal disease. Management of the disease through fungicides alone lead to cause soil residual problems and heatlth hazards, besides involving higher input cost. Hence, attempts were made to manage the disease using environment safer components like plant oils and oil cakes. In this present study, plant oils and oil cakes extract were screened against the fungus, among the oils and oil cakes Eucalyptus oil (2%) and Mahua cake extract (10%) were found superior in reducing the fungal growth.

Key Words : Laboratory, Plant, Oil cakes, *Alternaria alternata, Aloe vera*

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Aloe vera (L.) Burn. F. Syn. *Aloe barbadensis* (Miller) is an important medicinal plant belonging to the family Lilliaceae. It is commonly referred to as "miracle plant" for its numerous uses particularly in human health. The leaf gel possesses properties such as antioxidant, anti-diabetic, anti-cancerous, anti-ageing properties, immunostimulant and general tonic effect. The leaf spot disease of *Aloe vera* caused by a fungus *Alternaria alternate* is a serious fungal disease Kamalakannan *et al*. (2008). Chemical method of management to this disease may lead to some residual toxicity with the directly consumable aloe leaves, so this leads to take an alternative approaches. Use of plant oils and oil cakes in managing other plant disease impressed to test its efficacy in managing the leaf spot disease of *Aloe vera* both under laboratory and field condition. In this study the plant oils and oilcakes possessing fungicidal activity were evaluated against *Alternaria alternata* incitant of leaf spot in *Aloe vera* under laboratory conditions.

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MATERIAL AND METHODS

Efficacy of plant oils against A. alternata in vitro (Poisoned food technique- Schmitz, 1930) :

Seven plant oils found effective against pathogen *viz.,* eucalyptus oil (2.0%), neem oil (2.0%), coconut oil

(3.0%), castor oil (3.0%), pungam oil (3%), iluppai oil (3.0%) sesame oil (3.0%) and groundnut oil (3.0%) were tested against *A. alternata.* The required quantity of oil was mixed with the PDA medium and sterilized before plating and thoroughly mixed. Twenty ml of this medium was immediately poured into the sterilized Petri plates and allowed to solidify. Nine mm of actively growing virulent isolate culture was placed on the centre of the Petri dishes. The PDA medium without incorporating the oil served as control. Three replications were maintained, all the operations were carried out under aseptic condition. The dishes were inculpated at room temperature (28±2°C). When the control plate showed the full growth of the pathogen the diameter of the mycelial growth was measured in all the treatments. The results were expresssed in per cent inhibition over control.

Efficacy of Oil cake extracts against *A. alternata in vitro* :

The efficacy of oil cake extract was tested against A. alternata using poisoned food technique (Schmitz, 1930). The freshly prepared 50 ml PDA medium was distributed to several conical flasks. Five ml of aqueous extract of oil cake was mixed with 50 ml of PDA medium to obtain ten per cent concentration and sterilized. The fifteen ml of sterilized PDA medium was poured on sterilized Petri dish and then allowed to solidity. A nine mm mycelial disc of *A. alternate* was taken from actively growing culture and placed at the centre of each Petri dish and incupated at room temperature. The PDA medium without extract oil cake served as a control. The radial growth of the fungus was recorded when the control plate covered by this test fungus. Per cent inhibition (PI) of mycelial growth was calculated using the formula suggested by Pandey *et al.* (2000).

$$PI = \frac{Dc - Dt}{Dc} \times 100$$

Dc = Average diameter of fungal growth (cm) in control.

Dt = Average diameter of fungal growth (cm) in treatment.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Efficacy of oil cakes against *A. alternata* (*in vitro*) :

Among the plant oils tested eucalyptus oil (2%) was superior over all other oils against the pathogen *A. alternata* which recorded highest reduction of mycelial growth (70.00 %) and minimum of 18.72 per cent inhibition was recorded by castor oil (Table 1). The result of the present study indicated, eucalyptus oil (2%) inhibited the mycelial growth of the pathogen followed by neem oil @ two per cent. The earlier workers reported the similar results that unsaturated fatty acids present in plant oils may be inhibitory to the mycelial growth of the pathogens. This is in line with the findings of Gangrade *at al.* (1991), who reported the antifungal activity of Palmarosa oil against *Aspergillus niger*, *A. flavus*, *Fusarium oxysporum* and *Penicillium* spp. Mohan (1996) and Karthikeyan (1999) also reported the antifungal activity of palmarosa oil against *A. palandui*. Neem oil (3%) was found effective against *A. tenuis* caused chilli fruit rot (Sujatha Bai, 1992).

Efficacy of oil cake extracts against *A. alternata* (*in*

Table 1 : Effect of plant oils on the mycelial growth of *A. alternata in vitro*

Sr. No.	Treatments	Mycelial growth (cm)*	Per cent reduction over control
1.	Neem oil (2%)	5.1	42.70
2.	Groundnut oil (3%)	6.83	23.22
3.	Sesame oil (3%)	4.13	53.56
4.	Coconut oil (3%)	3.23	63.67
5.	Castor oil (3%)	7.23	18.72
6.	Sunflower oil (3%)	6.23	29.96
7.	Eucalyptus oil (2%)	2.67	70.00
8.	Pungam oil (3%)	4.16	53.18
9.	Control	8.90	0
	C.D. (P= 0.05)		0.49

* mean of three replication

Table 2 : Efficacy of plant oil cakes against *A. alternata in vitro*

Sr. No.	Treatments (10 %)	Mycelial growth (cm)*	Per cent reduction over control
1.	Groundnut cake extract	6.77	21.91
2.	Neem cake extract	4.27	50.74
3.	Coconut cake extract	6.93	20.06
4.	Sesame cake extract	7.13	17.76
5.	Cotton cake extract	6.50	25.02
6.	Pungam cake extract	3.43	60.43
7.	Mahua cake extract	2.71	68.74
8.	NSKE (5%)	3.33	61.59
9.	Control	8.67	0
	C.D. (P= 0.05)		0.45

* Mean of three replications

***vitro*) :**

Among the oil cake extracts tested at ten per cent level, the minimum diameter of mycelial growth (2.71cm) and maximum per centage of inhibition (68.74%) were recorded in Mahua cake extracft followed by NSKE (3.33cm and 61.59%), pungam cake extract(3.43cm and 60.43%) and neem cake extract (4.27 cm and 50.74%). The maximum diameter of mycelial growth (7.13cm) and minimum per centage of inhibition(17.76%) were recorded in sesame oil cake extract (Table 2). Result of present study was supported by several workers like Komathi (2002) who reported that ten per cent concentration of mahua cake extract exhibited total inhibition of mycelial growth of *Sclerotium rolfsi in vitro.* Alice *et al.* (1998) found that mahua cake extract at ten per cent was effective in reducing mycelial growth, sclerotial production and sclerotial germination of *S. rolfsii*. Dubey (2002) observed that soil application of karanj (Pungam) cake extract (5%) showed the best performance to reduce the disease intensity of web blight caused by *Thanetophorus cucumeri*. Harish *et al.* (2008) reported that among the four oil cake extracts tested *in vitro* agaisnt *B. oryzae*, Neem cake extract showed the maximum inhibition per cent to mycelial growth (80.18%) and spore germinatin (81.13%) of the pathogen followed by mahua cake extract, castor cake and gingelly cake extract.

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