

Effect of some volatile compound on some deuteromycetean fungi

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Abstract

Fungi respond to various volatile compounds in their ability to grow and reproduce. However, this aspect of fungal metabolism has been relatively less attended to. In the present investigation effects of certain volatile compounds on the growth and sporulation of four species of *Curvularia*, three species of *Fusarium*, two species of *Phoma* and *Botryodiplodia sp.* have been studied. *C. lunata* & *C. senegalensis* showed poor growth in acetic acid, ethyl alcohol, n-butanol, propionic acid, phenol, toluene, formaldehyde; *C. prasadii* & *C. clavata* showed good to moderate growth except in acetic acid & phenol. Three species of *Fusarium* showed good to moderate growth in acetone, ethyl alcohol, phenol & toluene, formaldehyde & inhibited in acetic acid, n-butanol, propionic acid. In *Phoma* excellent growth was seen in acetone, good in ethyl alcohol, moderate to poor in toluene, formaldehyde, acetic acid, phenol while inhibited in propionic acid & butanol. In *B. theobromae* excellent growth was seen in acetone, good in ethyl alcohol, moderate in acetic acid, toluene & inhibited in propionic acid, butanol, phenol & formaldehyde.

Keywords: *Curvularia*, *Fusarium*, *Phoma*, *Botryodiplodia*, Volatile compounds.

INTRODUCTION

According to Norman volatile compounds sublimate and form a protective atmosphere for combating the growth of microorganisms.¹ Volatiles also induce biological activity at a greater distance from their source^{2, 3}. They have relatively a high vapor pressure at physiological temperature and are capable of rapid movements through the space. Some of the volatile compounds are biologically active even in extremely small quantities. Besides these, the compounds remain active for longer time as compared to substances in solution which are likely to be activated.⁴ In present investigation effect of 9 volatile compounds on growth of sporulation of four species of *Curvularia*, three species of *Fusarium*, two species of *Phoma* and *Botryodiplodia theobromae* are recorded.

MATERIAL AND METHOD

Collection of materials and isolation of Fungi

Extensive survey was made in Amravati region for the collection of microorganisms caused disease to fruits and vegetables and samples were taken from different localities of this district. For sampling purpose specifications of localities were made on the basis of ecological and geographical variations found in Amravati district. The diseased fruits and vegetables were collected separately in polythene bags and symptoms on different hosts were recorded. Completely rotten fruits and vegetables were avoided for isolations as they contained mostly secondary infections. Slides were prepared by scrapping the fruiting bodies produced in infected regions.

Isolations were made by cutting small fragments of diseased spot along with healthy region. The diseased tissues were surface sterilized with 90% alcohol and transferred aseptically to Asthana and Hawker's medium 'A' (5g glucose, 3.5g KN₃, 1.75g KH₂PO₄, 0.75g MgSO₄.7H₂O and 15g agar agar). The slants were completely sterilized to avoid the secondary and bacterial infection. Inoculations were carried out in sterilized inoculation chambers at the temperature 27^o C. (+ 2^o C). After 2 or 3 days of inoculation the mycelium coming out of the diseased tissue was picked up and transferred to another fresh slant. Morphological and cultural characters of the organisms were carefully recorded. Identification of isolates was made from stock cultures present in Mycological Laboratory of Brijlal Biyani Science College, which was previously identified from Common Wealth Mycological Institute Kew, Surrey, England and also from a book of "Illustrated genera of fungi imperfectii"⁵.

Eight different volatile compound i.e. toluene, acetic acid, propionic acid, formaldehyde, acetone, phenol, ethyl alcohol, t-butanol were tested against four species of *Curvularia*, three species of *Fusarium*, two species of *Phoma* and *Botryodiplodia* species. For this process 15ml of sterile Asthana and Hawker's medium 'A' was poured into sterile petridish containing glass test tubes of 1ml capacity. Respective fungi were inoculated from 7 days old cultures. Pure volatile compound of 1ml were poured into test tube. The test tubes then slant. 1ml of distilled water served as control. After 7 days of incubation the diameter of the fungal colony was measured and compared with the control and percentage of inhibition was calculated.

RESULTS AND DISCUSSION

Fungi are among the most widely distributed organisms on earth.^{6, 7, 8, 9} Losses of crops due to fungal diseases or food spoilage can have a large impact on human food supplies & local economies. Most of the volatile compounds play an important role in inhibition of fungi.^{10, 11, 12, 13}

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Volatile compounds includes terpenoids, aldehydes, esters, acid, ketons, alcohols and coumarins. The biological activity of these compounds acting alone & in combination.^{14,15}

In present investigation effect of 8 volatile compounds i.e. ethyl alcohol, N-butanol, formaldehyde, acetone, toluene, phenol, propionic acid, acetic acid,^{16,17,18} on growth of sporulation of four species of *Curvularia*—three species of *Fusarium*, two species of *Phoma* and *Botryodiplodia* were summarize in table 1 (After 7 days).

Results show that *Curvularia lunata* and *Curvularia senegalensis* showed poor growth in acetone, acetic acid, ethyl alcohol, n-butanol, propionic acid, phenol, toluene, formaldehyde, while *Curvularia prasadii* and *Curvularia clavata* showed good to moderate growth except in acetic acid and phenol.

All three species of *Fusarium* viz *Fusarium equiseti*, *Fusarium moniliforme*, *Fusarium oxysporum* under investigation showed good to moderate growth in acetone, ethyl alcohol, phenol, toluene, formaldehyde while growth is inhibited in acetic acid, n-butanol, propionic acid.

Phoma nebulosa and *Phoma vulgaris* exhibits excellent growth in acetone, good in ethyl alcohol, moderate to poor growth in toluene and formaldehyde, acetic acid and phenol, and growth was inhibited in propionic acid and butanol. *Botryodiplodia theobromae* exhibited excellent growth in acetone, good in ethyl alcohol, moderate in acetic acid and toluene and growth was inhibited in propionic acid, butanol, phenol and formaldehyde.

Table 1. Effect of some volatile compounds on growth and sporulation of four species of *Curvularia*, three species of *Fusarium* two species of *Phoma* and one species of *Botryodiplodia* sp. (after 7days).

S. N.	Volatile compound	<i>C. lunata</i>		<i>C. senegalensis</i>		<i>C. clavata</i>		<i>C. prasadii</i>		<i>F. equiseti</i>		<i>F. moniliforme</i>		<i>F. oxysporum</i>		<i>P. nebulosa</i>		<i>P. vulgaris</i>		<i>B. theobromae</i>	
		D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.
1	Ethyl alcohol	1.78	poor	3.60	poor	31.20	good	23.40	good	27.60	good	34.10	good	26.20	good	31.56	good	31.25	good	28.20	good
2	N-butanol,	1.47	poor	1.78	poor	27.10	good	25.61	good	5.61	poor	8.51	poor	6.10	poor	-	-	-	-	-	-
3	Formaldehyde	2.78	poor	2.75	poor	34.20	good	28.20	good	25.61	good	33.43	good	38.20	good	15.30	moderate	14.34	moderate	-	-
4	Acetone,	5.89	poor	1.38	poor	32.20	good	26.20	good	28.90	good	31	good	31.29	good	49.90	excellent	45.65	excellent	40.20	excellent
5	Toluene	5.45	poor	1.29	poor	30.10	good	29.10	good	31.20	good	31.60	good	33.10	good	6.81	poor	4.32	poor	20.45	moderate
6	Phenol	4.97	poor	6.29	poor	2.41	poor	6.10	poor	33.0	good	36.10	good	34.92	good	21.22	moderate	20.45	moderate	-	-
7	Propionic acid	1.72	poor	3.28	poor	27.44	good	36.20	good	1.42	poor	3.44	poor	10.20	poor	-	-	-	-	-	-
8	Acetic acid	1.37	poor	1.49	poor	2.38	poor	7.89	poor	7.98	poor	3.93	poor	11.10	poor	1.32	poor	4.38	poor	19.20	moderate
9	Control	9.28		7.20		35.20		30.21		30.80		33.43		29.90		22.21		24.30		30.20	

Note - D =Diameter of colony in (mm); S= Sporulation.

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