

Efficacy of Chemicals on Spore Germination of Two Fungi



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Abstract

The successful establishment of microorganisms depends on their sensitivity to associate with the host in field or storage conditions. They cause severe damage to our food, feed, medicinal plants or parts and other agriculture products. Several chemicals like potassium permanganate, hexane, formalin, formic acid, propionic acid, acetone, and chloroform and petroleum ether were tested against spore germination of two fungi i.e, *Aspergillus flavus* and *Fusarium moniliforme*. The finding shows that chemicals considerably inhibited the spore germination of *A. flavus* and *F. moniliforme*. The higher concentration included greater inhibition in spore germination while lower concentration had less effect. But in case of all eight chemicals formalin and formic acid were found to be most effective chemical against spore germination at higher concentration.

Keywords: Efficacy of chemicals, Spore, Fungi.

Introduction

The need to prevent microbial spoilage of drug plants/parts in storage and field was urgently felt to minimize the deterioration of the therapeutic agents active against any particular disease. The application of chemicals to control mycoflora growing vigorously under natural storage and field conditions has been well examined in the recent past.

Aim of the Study

The present investigation aims at studying the effect of eight chemicals (hexane, formic acid, acetone, potassium permanganate, petroleum ether, formalin, chloroform and propionic acid) against the spore germination of two fungi i.e, *Aspergillus flavus* and *Fusarium moniliforme*.

Materials & Methods

Preparation of eight chemicals viz, hexane, formic acid, acetone, potassium permanganate, petroleum ether, formalin, chloroform and propionic acid were selected to study their effect on spore germination of test fungi viz, *Aspergillus flavus* and *Fusarium moniliforme*.

The spore suspension of *Aspergillus flavus* and *Fusarium moniliforme* was prepared separately in 10 ml of sterilized distilled water using 7-10 days old culture. The suspension was centrifuged and the sediments were washed twice by distilled water. The concentration of spore in each case was maintained (100-150/0.5 ml of distilled water) by dilution technique. 1 ml spore suspension was mixed with equal volume of extract. Percentage germination of spore was studied at the interval of 8 hours following the hanging drop method (Anonymous, 1947). Control was maintained in each case and average of the three readings was taken into account.

The inhibitory effect of chemicals was expressed in terms of percent spore germination and was calculated by following the formulae of Dixit et.al.(1978).

$$\% \text{ inhibition of spore germination} = \frac{G_c - G_t}{G_c} \times 100$$

G_c : Average spore germination under control

G_t : Average spore germination under treatment

Results and Discussions

A perusal of table-1 shows that all eight chemicals exhibited considerable inhibition in spore germination of *Aspergillus flavus* and *Fusarium moniliforme*, however, the degree of inhibition changed with the concentration as well as the nature of the chemicals used. In general, lower concentration (0.5-1 %) of all tested chemicals induced poor inhibitory effect on the germination of *Aspergillus flavus* and *Fusarium moniliforme* which gradually increased with the increase in the concentration of the chemicals.

Acetone, petroleum ether and potassium permanganate induced 31.81%, 52.84% and 42.61% respective inhibition in spore germination of *A. flavus* while 26.54%, 52.83% and 38.88% inhibition in *F. moniliforme* at 2% concentration. This gradually increased in the case of hexane, propionic acid and chloroform where *A. flavus* showed 78.40%, 82.38% and 87.27% inhibition and *F. moniliforme* exhibited 77.16%, 83.20% and 87.03% reduction in spore germination. The maximum inhibition in spore germination of *Aspergillus flavus* (87.27% and 88.86%) and *Fusarium moniliforme* (87.00% and 88.39%) was observed with the formic acid and formalin respectively. Similar observations were made by a number of investigators including Kaushik et.al. (1972), Sumbali and Mehrotra (1983), Prasad (1986) and Madhukar and Reddy (1991) who reported varied response of fungi with different chemicals. Singh (1992) also worked with different types of chemicals against spore germination and found satisfactory results. The various effect of chemicals depends on their chemical configuration as well as on the toxicity of the chemicals against a particular fungi.

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Table-1
Effect of Chemicals on Spore Germination of *A. flavus* and *F. moniliforme*

Name of chemicals	Concentration (%)	<i>A. flavus</i>	<i>A. flavus</i>	<i>F. moniliforme</i>	<i>F. moniliforme</i>
		(% spore germination)	(% inhibition over control)	(% spore germination)	(% inhibition over control)
Control		88		81	
Potassium permanganate	0.5	81.8	7.04	80.0	1.23
	1.0	78.1	11.25	77.37	4.56
	1.5	65.0	26.13	64.2	20.74
	2.0	50.5	42.61	49.5	38.88
Hexane	0.5	51.5	41.47	50.5	37.65
	1.0	45.2	48.63	44.2	45.43
	1.5	39.8	54.72	30.9	61.85
	2.0	19.0	78.40	18.5	77.16
Formalin	0.5	46.2	53.97	45.8	44.44
	1.0	40.0	54.31	38.6	52.34
	1.5	20.3	76.93	19.4	76.04
	2.0	09.8	88.86	09.4	88.39
Formic acid	0.5	35.4	59.72	35.0	56.79
	1.0	21.7	75.37	20.5	74.69
	1.5	17.5	80.11	17.0	79.01
	2.0	10.8	87.72	09.8	87.90
Propionic acid	0.5	56.2	36.13	53.5	33.95
	1.0	42.3	51.93	40.2	50.37
	1.5	36.2	58.86	32.8	59.50
	2.0	15.5	82.38	13.6	83.20
Acetone	0.5	80.0	9.09	78.0	3.70
	1.0	74.0	15.90	72.0	11.11
	1.5	62.0	29.54	61.0	24.69
	2.0	60.0	31.81	59.5	26.54
Chloroform	0.5	48.5	44.88	47.0	41.97
	1.0	41.2	53.18	40.8	49.62
	1.5	28.8	67.27	27.3	66.29
	2.0	11.2	37.27	10.5	87.03
Petroleum ether	0.5	70.5	19.88	69.8	13.82
	1.0	64.8	26.36	63.2	21.97
	1.5	20.5	42.61	49.6	38.76
	2.0	41.5	52.84	38.2	52.83