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In vitro Evaluation of Various Phytoextract against Detected Seed Mycoflora of Groundnut

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A B S T R A C T

A laboratory experiment was conducted to study the efficacy of some botanicals against seed-borne fungi isolated from Groundnut (*Arachis hypogaea* L.). For the management of different mycoflora Effect of nine botanicals were evaluated agents *Alternaria alternate, Aspergillus flavus, Aspergillus niger in vitro* condition. Effect of nine botanicals *viz. A. indica, O. sanctum, A. sativum, A. cepa, E. globules, L. camara, M. citrifolia, V. negundo* and *B. spectabilis* were found antifungal to *A. alternata, A. flavus* and *A. niger.* However, significantly highest mycelial growth inhibition was recorded with *A. indica* (80.18, 79.70, 81.95 %), followed by *A. sativum* (78.35, 78.28 and 80.93 %) and *A. cepa* (78.31, 77.26 and 80.08 %), respectively.

Introduction

Groundnut plays important role in the dietary supplement. Its kernels are consumed directly as raw, roasted or boiled kernels or as culinary oil. It contains about 46 to 50 per cent of oil in pure or unhydrogenated vanaspati form, which is used for cooking.

The several types of oil including: aromatic roasted peanut oil, refined peanut oil, used in the manufacture of soap, medicinal emulsions, wool and silk, artificial leather. Groundnut oil is composed of mixed glycerides and contains high proportion of unsaturated fatty acids, in particular oleic (50-60 %) and linoleic acid (18-30 %). Different micoflora is causes heavy losses during storage of groundnut, keeping in a view the research were carried out with using different phytoextract against *Alternaria alternate, Aspergillus flavus, Aspergillus niger*. During the investigations various experiments were conducted at the Department of Plant Pathology, College of Agriculture, VNMKV, Parbhani.

Materials and Methods

Plant extracts of nine botanicals were evaluated against *Alternaria alternata, Aspergillus flavus* and *A. niger*. Aqueous leaf extracts of the test botanicals were prepared by grinding with mixture-cum grinder the mixture was filtered through double layered

muslin cloth. Each of filtrates obtained were further filtered through Whatman No.1 filter paper using funnel and volumetric flasks (100 ml) the final clear extracts formed the standard plant extracts of 100 per cent concentration. These were evaluated (@ 10, 15 and 20 % each) *in vitro* against *Alternaria alternata, Aspergillus flavus* and *A. niger* applying Poisoned Food Technique (Nene and Thapliyal, 1993) and using Potato Dextrose Agar (PDA) as basal culture medium. An appropriate quantity of each plant extract (100 %) was separately mixed thoroughly with PDA medium in conical flasks (250 ml) to obtain desired concentration of 10, 15 and 20 per cent and autoclaved at 15 lbs/inch pressure for 15 to 20 minutes. Sterilized and cooled PDA medium mixed separately with plant extract was then poured (15 to 20 ml/plate) into sterile glass Petri plates (90 mm) and allowed to solidify at room temperature. Each plant extract and its respective concentration were replicated three times.

The plates containing PDA without any plant extract were maintained as untreated control. After solidification of PDA, all the treatment and control plates were aseptically inoculated by placing in the centre a 5 mm mycelial disc obtained from a week old actively growing pure culture of *Alternaria alternata, Aspergillus flavus* and *A. niger*. Plates containing without plant extract PDA and inoculated with mycelial disc of the test fungus served as untreated control. All these plates were then incubated at 26 ± 2°C temperature for a week or till the untreated control plates were fully covered with mycelial growth of the test fungus.

Experimental details

Design: CRD (Completely Randomized Design)
Replications: Three
Treatments: Ten

T_1: Neem (*Azadirachta indica)*
T_2: Tulsi (*Ocimum sanctum*)
T_3: Garlic (*Allium sativum*)
T_4: Onion (*Allium cepa*)
T_5: Noni (*Morinda citrifolia*),
T_6: Eucalyptus (*Eucalyptus globuse*)
T_7: Ghaneri (*Lantana camara*)
T_8: Nirgudi (*Vitex negundo*)
T_9: Bouganvillea (*Bouganvillea spectabilis*)
T_{10}: Control (untreated)

Observation on radial mycelial growth/colony diameter of the test fungus were recorded treatment wise at 24 hours interval and continued till mycelial growth of the test fungus was fully covered in the untreated control plates.

Per cent inhibition of mycelial growth over untreated control was calculated by applying the formula given by Vincent, 1927 as described under.

$$\text{Per cent inhibition} = \frac{C - T}{C} \times 100$$

Where,

C = growth of the test fungus in untreated control plate

T = growth of the test fungus in treated plate

Results and Discussion

In vitro bioefficacy of plant extracts / botanicals

Aqueous extracts of nine botanicals *viz.*, were evaluated *in vitro* (each @ 10, 15 and 20 %) against *A. alternata*, *A. flavus* and *A. niger* and the results obtained on its mycelial growth and inhibition were presented in the Table 1, 2 and 3 and depicted in the PLATE I, II, III and Figure 1, 2 and 3.

Radial mycelial growth of *A. alternata*

Results (Table 1 and PLATE I) revealed that aqueous extracts of all the nine botanicals tested were antifungal to *A. alternata,* which exhibited comparatively less mycelial growth than that of control and it was found to be decreased with increase in concentrations of the botanicals tested.

At 10 per cent concentration, radial mycelial growth of *A. alternata* was ranged from 28.24 mm (*A. indica*) to 35.25 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (28.24 mm), *A. sativum* (30.15 mm) and *A. cepa* (30.17 mm). These were followed by the botanicals *viz*., *O. sanctum* (30.45 mm), *E. globules* (30.55 mm), *L. camara* (31.72 mm), *M. citrifolia* (32.88 mm), *V. negundo* (32.88 mm) and *B. spectabilis* (35.25 mm).

At 15 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 per cent and it ranged from 16.65 mm (*A. indica*) to 24.18 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (16.65 mm), *A. sativum* (19.09 mm) and *A. cepa* (19.15 mm). These were followed by the botanicals *viz*., *O. sanctum* (19.68 mm), *E. globules* (20.38 mm), *L. camara* (22.15 mm), *M. citrifolia* (22.65 mm), *V. negundo* (23.35 mm) and *B. spectabilis* (24.18 mm).

At 20 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 and 15 per cent and it ranged from 8.61 mm (*A. indica*) to 14.15 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (8.61 mm), *A. sativum* (9.21 mm) and *A. cepa* (9.25 mm). These were followed by the botanicals *viz*., *O. sanctum* (9.79 mm), *E. globules* (10.37 mm), *L. camara* (11.38 mm), *M. citrifolia* (11.81 mm), *V. negundo* (13.00 mm) and *B. spectabilis* (14.15 mm).

Mycelial growth inhibition of *A. alternata*

At 10 per cent concentration, mycelial growth inhibition of *A. alternate* was ranged from 60.83 (*B. spectabilis*) to 68.62 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (68.62 %), *A. sativum* (66.50 %) and *A. cepa* (66.48 %). These were followed by the botanicals *viz*., *O. sanctum* (66.17 %), *E. globules* (66.06 %), *L. camara* (64.76 %), *M. citrifolia* (64.58 %), *V. negundo* (63.48 %) and *B. spectabilis* (60.83 %).

At 15 per cent, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed. at 10 per cent and it was ranged from 73.13 (*B. spectabilis*) to 81.50 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (81.50 %), *A. sativum* (78.79 %) and *A. cepa* (78.72 %). These were followed by the botanicals *viz*., *O. sanctum* (78.13 %), *E. globules* (77.36 %), *L. camara* (75.39 %), *M. citrifolia* (74.83 %), *V. negundo* (74.06 %) and *B. spectabilis* (73.13 %).

At 20 per cent, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed at 10 and 15 per cent and it was ranged from 84.28 (*B. spectabilis*) to 90.43 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (90.43 %), *A. sativum* (89.77 %) and *A. cepa* (89.72 %). These were followed by the botanicals *viz*., *O. sanctum* (89.12 %), *E. globules* (88.48 %), *L. camara* (87.35 %), *M.*

citrifolia (86.88 %), *V. negundo* (85.56 %) and *B. spectabilis* (84.28 %).

Result (Table 1) revealed that botanicals with different three concentrations tested were found antifungal against *A. alternate* and significantly inhibited its mycelial growth, over control. The effectiveness of *A. indica*, *A. sativum* and *A. cepa* extracts were due to the presence of bioactive and antifungal compounds like phenolic substances or non-volatile compounds. However, *A. indica*, *A. sativum* and *A. cepa* showed maximum inhibition against *A. alternata* in groundnut crop reported by Abd EI-Ghany (2015), Manoorkar and Gachande, (2014), Kantwa *et al.,* (2014), Jat and Aaglave (2013), Chandra *et al.,* (2013), Afzal *et al.,* (2010) and Kadam *et al.,* (2008). Studies on similar result of botanicals on other crops like safflower by Taware *et al.,* (2015), Devi *et al.,* (2013) and Ranaware *et al.,* (2010), soybean by Bhosale *et al.,* (2014), green gram by Swami and Alane (2013), onion by Mishra *et al.,* (2012), sunflower by Mesta *et al.,* (2009), wheat by Shafique *et al.,* (2007) and cotton by Ramegowda *et al.,* (2007).

Radial mycelial growth of *A. flavus*

Results (Table 2 ad PLATE II) revealed that aqueous extracts of all the 9 botanicals tested were antifungal to *A. flavus.*

At 10 per cent concentration, radial mycelial growth of *A. flavus* was ranged from 25.05 mm (*A. indica*) to 32.74 mm (*B. spectabilis*) as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (25.05 mm), *A. sativum* (25.59 mm) and *A. cepa* (26.55 mm). These were followed by the botanicals *viz*., *O. sanctum* (27.72 mm), *E. globules* (28.90 mm), *L. camara* (29.65 mm), *M. citrifolia* (30.71 mm), *V. negundo* (31.58 mm) and *B. spectabilis* (32.74 mm).

At 15 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 per cent and it ranged from 18.01 mm (*A. indica*) to 24.51 mm (*B. spectabilis*) as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (18.01 mm), *A. sativum* (20.45 mm) and *A. cepa* (21.72 mm). These were followed by the botanicals *viz*., *O. sanctum* (21.88 mm), *E. globules* (22.55 mm), *L. camara* (22.95 mm), *M. citrifolia* (23.28 mm), *V. negundo* (23.45 mm) and *B. spectabilis* (24.51 mm).

At 20 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 and 15 per cent and it ranged from 11.42 mm (*A. indica*) to 17.25 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (11.42 mm), *A. sativum* (12.62 mm) and *A. cepa* (12.92 mm).

These were followed by the botanicals *viz*., *O. sanctum* (13.19 mm), *E. globules* (14.48 mm), *L. camara* (15.55 mm), *M. citrifolia* (15.75 mm), *V. negundo* (16.75 mm) and *B. spectabilis* (17.25 mm).

Mycelial growth inhibition of *A. flavus*

At 10 per cent concentration, mycelial growth inhibition of *A. flavus* was ranged from 63.69 (*B. spectabilis*) to 72.17 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (72.17 %), *A. sativum* (71.57 %) and *A. cepa* (70.28 %).

These were followed by the botanicals *viz., O. sanctum* (69.20 %), *E. globules* (67.06 %), *L. camara* (67.89 %), *M. citrifolia* (65.83 %), *V. negundo* (64.91 %) and *B. spectabilis* (63.69 %).

Table.1 *In vitro* efficacy of plant extracts against *A. alternata*

Tr. No.	Treatments	Col. dia.* (mm) at Conc.			Av. (mm)	Per cent Inhibition			Av. (%)
		10 %	15 %	20 %		10 %	15 %	20 %	
T_1	Neem (*A. indica*)	28.24	16.65	8.61	17.83	68.62 (55.93)	81.50 (64.53)	90.43 (71.98)	**80.18 (63.56)**
T_2	Tulsi (*O. sanctum*)	30.45	19.68	9.79	19.97	66.17 (54.43)	78.13 (62.12)	89.12 (70.74)	**77.81 (61.90)**
T_3	Garlic (*A. sativum*)	30.15	19.09	9.21	19.48	66.50 (54.63)	78.79 (62.58)	89.77 (71.35)	**78.35 (62.27)**
T_4	Onion (*A. cepa*)	30.17	19.15	9.25	19.52	66.48 (54.62)	78.72 (62.53)	89.72 (71.30)	**78.31 (62.24)**
T_5	Noni (*M.citrifolia*)	31.88	22.65	11.81	22.11	64.58 (53.48)	74.83 (59.89)	86.88 (68.76)	**75.43 (60.29)**
T_6	Eucalyptus (*E. globules*)	30.55	20.38	10.37	20.43	66.06 (54.38)	77.36 (61.59)	88.48 (70.16)	**77.30 (61.55)**
T_7	Ghaneri (*L. camara*)	31.72	22.15	11.38	21.75	64.76 (53.58)	75.39 (60.26)	87.35 (69.17)	**75.83 (60.55)**
T_8	Nirgudi (*V. negundo*)	32.88	23.35	13.00	23.08	63.48 (52.82)	74.06 (59.38)	85.56 (67.67)	**65.37 (53.95)**
T_9	Bouganvillea (*B. spectabilis*)	35.25	24.18	14.15	24.53	60.83 (51.25)	73.13 (58.78)	84.28 (66.64)	**72.75 (58.53)**
T_{10}	Control	90	90	90	90	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	**0.00 (0.00)**
	SEm±	**0.39**	**0.35**	**0.39**	**0.38**	**0.45**	**0.39**	**0.37**	**0.45**
	C.D. @ 1%	**1.29**	**1.15**	**1.09**	**1.18**	**1.49**	**1.29**	**1.21**	**1.33**

*-Mean of three replications,
Dia.: Diameter, Av.: Average, Conc.: Concentration, figures in parentheses arc sine transformed values

Table.2 *In vitro* efficacy of various plant extracts against *A. flavus*

Tr. No.	Treatments	Col. dia.* (mm) at Conc.			Av. (mm)	Per cent Inhibition			Av. (%)
		10 %	15 %	20 %		10 %	15 %	20 %	
T_1	Neem (*A. indica*)	25.05	18.01	11.42	18.16	72.17 (58.16)	79.99 (63.43)	86.94 (68.81)	**79.70 (63.22)**
T_2	Tulsi (*O. sanctum*)	27.72	21.88	13.19	20.93	69.20 (56.29)	75.69 (60.46)	85.34 (67.48)	**76.74 (61.17)**
T_3	Garlic (*A. sativum*)	25.59	20.45	12.62	19.55	71.57 (57.78)	77.28 (61.53)	85.98 (68.01)	**78.28 (62.22)**
T_4	Onion (*A. cepa*)	26.55	21.72	12.92	20.40	70.28 (56.96)	75.87 (60.58)	85.64 (67.73)	**77.26 (61.51)**
T_5	Noni (*M.citrifolia*)	30.71	23.28	15.75	23.25	65.83 (54.23)	74.13 (59.43)	82.50 (65.27)	**74.15 (59.44)**
T_6	Eucalyptus (*E. globules*)	29.65	22.95	15.55	22.72	67.06 (54.98)	74.50 (59.67)	82.72 (65.43)	**74.76 (59.84)**
T_7	Ghaneri (*L. camara*)	28.90	22.55	14.48	21.98	67.89 (55.48)	74.94 (59.96)	83.91 (66.35)	**75.58 (60.39)**
T_8	Nirgudi (*V. negundo*)	31.58	23.45	16.75	23.93	64.91 (53.67)	73.94 (59.30)	81.39 (64.44)	**73.41 (58.96)**
T_9	Bouganvillea (*B. spectabilis*)	32.74	24.51	17.25	24.83	63.69 (52.94)	72.76 (58.54)	80.83 (64.03)	**72.43 (58.33)**
T_{10}	Control	90	90	90	90	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	**0.00 (0.00)**
	SEm±	**0.41**	**0.37**	**0.36**	**0.38**	**0.45**	**0.41**	**0.38**	**0.41**
	C.D. @ 1%	**1.35**	**1.21**	**1.19**	**1.25**	**1.50**	**1.35**	**1.25**	**1.37**

*-Mean of three replications,
Dia.: Diameter, Av.: Average, Conc.: Concentration, figures in parentheses arc sine transformed value

Table.3 *In vitro* efficacy of various plant extracts against *A. niger*

Tr. No.	Treatments	Col. dia.* (mm) at Conc.			Av. (mm)	Per cent Inhibition			Av. (%)
		10 %	15 %	20 %		10 %	15 %	20 %	
T_1	Neem (*A. indica*)	25.22	14.34	9.18	16.25	71.98 (58.03)	84.07 (66.48)	89.80 (71.37)	**81.95 (64.85)**
T_2	Tulsi (*O. sanctum*)	27.30	16.62	12.48	18.8	69.67 (56.58)	81.53 (64.55)	86.13 (68.13)	**79.11 (62.80)**
T_3	Garlic (*A. sativum*)	25.45	15.75	10.28	17.16	71.72 (57.87)	82.50 (65.27)	88.58 (70.25)	**80.93 (64.11)**
T_4	Onion (*A. cepa*)	26.94	15.84	10.88	17.87	70.07 (56.83)	82.40 (65.20)	87.76 (69.52)	**80.08 (63.49)**
T_5	Noni (*M.citrifolia*)	29.71	18.39	14.67	20.92	66.99 (54.93)	79.57 (63.13)	83.70 (66.19)	**76.75 (61.17)**
T_6	Eucalyptus (*E. globules*)	28.53	17.19	12.78	19.50	68.30 (55.73)	80.90 (64.09)	85.80 (67.86)	**78.11 (62.10)**
T_7	Ghaneri (*L. camara*)	28.90	17.32	13.39	19.87	67.89 (55.48)	80.76 (63.98)	85.12 (67.31)	**77.92 (61.97)**
T_8	Nirgudi (*V. negundo*)	30.71	19.65	15.67	22.01	65.83 (54.23)	78.17 (62.15)	82.59 (65.34)	**75.53 (60.35)**
T_9	Bouganvillea (*B. spectabilis*)	31.65	22.83	17.15	23.87	64.83 (53.63)	74.63 (59.76)	80.94 (64.11)	**73.47 (58.99)**
T_{10}	Control	90	90	90	90	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	**0.00 (0.00)**
	SEm±	**0.39**	**0.37**	**0.33**	**0.36**	**0.43**	**0.41**	**0.37**	**0.40**
	C.D. @ 1%	**1.28**	**1.23**	**1.09**	**1.20**	**1.42**	**1.37**	**1.22**	**1.34**

*-Mean of three replications,
Dia.: Diameter, Av.: Average, Conc.: Concentration, figures in parentheses arc sine transformed value

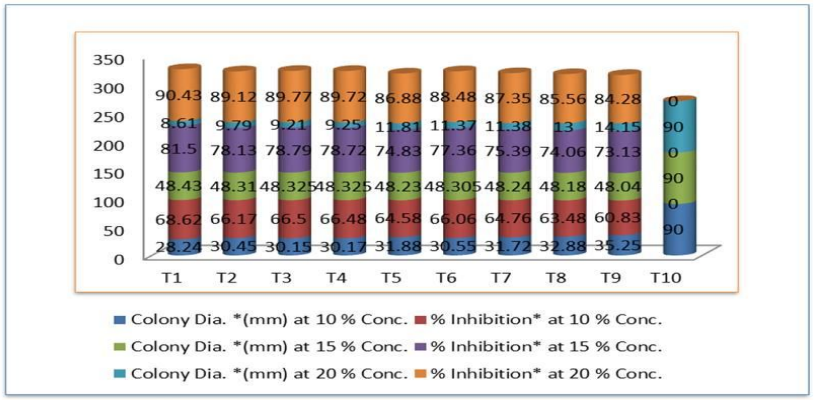

Fig. 1 *In vitro* efficacy of Botanicals (*A. alternata*)

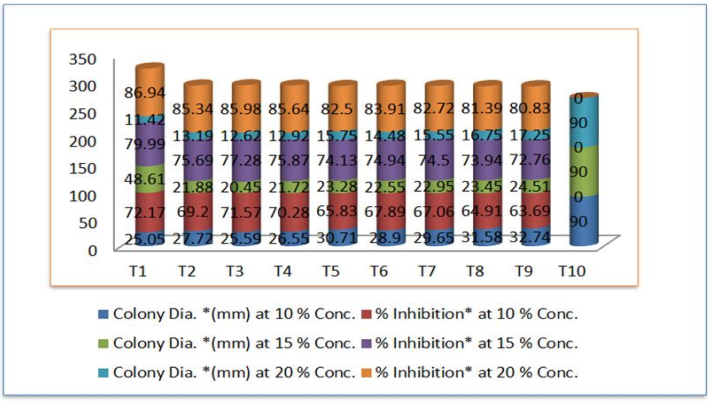

Fig. 2 *In vitro* efficacy of Botanicals (*A. flavus*)

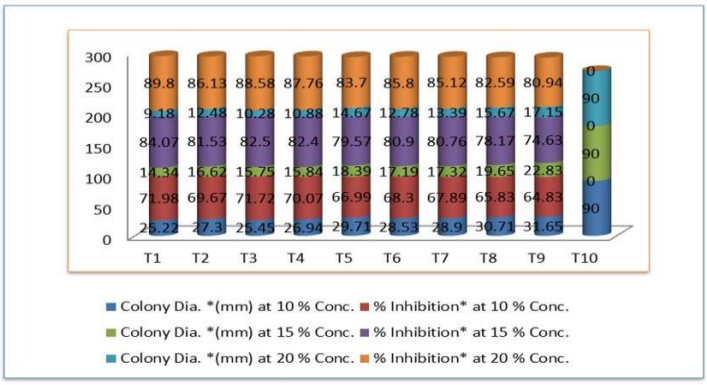

Fig. 3 *In vitro* efficacy of Botanicals (*A. niger*)

PLATE I

10 % (A) 15 % (B) 20% (C)

In vitro efficacy of botanicals against mycelial growth and inhibition of *A. alternata.*

PLATE II

10 % (A) 15 % (B) 20% (C)

In vitro efficacy of botanicals against mycelial growth and inhibition of *A. flavus*

PLATE III

10 % (A) 15 % (B) 20% (C)

In vitro efficacy of botanicals against mycelial growth and inhibition of *A. niger.*

At 15 per cent concentration, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed at 10 per cent and it was ranged from 72.76 (*B. spectabilis*) to 79.99 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (79.99 %), *A. sativum* (77.28 %) and *A. cepa* (75.87 %). These were followed by the botanicals *viz.*, *O. sanctum* (75.69 %), *E. globules* (74.94 %), *L. camara* (74.50 %), *M. citrifolia* (74.13 %), *V. negundo* (73.94 %) and *B. spectabilis* (72.76 %).

At 20 per cent concentration, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed at 10 and 15 per cent and it was ranged from 80.83 (*B. spectabilis*) to 86.94 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (86.94 %), *A. sativum* (85.98 %) and *A. cepa* (85.64 %). These were followed by the botanicals *viz.*, *O. sanctum* (85.34 %), *E. globules* (83.91 %), *L. camara* (82.72%), *M. citrifolia* (82.50 %), *V. negundo* (81.39 %) and *B. spectabilis* (80.83 %).

Radial mycelial growth of *A. niger*

Results (Table 3) revealed that aqueous extracts of all the nine botanicals tested were fungistatic / antifungal to *A. niger*, which exhibited comparatively less mycelial growth than that of untreated control (PLATE III), and it was found to be decreased with increase in concentrations of the botanicals tested.

At 10 per cent concentration, radial mycelial growth of *A. niger* was ranged from 25.22 mm (*A. indica*) to 31.65 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (25.22 mm) and *A. sativum* (25.45 mm) and *A. cepa* (26.94 mm). These were followed by the botanicals *viz*., *O. sanctum* (27.30 mm), *E. globules* (28.53 mm), *L. camara* (28.90 mm), *M. citrifolia* (29.71 mm), *V. negundo* (30.71 mm) and *B. spectabilis* (31.65 mm). At 15 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 per cent and it ranged from 14.34 mm (*A. indica*) to 22.83 mm (*B. spectabilis*), as against control (90.00 mm).

However, significantly least mycelial growth was recorded with *A. indica* (14.34 mm), *A. sativum* (15.75 mm) and *A. cepa* (15.84 mm). These were followed by the botanicals *viz*., *O. sanctum* (16.62 mm), *E. globules* (17.19 mm), *L. camara* (17.32 mm), *M. citrifolia* (18.39 mm), *V. negundo* (19.65 mm) and *B. spectabilis* (22.83 mm).

At 20 per cent concentration, all the botanicals tested exhibited similar trend with decreased mycelial growth as compared to that of observed at 10 and 15 per cent and it ranged from 9.18 mm (*A. indica*) to 17.15 mm (*B. spectabilis*), as against control (90.00 mm). However, significantly least mycelial growth was recorded with *A. indica* (9.18 mm), *A. sativum* (10.28 mm) and *A. cepa* (10.88 mm). These were followed by the botanicals *viz*., *O. sanctum* (12.48 mm), *E. globules* (12.78 mm), *L. camara* (13.39 mm), *M. citrifolia* (14.67 mm), *V. negundo* (15.67 mm) and *B. spectabilis* (17.15 mm).

Mycelial growth inhibition of *A. niger*

At 10 per cent, mycelial growth inhibition of *A. niger*was ranged from 64.83 (*B. spectabilis*) to 71.98 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (71.98 %), *A. sativum* (71.72 %) and *A. cepa* (70.07 %). These were followed by the botanicals *viz., O. sanctum* (69.67 %), *E. globules* (68.30 %), *L. camara* (67.89 %), *M. citrifolia* (66.99 %), *V. negundo* (65.83 %) and *B. spectabilis* (64.83 %).

At 15 per cent, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed at 10 per cent and it was ranged from 74.63 (*B. spectabilis*) to

84.07 (*A. indica*) per cent. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (84.07 %), *A. sativum* (82.50 %) and *A. cepa* (82.40 %).

These were followed by the botanicals *viz.*, *O. sanctum* (81.53 %), *E. globules* (80.90 %), *L. camara* (80.76 %), *M. citrifolia* (79.57 %), *V. negundo* (78.17 %) and *B. spectabilis* (74.63 %).

At 20 per cent, all the botanicals tested exhibited similar trend with increased mycelial growth inhibition that of observed at 10 and 15 per cent and it was ranged from 80.94 (*B. spectabilis*) to 89.80 (*A. indica*) per cent.

However, significantly highest mycelial growth inhibition was recorded with *A. indica* (89.80 %), *A. sativum* (88.58 %) and *A. cepa* (87.76 %). These were followed by the botanicals *viz.*, *O. sanctum* (86.13 %), *E. globules* (85.50 %), *L. camara* (85.12 %), *M. citrifolia* (83.70 %), *V. negundo* (82.59 %) and *B. spectabilis* (80.94 %).

Effect of nine botanicals *viz. A. indica*, *O. sanctum*, *A. sativum*, *A. cepa*, *E. globules*, *L. camara*, *M. citrifolia*, *V. negundo* and *B. spectabilis* evaluated *in vitro* were found antifungal to *A. alternata*, *A. flavus* and *A. niger*. However, significantly highest mycelial growth inhibition was recorded with *A. indica* (80.18, 79.70, 81.95 %), followed by *A. sativum* (78.35, 78.28 and 80.93 %) and *A. cepa* (78.31, 77.26 and 80.08 %), respectively.

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