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IN VITRO SCREENING OF FUNGICIDES AND PLANT EXTRACTS AGAINST SIX PATHOGENIC FUNGI ISOLATED FROM COTTON (*GOSSYPIUM ARBOREUM* L.) SEED

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Abstract

Six pathogenic fungi, namely *Aspergillus flavus* Link., *A. niger* van Tieghem (Type-I)., *Curvularia lunata* (Wakker) Boedijn, *Fusarium moniliforme* var. *subglutinans* Wr. & Reink., *Fusarium sporotrichioides* Sherb., Mem. and *Rhizoctonia solani* J.G. Kuhn were isolated from cotton seeds. Five fungicides *viz*., Acrobat MZ, Autostin 50 WDG, Capvit 50 WP, Nativo 75 WP and Thiovit 80 WG were selected to evaluate *in vitro* efficacy at 100, 200, 300, 400 and 500 ppm concentrations against pathogenic fungi following poisoned food technique. Out of 5 fungicides Nativo 75 WP showed the complete growth inhibition of above mentioned six pathogenic fungi at all the used concentrations. Autostin 50 WDG showed complete growth inhibition of all tested pathogenic fungi except *Curvularia lunata*. Leaf extract of five angiospermic plants *viz*., *Adhatoda vasica*, *Aegle mermelos*, *Azadirachta indica*, *Datura metel* and *Psidium guajava* were selected to evaluate *in vitro* fungitoxicity at 5, 10, 15 and 20% concentrations against the test pathogens. At 20% concentration, out of the 5 plants extracts *A. indica* was found to be most active to inhibit the growth of *Aspergillus niger* (Type-I) (65.56%) and *Fusarium moniliforme* var. *subglutinans* (75.00%), *Psidium guajava* were most active against *A. flavus* (81.29%) and *Curvularia lunata* (72.23%), and *Datura metel* was most active against *Fusarium sporotrichioides* (64.77%) and *Rhizoctonia solani* (42.44%).

Introduction

Cotton (*Gossypium* spp.) is the most important natural textile fiber and vegetable oil source of the world (Vollmann and Laimer 2013). The genus *Gossypium* comprises around 50 species (Wendel *et al*. 2009) of which *G. hirsutum*, *G. barbadense*, *G. arboreum* and *G. herbaceum* are cultivated commercially throughout the world. *Gossypium arboreum* is grown in hilly regions of Bangladesh mainly in Chittagong and the Chittagong hill tracts. Economically it is very important as the lint is of superior quality, its staple is coarse and very short but very strong (Pandey 1980). More than 80 countries in the world and 2.5% cultivable lands are being used to cultivate cotton Nearly 80% of garments made in Bangladesh are sourced from cotton (Uddin and Mortuza 2015). Due to the rapid flourishing domestic weaving and knitting industries in Bangladesh, the overall consumption of cotton is also increasing enormously day by day. According to Bangladesh Textile Mills Association (BTMA), Bangladesh now imports approximately $ 2 billion worth of cotton every year.

Every year the yield of cotton production is decreased by different seedling disease which are mainly caused by fungi, bacteria and viruses. Seedling diseases are generally caused by *Thielaviopsis* spp., *Rhizoctonia* spp., *Pythium* spp. and *Fusarium* spp. (Johnson and Chambers 1973). To mitigate the risk associated with fungal infection in cotton seeds, fungicides have been recommended (Hillocks *et al*. 1988, McLean and Gazaway 2000). Deposition of the residual fungicides in the soil, in plants and their fruits can negatively affect both the environment and human population in the long run. To minimize the environmental contamination and produce biologically safer fungicides, many alternatives have been tried, including physical treatments,

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biological control, use of low toxicity chemicals such as plant extracts (Shahnaz *et al.* 2010, Sayago *et al.* 2012). Among them, the use of plant extracts has shown promising effects due to minimal environmental impacts and little to no danger to the consumers (Varma *et al*. 1999). Due to cost effectiveness and easy to make, plant extracts are gaining a lot of attention these days. Over the last three decades some articles related to the control of *Fusarium* species on various plants extract has been published (So 1990, Bansal and Rajesh 2000).

Present investigation was undertaken to screening of some selected fungicides and fungitoxicity of selected plant extracts against the pathogenic fungi isolated from cotton seeds.

Materials and Methods

Three varieties of cotton seeds, namely HC-1, HC-2 and HC-3 were collected from Cotton Development Board (CDB), Khamarbari, Farmgate, Dhaka. The collected seed samples were kept in polythene bag with airtight container in two conditions, one in room temperature (25°C) and other in refrigerator at 4ºC temperature for subsequent use. Fungi associated with cotton seeds were isolated following 'Blotter' and 'Tissue Planting' methods (Shamsi *et al.* 2010). The experiment was conducted in the laboratory of Mycology and Plant Pathology, Department of Botany, University of Dhaka, Bangladesh.

Identification of the isolated pathogenic fungi was determined following standard literatures (Thom and Rapper 1945, Benoit and Mathur 1970, Booth 1971, Barnett and Hunter 2000). Pathogenicity test of the isolated fungi were done following 'seed inoculation technique' (Chowdhury *et al.* 2015).

Five fungicides with different active ingredients *viz.,* Acrobat MZ (60% mancozeb and 9% dimethamorph), Autostin 50 WDG (50% carbendazim), Capvit 50 WP (copper oxychloride), Nativo 75 WP (tebuconazole and trifloxystrobin) and Thiovit 80 WG (sulphur) were collected from the Siddique Bazar, Gulistan, Dhaka. *In vitro* fungitoxicity of these fungicides at 100, 200, 300, 400 and 500 ppm concentrations was evaluated against *Aspergillus flavus, Aspergillus niger* (Type-I), *Curvularia lunata, Fusarium moniliforme* var. *subglutinans, Fusarium sporotrichioides* and *Rhizoctonia solani.*

For each fungicide, a stock solution having the concentration of 10,000 ppm was prepared. The calculated amount of stock solution of a fungicide was supplemented with sterilized PDA medium to get the concentration of 100, 200, 300, 400 and 500 ppm, respectively. The concentrations of fungicides were expressed in terms of its active ingredients. In control set, required amount of sterilized water instead of fungicide solution was added to the PDA medium. Then 15 ml of medium was poured in each Petri plate and allowed them to solidify.

Therefore, at the center of the plate 5 mm agar disk of test pathogen was inoculated. Three replications were maintained in each treatment. The plates were incubated at 25 ± 2°C in an incubator. The radial growth of control and treatment plates were measured at 5 days of incubation.

Fresh leaves of five angiospermic plants, namely *Adhatoda vasica* Nees., *Azadirachta indica* A. Juss., *Datura metel* L., *Aegle mermelos* L. and *Psidium gujava* L. were selected for evaluating their efficacy on the radial growth of six pathogenic fungi isolated from hill cotton *viz.*, *Aspergillus flavus, Aspergillus niger* (Type-I), *Curvularia lunata, Fusarium moniliforme* var. *subglutinans, Fusarium sporotrichioides* and *Rhizoctonia solani*. Leaves of the selected plants were collected from the Botanical Garden of Curzon Hall Campus and Kabi Sufia Kamal Hall, University of Dhaka. Leaves of each plant were thoroughly washed in tap water, air dried and then used for fresh extract preparation. Leaf extracts were prepared by crushing known weight of fresh

leaves with distilled water in ratio of 1 : 1 (w/v). In this method, the requisite amount of the filtrate of each plant extract was mixed with PDA medium to get 5, 10, 15 and 20% concentrations.

The medium thus prepared was poured into sterilized Petri plates and allowed to solidify. Each Petri plate was inoculated centrally with a 5 mm agar disc cut from the margin of actively growing culture of the test pathogens. In the control set, a Petri plate containing PDA medium with the requisite amount of distilled water instead of a plant extract was also inoculated with agar disc of the test pathogen in the same manner as described above. Three replications were maintained for both the experimental and control sets. The inoculated Petri plates were incubated at 25 ± 2˚C. The radial growth of the colonies of the test pathogen was measured after 5 days of incubation.

The fungitoxicity of the fungicides and plant parts extracts in terms of percentage inhibition of mycelial growth were calculated by using the following formula:

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

where, I = Per cent growth inhibition, C = Growth in control, T = Growth in treatment

The data were collected as inhibition percentage of the radial growth of the pathogen in mm in each replication and evaluated by analysis of variance (ANOVA) by using STAR statistical program and means were compared using DMRT.

Results and Discussion

Twelve species of fungi were isolated from the seeds of three cotton varieties (HC-1, HC-2 and HC-3) following "Tissue planting" and "Blotter" methods during the period of April 2017. The isolated fungi were *Aspergillus flavus* Link, *A. fumigatus Fresenius, A. niger* van Tieghem (Type-I), *A. niger* (Type-II), *Chaetomium globosum* Kunze ex Fr., *Curvularia lunata* (Wakker) Boedijn, *Fusarium moniliforme* var. subglutinans Wr. & Reink, *Fusarium sporotrichioides* Sherb., Mem., *Penicillium* Link, *Pestalotiopsis guepinii* (Desm.) Stay., *Rhizoctonia solani* J.G. Kuhn, *Rhizopus stolonifer* (Ehrenb.: Fr.) Vuill. and *Trichoderma viride* Pers (Nahar *et al.* 2019).

Out of 12 isolated fungi six, namely *Aspergillus flavus, A. niger* (Type-1), *Curvularia lunata, Fusarium moniliforme* var. *subglutinans, Fusarium sporotrichioides* and *Rhizoctonia solani* showed pathogenic potentiality following 'seed inoculation technique'. These pathogenic fungi had remarkable effect on seed germination, root shoot length and mortality of seedlings (Shamsi and Nahar 2019).

Amongst five selected fungicides the complete inhibition of the radial growth of *Aspergillus flavus* was observed with Autostin 50 WDG and Nativo 75 WP at all the treated concentrations. Capvit 50 WP showed complete growth inhibition of the fungus at 300, 400 and 500 ppm concentrations. The toxicity of these fungicides against *Aspergillus flavus* at 100 ppm concentration in descending order was Nativo 75 WP / Autostin 50 WDG > Acrobat MZ > Thiovit 80 WG > Capvit 50 WP (Table 1). Out of five fungicides, the complete inhibition of the radial growth of *Aspergillus niger* (Type-I) was observed in Autostin 50 WDG and Nativo 75 WP at all the treated concentrations. At 100 ppm Capvit 50 WP showed the lowest inhibition (48.7%). Thiovit 80 WG showed no inhibitory activity at all (Table 1). The toxicity of these fungicides against *Aspergillus niger* (Type-I) at 100 ppm concentration in descending order was Nativo 75 WP/Autostin 50 WDG > Acrobat MZ > Capvit 50 WP > Thiovit 80 WG (Table 1).

The radial growth of *Curvularia lunata* was completely inhibited by Nativo 75 WP at all the treated concentrations. Capvit 50 WP showed complete growth inhibition at 400 and 500 ppm

Table 1. Per cent inhibition of radial growth of pathogenic fungi at different concentrations (ppm) of fungicides.

Name of fungi	Fungicides	% inhibition of radial growth of fungi at different concentrations (ppm)				
		100	200	300	400	500
Aspergillus flavus	Acrobat MZ	65.19^{b}	69.44^{c}	72.78^{b}	75.56^{b}	79.67^{b}
	Autostin 50 WDG	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Capvit 50 WP	34.62^{d}	72.12^{b}	100^{a}	100^{a}	100^{a}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	51.67^{c}	59.44^{d}	61.67^{c}	64.26^{c}	68.11^{c}
	CV%	1.35	1.53	0.64	0.82	1.20
Aspergillus niger (Type-I)	Acrobat MZ	61.11^{b}	65.0^{b}	68.52^{b}	71.48^{b}	75.56^{b}
	Autostin 50 WDG	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Capvit 50 WP	48.7^{c}	59.44^{c}	65.0^{c}	68.89^{c}	72.44^{c}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	0^{d}	0^{d}	0^{d}	0^{d}	0^{d}
	CV%	0.73	1.58	0.57	0.76	0.83
Curvularia lunata	Acrobat MZ	37.26^{c}	48.67^{d}	56.27^{d}	67.68^{b}	100^{a}
	Autostin 50 WDG	43.62^{bc}	53.83^{c}	59.15^{c}	64.89^{b}	70.64^{b}
	Capvit 50 WP	48.53^{b}	66.74^{b}	80.0^{b}	100^{a}	100^{a}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	18.6^{d}	28.29^{e}	39.15^{e}	46.89^{c}	56.2^{c}
	CV%	6.49	3.57	1.81	2.05	3.25
Fusarium moniliforme var. *subglutinans*	Acrobat MZ	37.72^{b}	46.78^{b}	58.19^{b}	64.91^{b}	70.18^{b}
	Autostin 50 WDG	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Capvit 50 WP	16.25^{d}	25.09^{d}	36.39^{d}	46.99^{c}	61.84^{c}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	27.08^{c}	35.76^{c}	45.14^{c}	48.96^{c}	56.59^{d}
	CV%	5.16	3.66	3.11	3.43	2.51
Fusarium sporotrichioides	Acrobat MZ	33.96^{b}	45.28^{b}	55.47^{b}	59.62^{b}	73.58^{b}
	Autostin 50 WDG	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Capvit 50 WP	25.19^{a}	30.12^{d}	44.94^{c}	61.48^{b}	100^{a}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	27.88^{bc}	35.89^{c}	43.27^{c}	50.96^{c}	56.09^{c}
	CV%	7.01	3.68	3.39	3.10	1.13
Rhizoctonia solani	Acrobat MZ	16.22^{b}	31.89^{b}	35.78^{b}	38.89^{c}	46.89^{c}
	Autostin 50 WDG	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Capvit 50 WP	0^{c}	20.33^{d}	31.11^{c}	68.67^{b}	83.56^{b}
	Nativo 75 WP	100^{a}	100^{a}	100^{a}	100^{a}	100^{a}
	Thiovit 80 WG	16.33^{b}	25.78^{c}	31.11^{c}	33.33^{d}	36.67^{d}
	CV%	0.71	4.96	2.68	1.28	0.73

Means followed by the same letter within a column did not differ significantly at 5% level by DMRT.

concentrations. Acrobat MZ showed complete inhibition at 500 ppm concentration. The lowest activity (18.6%) was shown by Thiovit 80 WG at 100 ppm concentration (Table 1). The toxicity of these fungicides against *Curvularia lunata* at 100 ppm concentration in descending order was Nativo 75 WP > Capvit 50 WP > Autostin 50 WDG > Acrobat MZ > Thiovit 80 WG (Table 1). In *Fusarium moniliforme* var. *subglutinans* the complete inhibition was observed with Autostin 50 WDG and Nativo 75 WP at all the treated concentrations. At 500 ppm concentration Acrobat MZ, Capvit 50 WP and Thiovit 80 WG showed 70.18, 61.84 and 56.59% radial growth inhibitions, respectively. The toxicity of these fungicides against *Fusarium moniliforme* var. *subglutinans* at 100 ppm concentration in descending order was Nativo 75 WP / Autostin 50 WDG > Acrobat MZ > Thiovit 80 WG > Capvit 50 WP (Table 1). The radial growth of *Fusarium sporotrichioides* was completely inhibited by Autostin 50 WDG and Nativo 75 WP at all the treated concentrations. Capvit 50 WP showed complete growth inhibition at 500 ppm concentrations. The toxicity of these fungicides against *Fusarium sporotrichioides* at 100 ppm concentration in descending order was Nativo 75 WP/Autostin 50 WDG > Acrobat MZ > Thiovit 80 WG > Capvit 50 WP (Table 1).

In *Rhizoctonia solani* the complete inhibition was observed with Autostin 50 WDG and Nativo 75 WP at all the treated concentrations. At 500 ppm concentration Acrobat MZ, Capvit 50 WP and Thiovit 80 WG showed 46.89, 83.56 and 36.67% radial growth inhibitions, respectively. The toxicity of these fungicides against *Rhizoctonia solani* at 100 ppm concentration in descending order was Nativo 75 WP/Autostin 50 WDG > Thiovit 80 WG > Acrobat MZ > Capvit 50 WP (Table 1). It is also apparent from the results that the per cent growth inhibition of the test pathogens gradually increased with the increase in concentration of the fungicides. Khatun and Shamsi (2016) found that Bavistin 50 WP and Greengel 72 WP showed complete radial growth inhibition of *Aspergillus flavus* and *Curvularia lunata* at 400 and 500 ppm concentrations. The present investigation was similar with aforesaid experiment. Rathod and Pawar (2013) reported that the combination of Mancozeb and Cupravit 50 WP both at 0.4% significantly reduced the mycelial growth of *Fusarium* spp, *Alternaria* spp, *Sclerotium* spp, *Aspergillus flavus* and *A. niger* after seven days of observation. Previously it was reported that bavistin, mancozeb, carbindazim, hexacanazole, cupravit and benlate inhibited the radial growth of *Fusarium* spp. (Fravel *et al*. 2005, Iqbal *et al*. 2010, Chowdhury *et al*. 2015, Mamun *et al*. 2016).

Out of the five plant extracts, *Psidium guajava* showed highest (81.29%) radial growth inhibition of *Aspergillus flavus* at 20% concentration which was followed by *Azadirachta indica* (78.11%), *Agle mermelos* (68.33%), and *Adhatoda vasica* (64.91%). *Dutura metel* showed no inhibition. The order of effectiveness of plant extracts against *Aspergillus flavus* at 20% concentration was *Psidium guajava* > *Azadirachta indica* > *Aegle mermelos* > *Adhatoda vasica* > *Datura metel* (Table 2). *Azadirachta indica* showed maximum (65.56%) radial growth inhibition of *Aspergillus niger* (Type-I) at 20% concentration which was followed by *Dutura metel* (63.67%), *Agle mermelos* (60.78%), and *A. vasica* (58.70%). There was no growth inhibition of *A. niger* (Type-I) by *Psidium guajava*. The order of effectiveness of plant extracts against *Aspergillus niger* (Type-I) at 20% concentration was *Azadirachta indica* > *Datura metel* > *Aegle mermelos* > *Adhatoda vasica* > *Psidium guajava* (Table 2).

The highest inhibition of the radial growth of *Curvularia lunata* was observed with *Psidium guajava* (72.26%) at 20% concentration which was followed by *A. indica* (61.90%), *Dutura metel* (61.83%), *A. vasica* (47.14%) and *Aegle mermelos* (44.02%). The order of effectiveness of plant extracts against *Curvularia lunata* at 20% concentration was *Psidium guajava* > *Azadirachta indica* > *Datura metel* >*Adhatoda vasica* > *Aegle mermelos* (Table 2).

Table 2. Per cent inhibition of radial growth of pathogenic fungi at different concentrations of plant extracts.

Name of fungi	Name of plants	% inhibition of radial growth of fungi at different concentrations			
		5	10	15	20
Aspergillus flavus	*Adhatoda vasica* Nees.	52.88[b]	55.14[d]	60.15[c]	64.91[d]
	Aegle mermelos L.	45.56[c]	58.33[c]	62.78[c]	68.33[c]
	Azadirachta indica A. Juss.	58.0[a]	63.11[b]	65.78[b]	78.11[b]
	Datura metel L.	0[d]	0[e]	0[d]	0[e]
	Psidium guajava L.	62.22[a]	70.22[a]	76.11[a]	81.29[a]
	CV (%)	6.40	2.56	2.93	2.21
Aspergillus niger (Type-I)	*Adhatoda vasica* Nees.	0[b]	36.11[b]	52.59[b]	58.70[b]
	Aegle mermelos L.	22.0[a]	47.0[a]	53.56[b]	60.78[ab]
	Azadirachta indica A. Juss.	0[b]	50.0[a]	58.0[a]	65.56[a]
	Datura metel L.	0[b]	32.56[b]	51.89[b]	63.67[ab]
	Psidium guajava L.	0[b]	0[c]	0[c]	0[c]
	CV (%)	32.10	12	2.46	6.47
Curvularia lunata	*Adhatoda vasica* Nees.	21.15[c]	29.07[cd]	37.44[c]	47.14[c]
	Aegle mermelos L.	20.94[c]	26.34[d]	30.34[d]	44.02[c]
	Azadirachta indica A. Juss	30.16[b]	34.29[bc]	49.84[b]	61.90[b]
	Datura metel L.	32.26[b]	38.17[b]	43.55[bc]	61.83[b]
	Psidium guajava L.	47.26[a]	54.45[a]	59.93[a]	72.26[a]
	CV (%)	9.55	8.93	7.86	5.29
Fusarium moniliforme var. *subglutinans*	*Adhatoda vasica* Nees.	28.95[c]	34.21[c]	46.99[c]	54.14[c]
	Aegle mermelos L.	21.9[d]	29.75 [d]	34.71[d]	47.52[d]
	Azadirachta indica A. Juss	49.61[a]	57.42[a]	64.84[a]	75.0[a]
	Datura metel L.	21.9[d]	29.75[d]	34.71[d]	47.52[d]
	Psidium guajava L.	41.24[b]	49.48[b]	54.64[b]	64.95[b]
	CV (%)	9.31	5.74	6.20	3.59
Fusarium sporotrichioides	*Adhatoda vasica* Nees.	30.85[a]	40.43[b]	44.68[b]	62.77[a]
	Aegle mermelos L.	9.27[b]	19.51[d]	24.88[c]	38.54[c]
	Azadirachta indica A. Juss.	31.45[a]	36.02[bc]	39.52[b]	44.89[b]
	Datura metel L.	27.05[a]	35.59[c]	40.93[b]	64.77[a]
	Psidium guajava L.	25.93[a]	46.8[a]	56.57[a]	62.63[a]
	CV (%)	17.62	7.54	7.98	4.07
Rhizoctonia solani	*Adhatoda vasica* Nees.	0[b]	0[b]	0[b]	0[b]
	Aegle mermelos L.	0[b]	0[b]	0[b]	0[b]
	Azadirachta indica A. Juss.	0[b]	0[b]	0[b]	0[b]
	Datura metel L.	0[constant]	20.56[a]	37.56[a]	42.44[a]
	Psidium guajava L.	0[b]	0[b]	0[b]	0[b]
	CV (%)	Constant	16	10.09	3.38

Means followed by the same letter within a column did not differ significantly at 5% level by DMRT.

The highest inhibition of the radial growth of *Fusarium moniliforme* var. *subglutinans* was observed with *Azadirachta indica* (75.0%) at 20% concentration which was followed by *Psidium*

guajava (64.95%), *A. vasica* (54.14%), *Dutura metel* (47.52%), and *Aegle mermelos* (47.52%). The order of effectiveness of plant extracts against *Fusarium moniliforme* var. *subglutinans* at 20% concentration was *Azadirachta indica* > *Psidium guajava* > *Adhatoda vasica* > *Aegle mermelos* > *Datura metel* (Table 2). The highest inhibition of the radial growth of *Fusarium sporotrichioides* was observed with *Dutura metel* (64.77%) at 20% concentration which was followed by *Adhatoda visica* (62.77%), *Psidium guajava* (62.63%), *A. indica* (44.89%), and *Aegle mermelos* (38.54%). The order of effectiveness of plant extracts against *Fusarium sporotrichioides* at 20% concentration was *Datura metel* > *Adhatoda vasica* > *Psidium guajava* > *Azadirachta indica* > *Aegle mermelos* (Table 2). Exclusively *Dutura metel* showed inhibition of the radial growth of *Rhizoctonia solani* at 10, 15 and 20% and the inhibition percentage was 20.56, 37.56 and 42.44 (Table 2).

Mondall *et al*. (2009) reported that the crude aqueous and alcoholic leaf extracts of *Azadirachta indica* was more effective in inhibitions of growth of the fungus *Aspergillus* in comparison to inhibitory effects on *Rhizopus* growth in the artificial culture medium. Shanaz *et al*. (2010) reported the inhibitory effect of *Datura alba* against *Macrophomina phaseolina* and *Rhizoctonia solani*. Khatun and Shamsi (2016) reported that the complete inhibition of radial growth of *Curvularia lunata* was observed with plant extract of *A. indica* and *D. metel* at 20% concentration. William (2008) reported that *Lowsonia inermis* inhibited conidial germination of *A. flavus* and *A. fumigatus* while *A. niger* was mostly inhibited by *A. indica*. Mamun *et al*. (2016) reported that *Azadirachta indica* and *D. metel* showed promising activity against *Fusarium* spp. The present result also showed similar activity.

The present investigation suggests that out of five fungicides Nativo 75 WP and Autostin 50 WDG are identified as the best inhibiting fungicides for six pathogenic fungi of cotton seeds and out of five plant extracts, depending on the pathogenic fungi *Azadirachta indica, Datura metel* and *Psidium guajava* showed promising effect.

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