Antifungitoxic Activities of *S. alata* Linn Leaf Extracts on stored Yam (*Dioscorea rotundata* Poir) Tuber Rot Organisms

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Abstract: Antifungitoxic activities of ethanol leave extracts of *Senna alata* was evaluated *in vitro*. Varied concentrations of the test plant extracts were inhibitive on the mycelia growth of *Botryodiplodia theobromae, Aspergillus flavus, Aspergillus niger* and *Aspergillus glaucus*, Activities of 50% and 30% ethanol extracts of *S. alata* at 10-50g/100ml and 50g/100ml respectively inhibited *A. glaucus* completely (100%). Also, 50% ethanol extract of *S. alata* at 50g/100ml completely inhibited *A. glaucus.* This investigation showed that ethanol leaves extracts of *S. alata* had high controlling capacity on fungal pathogens of yam tubers.
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Introduction

Senna spp belongs to the family Fabaceae. It is an ornamental Pan-tropical plant that is widely distributed from America to India (Ibrahim, 1995). Medicinal values of *S. alata* leaf extracts against ringworm, itching, eczema, pruritis, scabies and ulcer have also been reported (Abubacker, *et al*; 2008; Alam, *et al*; 2009). Mainly, fungal pathogens often penetrate tuber through wounds which are caused by insects, nematodes as well as poor handling during pre and post harvest operations. Associations of many fungi such as *Aspergillus tamari, Botryodiplodia theobromae, Aspergillus flavus, Rosellinia bunodes, Fusarium* species, *Aspergillus niger* with yam tuber diseases have been reported (Ijato, 2011b; Adejumo and Lagenkamper , 2012). Hence, this experiment was designed to evaluate the effects of ethanol leaf extracts of *S. alata* on post harvest rot fungi of yam tubers *in vitro*.

Materials And Methods

Collection of materials and preparation

Healthy and infected yam tubers with signs of infection were purchased at Oba market, Otun-Ekiti. These were conveyed to the laboratory of Plant Science, Ekiti State University, Ado-Ekiti for authentication in the herbarium. Leaves of *S. alata* were collected from the forest area of Ekiti State University, Ado-Ekiti; identity authentication was done at herbarium unit, air dried at room temperature and stored at 24^0C until when needed.

Preparation of plant extracts

Leaves of *S. alata* were dried, pulverised and weighed into 10-50g. Each sample was added to 100ml of concentrations of ethanol: 10, 30 and 50%. The mixtures were filtered with a four-fold cheese cloth and the filtrates were used to poison the potato dextrose agar (PDA).

Result

The inhibitory effects of 10, 30 and 50% ethanol extract of *S. alata* on the fungal rot organisms differed significantly ($p<0.05$) from the untreated control and standard. The effectiveness of 10% ethanol extracts of *S. alata* on the rot organisms increased with the increase in concentration.

Effects of 10% ethanol leaf extracts of *S. alata* on the mycelial growth of fungal rot organisms

The antimycotic effects of 10% ethanol leaf extract of *S. alata* on the rot organisms are presented in Table 1. Antifungal effects of 10% ethanol extract of *S. alata* at 10-50g/100ml on *B. theobromae* ranged from 93.23% to 95.83%. The radial thrive of *B. theobromae* was most retarded by 95.70% and 95.17% at 40g and 30g/100ml of 10% ethanol extract of *S. alata*, on *B. theobromae* respectively. Mycelial growth of *B. theobromae* (94.00%) was impeded by 10% ethanol extract of *S. alata* at 20g/100ml.

Antimycelial effects of 10% ethanol extract of *S. alata* on *A. flavus* at 10-50g/100ml ranged between 79.03% and 94.90%. *A. flavus* was most inhibited by 10% ethanol extract of *S. alata* at 50g/100ml by

94.90%, followed by 40g, 30g and 20g/100ml of 10% ethanol extract of *S. alata,* eliciting 94.33%, 93.50% and 93.43% respectively.

Fungicidal effects of 10% ethanol extract of *S. alata* at 10-50g/100ml on *A. glaucus* ranged from 92.10% to 95.23%. The radial growth of *A. glaucus* (95.23%) was most inhibited by 10% ethanol extract of *S. alata* at both 50g and 40g/100ml, followed by antifungal capacity of 93.87% and 93.77% by 10% ethanol extract of *S. alata* at 30g and 20g/100ml on *A. glaucus* respectively.

The antimicrobial effects of 10% ethanol extracts of *S. alata* at 10-50g/100ml on *A. niger* ranged from 91.77% to 96.83%. Highest antifungal effect of 96.83% on *A. niger* was elicited by 10% ethanol extract of *S. alata* at 50g/100ml, followed by mycelial growth retardation effects of 96.43%. *A. niger* (93.13%) was inhibited by 10% ethanol extracts of *S. alata* at both 40g and 30g/100ml

Table 1: Effects of 10% ethanol leaf extracts of *S. alata* on the mycelial growth of fungal rot organisms.

(g/100ml)	% inhibition of radial mycelial growth			
	B. theobromae	*A. flavus*	*A. glaucus*	*A. niger*
10	93.23[a]	79.03[b]	92.10[a]	91.77[b]
20	94.00[a]	93.43[a]	93.77[a]	93.13[ab]
30	95.17[a]	93.50[a]	93.87[a]	96.43[a]
40	95.70[a]	94.33[a]	95.23[a]	96.43[a]
50	95.83[a]	94.90[a]	95.23[a]	96.83[a]
Standard	40.70[b]	30.20[c]	60.50[b]	50.00[c]
Control	0.00[c]	0.00[d]	0.00[c]	0.00[d]

Mean with the same letter(s) within a column are not significantly different ($p<0.05$) according to the Duncan multiple range test.

Effects of 30% ethanol leaf extracts of *S. alata* on the mycelial growth of fungal rot organisms.

The antifungal effects of 30% ethanol leaf extracts of *S. alata* on the fungal pathogens are presented in Table 2. Inhibitive effects of 30% ethanol extracts of *S. alata* at 10-50g/100ml on *B. theobromae* ranged from 90.83% to 96.03%. *B. theobromae* was mostly inhibited by 30% ethanol extract of *S. alata* by 96.03% at 50g/100ml, followed by exhibition of inhibitory effects of 94.20% and 92.40% by 30% ethanol extract of *S. alata* at 40g and 30g/100ml respectively, 30% ethanol extract of *S. alata* at 20g/100ml was inhibitive on *B. theobromae* by 91.13%.

High antifungal effects of 30% ethanol extracts of *S. alata* at 10-50g/100ml showed on *A. flavus* ranged between 92.60% and 100%. *A. flavus*(100%) was completely inhibited by 30% ethanol extract of *S. alata* at 50g/100ml, followed by 30% ethanol extracts of *S. alata* at 40g, 30g and 20g/100ml, eliciting 97.83%, 96.37% and 95.97% against *A. flavus* respectively.

Microbecidal effects on *A. glaucus* ranged from 94.67% to 96.57 30% by ethanol extracts of *S. alata* at 10-50g/100ml. The phytotoxic ability of 30% ethanol extracts of *S. alata* at both 50g and 40g/100ml was most active against *A. glaucus* by exhibiting 96.57% inhibition, followed by 96.33% and 95.53% on *A. glaucus*.

High fungitoxic effects of 30% ethanol extract of *S. alata* at 10-50g/100ml was on *A. niger* ranging from 85.87% to 96.03%.The bio-protective activity of 30% ethanol of *S. alata* at 50g/100ml was greatest on *A. niger* (97.83%), followed by exhibition of inhibitory values of 96.00% and 93.77% against *A. niger* by 30% ethanol extract of *S. alata* at 40g and 30g/100ml. Antimicrobial effect of 91.00% on *A. niger* by 30% ethanol of *S. alata* at 20g/100ml. The least fungicidal effect of the extract was against *A. niger* (85.87%) by 30% ethanol of *S. alata* at 20g/100ml.

Table 2: Effects of 30% ethanol leaf extracts of *S. alata* on mycelia growth of fungal rot organisms.

(g/100ml)	% inhibition of mycelial growth			
	B. theobromae	*A. flavus*	*A. glaucus*	*A. niger*
10	90.83^{b}	92.60^{b}	94.67^{a}	85.87^{bc}
20	91.13^{b}	95.97^{b}	95.53^{a}	91.00^{b}
30	92.40^{ab}	96.37^{ab}	96.33^{a}	93.77^{ab}
40	94.20^{ab}	97.83^{ab}	96.57^{a}	96.00^{a}
50	96.03^{a}	100^{a}	96.57^{a}	96.03^{a}
Standard	40.70^{c}	30.20^{c}	60.50^{b}	50.00^{d}
Control	0.00^{d}	0.00^{d}	0.00^{c}	0.00^{e}

Mean with the same letter(s) within a column are not significantly different ($p<0.05$) according to the Duncan multiple range test.

Effects of 50% ethanol leaf extracts of *S. alata* on the mycelial growth of fungal rot organisms.

The antimicrobial effects of 50% ethanol leaf extracts of *S. alata* on the fungal pathogens are presented in Table 3. An antimycelial effect of 50% ethanol extracts of *S. alata* at 10-50g/100ml was on *B. theobromae* ranging from 60.60% to 89.40%. The highest mycelial reduction effect of 50% ethanol extracts of *S. alata* at 50g/100ml on *B. theobromae* (89.40%), 50% ethanol extracts of *S. alata* at 40g and 30g/100ml exhibited antimycotic effects of 89.40% and 84.20% against *B. theobromae* respectively, followed by antirot effect of 70.80% against *B. theobromae* by 50% ethanol extracts of *S. alata* at 20g/100ml. Biocidal value of 50% ethanol extracts of *S. alata* at 10g/100ml was recorded against *B. theobromae* (60.60%). The fungicidal efficacies of the extracts were complete on *A. flavus*(100%).

Antifungal effects of 50% ethanol extracts of *S. alata* at 10-50g/100ml on *A. glaucus,* ranged from 60.77% to 100%. The highest bio-preservative capacity of 100% was recorded against *A. glaucus* by 50% ethanol extract of *S. alata* at 50g/100ml, followed by 87.43% and 76.33% on *A. glaucus* by 50% ethanol extracts of *S. alata* at 40g and 30g/100ml respectively.

Antimycotic effects of 50% ethanol extracts of *S. alata* at 10-50g/100ml on *A. niger* ranged between 76.20% and 87.70%. *A. niger* (87.70%) was mostly inhibited by 50% ethanol extract of *S. alata* at 50g/100ml, followed by 50% ethanol extracts of *S. alata* at 40g and 30g/100ml, exhibiting mycelial inhibitions of 76.20% and 73.10% on *A. glaucus* respectively. Also, 50% ethanol extract of *S. alata* at 20g/100ml reduced the radial growth of *B. theobromae* by 65.63%, while 50% ethanol extract of *S. alata* at 10g/100ml was against *A. niger* (76.20%).

Table 3: Effects of 50% ethanol leaf extracts of *S. alata* on the mycelial growth of fungal rot organisms.

g/100ml	% inhibition of mycelial growth			
	B. theobromae	*A. flavus*	*A. glaucus*	*A. niger*
10	60.60^{d}	100^{a}	54.67^{e}	60.77^{d}
20	70.80^{c}	100^{a}	54.67^{e}	65.63^{c}
30	75.30^{c}	100^{a}	76.33c	73.10^{b}
40	84.20^{b}	100^{a}	87.43^{b}	76.20^{b}
50	89.40^{a}	100^{a}	100^{a}	87.70^{a}
Standard	40.70^{e}	30.20^{b}	60.50^{d}	50.00^{e}
Control	0.00^{f}	0.00^{c}	0.00^{f}	0.00^{f}

Mean with the same letter(s) within a column are not significantly different ($p<0.05$) according to the Duncan multiple range test

Discussion

B. theobromae, A glaucus A. flavus and A. niger were found to cause rot of *D. rotundata*. Association of these fungi with post harvest rots of yam tubers had been reported (Okigbo, 2005; Okigbo and Ogbonnaya, 2006). It can be established that *Senna alata* is potent against rot organisms of yam tubers, and it has been found to be very active in controlling post harvest diseases.

References

1. Ibrahim, D and Osman, H (1995). Antimicrobial activity of *S alata* from Malaysia. *J. Ethnopharmacol*. 5(3):151-156.
2. Adejumo, T.O and Lagenkamper, G (2012). Evaluation of botanicals as bio-pesticicide on the growth of *Fusarium vertililioides* causing rot diseases and fumonisin production of maize. *J. of Microbiology and Antimicrobials*. 4(1):23-31.
3. Ijato, J.Y (2011b). Evaluation of antifungal effects of extracts of *Allium sativum* and *Nicotiana tabacum* against soft rot of yam (*Dioscorea alata*). *Researcher*. 3(2): 1-5.
4. Abubacker, M.N, Ramannathan, R. and Senthil, K. T (2008). *In vitro* antifungal activity of *Cassia alata* Linn. Flower extract. *Natural Product Radiance*.7 (1):6-9.
5. Alam, M.T, Karim, M.M, Shaila, N, Khan (2009). Antibacterial activity of different organic extract of *Achyranches aspera* and *Cassia alata. J. of Sci. Res*. 1(2): 393-398.
6. Okigbo, R. N and Ogbonnaya, U.O (2006). Antifungal effects of two tropical plant leaves extract (*Ocimum gratissimum* and *Aframomum melegueta*) on post harvest yam (*Dioscorea* spp.) rot. *Afr. J. Biotech.*, 5(9): 727-731.
7. Okigbo, R.N (2005). Biological Control of Post harvest fungal rot of yam (*Dioscorea* spp.) with *Bacillus subtilis". Mycopathologia*.159: 307-314.

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