INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

www.ijabpt.com ISSN : 0976-4550

Volume-6, Issue-2, April-June-2015 Coden IJABFP-CAS-USA Copyrights@2015

Received: 20th Jan-2015 *Revised: 21st Feb-2015* *Accepted: 23rd Feb-2015*

Research article

EFFICACY OF THREE LOCAL PLANT EXTRACTS AS SEED TREATMENT ON THE GERMINATION, INFECTION AND VIGOUR INDEX OF TWO COTTON SEED VARIETIES FROM CHAD

Serferbe Signaboubo[1], *G. Tsopmbeng Noumbo.[1,2], Yaouba Aoudou[2], J.Djeugap Fovo[2] and E. Keuete Kamdoum[1].

[1]Laboratory of Applied Botany, University of Dschang, Cameroon
[2]Phytopathology Laboratory / University of Dschang, Cameroon
*Corresponding author: email: grnoumbo@gmail.com

ABSTRACT: Seed treatment protects the seed or young plant against pests and diseases transmitted by seed or soil and stimulates germination and plant growth. Extracts from three Chadian plants, prepared from leaves of *Azadirachta indica and bark of Boswellia dalzielii and Cassia sieberiana* were evaluated for their efficacy as seed treatment on two varieties of cotton seeds; Stam F and A51 in Petri dishes and plastic trays. Cotton seed were soaked separately for one hour in various concentrations of aqueous and ethanolic extracts and plated on blotters as well as in sterilized soil in plastic trays. The results showed that seed treated with leaf extracts of *Azadirachta indica* and bark of *Boswellia dalzielii* reduced significantly ($P \leq 0,05$) seed borne infection, improved seed germination and vigour index of cotton seeds when compared to those treated with *Cassia sieberiana* bark extract and distilled water. It can be suggested that extracts of *A. indica* and *B. dalzielli* have antifungal effect and can be used to treat seed against seed borne pathogens of cotton, increase seed germination and vigour index.

Key words: Cotton, seed treatment, plant extracts, seed fungal infection, seed germination

INTRODUCTION

Cotton (*Gossypium barbadense* L.) is one of the most important fibre and oil crop grown in many countries of the world. It played an important role in the economic development of many West and central African countries (OCDE; 2005). In Chad, cotton remains the main source of income for the community development to meet its basic needs and improve quality of life. Cotton accounts for 60% to 65% of the export income and supplies more than 1,094 permanent jobs (Ministry of Agriculture, 2007, CEEAC, 2011). At national level, it contributes to 3-10 % to Gross Domestic Product (GDP) and accounts for about 36.2 % income from domestic exports (OCDE; 2005). Most products derived from cottonseed, including cottonseed oil and cottonseed meal areprocessed and used in foods products and animal feed (Smith 1995). Cotton is generally propagated by seeds and these are potential harbour of numerous micro-fungi which may impair seed germination resulting in the production of abnormal seedlings (Bateman and Kwasna, 1999; Khanzada *et al*., 2002). Most cottondiseases are transmitted through seeds which in most cases affect the quality of the fibre and seed. Seed diseases may cause seed rot and damping-off of the seedlings reducing subsequently the number of stands. Various fungal seed borne pathogens have been reported to reduce germination percentage and seedling vigour in cotton seed (Jeyalakshmi *et al*., 1999; Eisa *et al*., 2007; Tomar *et al*., 2012). Control of seed-borne fungi is currently limited to the use of protecting fungicides (Thomas and Sweetingham, 2003). Increasing knowledge and concerns about the environmental hazard due to intensive and repeated applications fungicide have prompted the industries and research scientists to hunt for antifungal substances that are cost-effective, non-toxic, eco-friendly and which are highly performant in eliminating or reducing the incidence of important pathogens and improve seed germination and seedling vigour.

Among these substances, plant extracts have proven to be a potential sourcefor the natural pesticide development for the control of seed-borne fungi (Tripathi and Shukla, (2010); Al-Reza *et al*. (2010); Veloz-Garcia *et al.* (2010); Kuri *et al*., (2011); Malkhan *et al*. (2012).Plant extracts have been reported to reduce the incidence of fungi transmitted by seeds and to increase the percentage of germination and seedling emergence (Hasan, 2005).

Researchers from various countries have reported the effectiveness of plant extracts used against seed infection in order to increase cotton seedlings performance (Gustavo and Mariana, 2010; Tomar *et al*., 2012 and Rathinavel, 2013). The present investigation was undertaken to evaluate the efficacy of plant extracts from three local plants as antifungal agent on germination, infection and seedling vigour on cotton seed. The finding of the present investigation is an important step towards cotton seedlings protection strategies and management of seed-borne diseases.

MATERIALS AND METHODS

Plant extracts for seed treatment:

Leaves of *Azadirachta indica* and barks *of Boswellia dalzielii* and *Cassia sieberiana* were harvested from different trees in Pala locality in Chad. Plant species and parts used in the study are presented in Table 1. They were washed under tape water and rinsed thrice with distilled water. After washing, the leaves and the barks were cut into small pieces then dried separately in an oven at 50-60°C for 48 hours followed by blending in an electronic blender. One hundred grams of fine powders of each sample were macerated in 500 ml of water and/or ethanol for two days. They were then filtered through the muslin cloth. Aqueous extract were oven dried at 50°C for 7 days while ethanol extracts were evaporated on water bath at 60rpm. Extraction was performed in the Laboratory of Microbiology and Antimicrobial Substances of the University of Dschang. These extracts were preserved separately in small containers at room temperature for further experiments.

Seed treatment

Seeds of two cotton varieties, A51 and Stam F were obtained from the Chadian Institute of Agronomic Research and Development (ITRAD) in December 2012. One thousand seeds were first washed with distilled water then surface sterilized with 2% sodium hypochlorite for ten minutes and rinsed thoroughly with distilled water and kept on blotting paper to remove excess moisture from seed surface. Seeds were treated by dipping them separately in different concentrations of aqueous and/or ethanolicplant extractfor one hour (ISTA, 1996). The following concentrations; 25 mg/ml; 50 mg/ml; 75 mg/ml and 100 mg/ml and 12.5 mg/ml; 25 mg/ml; 37,5 mg/ml and 50mg/ml were used respectively for aqueous and ethanolic extract. The excess extract was drained off and treated seeds were kept in blotting paper to remove excess moisture from seed surface and dry in the open air. The seeds were then plated on moist blotters petri dishes (10 seeds/dish) and incubated at 23±1°C for seven daysunder alternating cycles of light and darkness of 12 hours each using fluorescent tubes as light source and examined for percentage seed infection, germination and seedling vigour.

In plastic tray, seeds were dipped in solutions with varied concentration of 25mg/ml and 50 mg/ml for aqueous extract, and 12.5 mg/ml and 25 mg/ml for ethanolic extract based on the results obtained from previous experiment in petri dishes. Treated seeds were sown in sterilized sandy soil in Plastic trays of 30 cm x 10 cm x 5 cm were used. Fifty treated seeds were selected at random and sown on sandy soil in each plastic tray in five lines (10 seeds/line). A total of 200 seeds were used for each cotton variety. Percentage seed germination and seedling vigour were evaluated 15 days after sowing. Thirty seedlings from each tray were randomly selected for measurement of shoot or root length. The seedling vigour was determined following the formula of Varadarajan and Rao (2002) as shown below:

Vigour index (VI) = Percent germination of seed × (Root length + Shoot length).

In both experiment, Seeds dipped in distilled water and Mancozan (1mg/ml) for the same period served as negative and positive control. Complete randomized design (CRD) was used in the experiments and each treatment was repeated thrice.

Statistical analysis

The data collected on different parameters were subjected to Analysis of variance (ANOVA) using SPSS software version 17 and means for all treatments were separated using Duncan Multiple Range Test (DMRT) at $P \leq 0.05$.

RESULTS

Results on the effect of seed treatment with aqueous plant extracts on seed germination and infection and seedling vigour are presented in Table 2. The germination, seed infection and vigour index of treated seed with *Azadirachta indica* and *Boswellia dalzielii* recorded no significant difference under aqueous extracts at different concentrations. The four concentrations tested gave the same germination percentage, seed infection and vigour index which were similar to Mancozeb and statistically different to the untreated seeds (control) for the two varieties.

Cotton seeds treated with extract of *Cassia sieberiana* at 75 mg/ml and Mancozeb gave the highest germination percentage for the two varieties, followed by those treated with 25 mg/ml and 50 mg/ml. The lowest germination percentage was recorded in seed treated with 100 mg/ml for Stam F variety. In term of seed infection, the highest percentage was recorded in control treatment. No significant difference was observed between the different concentrations of aqueous extract and Mancozeb for the two varieties used.

Ethanolic plant extracts treatment results on seed germination, infection and seedling vigour are presented in Table 3. Cotton seeds treated with ethanolic extracts at concentrations of 12.5 mg/ml and 25 mg/ml had highest germination percentage and vigour index at same level for the two varieties but significantly different from negative control and similar to Mancozeb. The lowest was recorded on seeds treated with ethanolic extracts of *Azadirachta indica* and *Boswellia dalzielii* at concentration 37.5 mg/ml and 50 mg/ml for the two varieties of cotton seeds. Also, seed infection percentage was similar to that of Mancozeb and lower to the control untreated seeds. A part from the concentration of50 mg/ml, ethanolic extract of *Cassia sieberiana* gave similar higher germination percentage and vigour index with the other concentrations of the extract and the lowest infection percentage than the control in cotton seed variety A51. For Stam F variety, the highest germination percentage (96%) and seedling vigour index (1116) was recorded at concentration of 12.5 mg/ml with the same ethanolic extract and the lowest in the control treatment while the same infection percentage was observed with other concentrations.

The result of the effect of various seed treatment with aqueous plant extracts on seedling emergence, seedling infection and seedling vigour of two cotton varieties on plastics trayare shown on Table 4. At concentrations 25 mg/ml and 50 mg/ml, seedling emergence and seedling vigour were statistically higher than the untreated seeds and similar to Mancozeb while seedling infection was higher in control treatment for the two cotton varieties.

As for aqueous extracts, the two concentrations used gave statistically higher seedling emergence and seedling vigour and lowest seedling infection compared to untreated seeds (control) with the two cotton varieties. These parameters were statistically similar to Mancozeb (Table 5).

Table 1: Plant species and parts used in the study.

Local name	English name	Scientific name	Plant parts used
Neem	Neem	*Azadirachta indica* L	Leaf
Mbiém	Papery bark tree	*Boswellia dalzielii* Hutch	Bark
Teuzok	African Laburnum	*Cassia sieberiana* DC	Bark

Table 2. Effect of aqueous plant extracts on seed germination, seed infection and vigour index of two cotton varieties on petri dishes.

Treatments	*Azadirachta indica*			*Boswellia dalzielii*			*Cassia sieberianna*		
	% seed germination	% seed infection	Vigour index	%seed germination	% seed infection	Vigour index	% seed germination	% seed infection	Vigour index
Stam F Variety									
T_0	82±6.3^{b}	20±10.5^{a}	814±308.0^{b}	82±6.3^{b}	20±10.5^{a}	814±308^{b}	82±6.3^{b}	20±10.5^{a}	814±308^{b}
T_{25}	91±1.1^{a}	14±5.2^{ab}	1127±237.2^{a}	87±8.1^{c}	16±7.0^{ab}	883.7±155^{bc}	85±7^{ab}	20±10^{a}	776.5±314^{b}
T_{50}	92±6.3^{a}	6±7.0^{c}	1124±225.4^{a}	94±5.1^{ab}	10±4.7^{bc}	1070.5±219^{ab}	80±13^{b}	13±5^{ab}	893.7±232^{ab}
T_{75}	94±5.2^{a}	6±7.0^{c}	1231±203.9^{a}	96±5.2^{a}	5±5.30^{c}	1131.1±211^{a}	93±7^{a}	8±6^{b}	1105.3±245^{a}
T_{100}	88±9.2^{ab}	4±5.2^{c}	1030±151.7^{a}	95±5.3^{a}	4±5.20^{c}	1079.5±201^{ab}	61±13^{c}	7±6.7^{b}	476.2±237^{c}
T_m	88±9.2^{ab}	9±5.7^{bc}	1022±161.8^{a}	88±9.2^{ab}	9±5.7^{bc}	1022±162^{a}	88±9.2^{ab}	9±5.7^{bc}	1022±162^{a}
A51 Variety									
T_0	79±7.38^{b}	29±8.75^{a}	740.5±270.26^{c}	79±7.37^{b}	29±8.75^{a}	740.5±270.26^{c}	79±7.37^{b}	29±8.75^{a}	741±270.26^{c}
T_{25}	90±8.16^{a}	18±13.16^{b}	1064±225.50^{ab}	79±7.38^{c}	13±4.83^{b}	828.1±180.25^{bc}	81±7.38^{c}	22±6.32^{a}	788±213.50^{cd}
T_{50}	92±4.21^{a}	7±4.83^{c}	1225.6±239.88^{a}	79±7.38^{c}	13±4.83^{b}	828.1±180.25^{bc}	89±8.75^{ab}	29±8.75^{a}	909±284.29^{bcd}
T_{75}	88±9.19^{a}	5±5.27^{bc}	1056.4±159.40^{ab}	94±9.66^{a}	12±4.216^{b}	1175.0±156.27^{a}	94±5.16^{a}	6±6.99^{bc}	1162±157.34^{a}
T_{100}	87±9.48^{a}	5±5.27^{c}	937.3±272.27^{bc}	92±6.32^{a}	9±5.67^{b}	1020.2±307.61^{ab}	86±10.75^{bc}	8±7.88^{b}	1055±252.78^{ab}
T_m	85±8.49^{ab}	8±6.32^{b}	988.2±153.51^{bc}	85±8.49^{ab}	8±6.32^{b}	988.2±153.51^{bc}	85±8.49^{ab}	8±6.32^{b}	988±153.51^{bc}

*****Means in a column for each cultivars followed by the same letters are not significantly different according to Duncan New Multiple range Test (P = 0.05).

T_0 = untreated control; T_{25} = 25 mg/ml; T_{50} = 50 mg/ml; T_{75} = 75 mg/ml; T_{100} = 100mg/ml; T_m = Mancozeb

Data given are means of four replicates

Table 3. Effect of ethanolic plant extracts on seed germination, seed infection and vigour index of two cotton varieties

Treatments	*Azadirachta indica*			*Boswellia dalzielii*			*Cassia sieberianna*		
	% seed germination	% seed infection	Vigour index	% seed germination	% seed infection	Vigour index	% seed germination	% seed infection	Vigour index
StamFVariety									
T_0	82±6.3^{b}	20±10,5^{a}	814±308^{b}	82±6,3^{b}	20±10,5^{a}	814±308^{b}	82±6,3^{b}	20±10.5^{a}	814±308^{b}
$T_{12.5}$	85±10.80^{ab}	12±7.88^{b}	948±158.52^{abc}	92±6.32^{a}	6±5.16^{bc}	1096±222^{a}	96±5.16^{a}	6±6.99^{c}	1116±192.77^{a}
T_{25}	94±8.43^{a}	4±5.16^{cd}	1204±253.63^{a}	92±12.29^{a}	3±4.48^{cd}	1069±233.07^{a}	87±9.48^{c}	5±7.07^{c}	999±161.42^{abc}
$T_{37.5}$	86±15.05^{ab}	2±4.21^{cd}	737±306.16^{c}	48±24.85^{c}	2±4.21^{cd}	404±286.88^{c}	83±6.75^{c}	4±6.99^{c}	903±136.28^{bc}
T_{50}	49±36.62^{c}	1±3.16^{c}	462±441.30^{d}	40±17.64^{c}	0±0^{d}	323±138.37^{c}	84±9.66^{c}	4±6.99^{c}	910±177.07b^{b}
T_m	88±9.2^{ab}	9±5.7^{bc}	1022±161.8^{a}	88±9,2^{ab}	9±5,7^{bc}	1022±162^{a}	88±9.2^{ab}	9±5.7^{bc}	1022±162^{a}
A51 Variety									
T_0	79±7.38^{b}	29±8.75^{a}	740,5±270.26^{c}	79±7.37^{b}	29±8.75^{a}	740±270.26^{c}	79±7.37^{b}	29±8.75^{a}	741±270.26^{c}
$T_{12.5}$	92±6.32^{a}	6±5.16^{bc}	1096±221,69^{a}	92±6.32^{a}	6±5.16^{bc}	1096±222^{a}	95±7.07^{a}	6±6.99^{bc}	1078±177.16^{ab}
T_{25}	92±12.29^{a}	3±4.48^{cd}	1069±233,07^{a}	92±12.29^{a}	3±0.48^{d}	1069±233.07^{a}	96±5.16^{a}	4±5.16^{bc}	1071±246^{ab}
$T_{37.5}$	48±24.85^{c}	2±4.22^{cd}	404±286,88^{c}	48±24.85^{d}	2±4.22^{d}	404±286.88^{c}	97±4.83^{a}	3±4.83^{bc}	1201±103.32^{a}
T_{50}	40±1764^{c}	0±0^{d}	323±138.37^{c}	23±12.52^{d}	0±0.00^{d}	190±144.02^{d}	86±13.49^{b}	1±3.16^{c}	774±221.07^{cd}
T_m	85±8.49^{ab}	8±6.32^{b}	988±153.51^{bc}	85±8.49^{ab}	8±6.32^{b}	988±153.51^{bc}	85±8.50^{ab}	8±6.32^{b}	988±153.51^{bc}

*****Means in a column for each variety followed by the same letters are not significantly different according to Duncan New Multiple range Test (P = 0.05).

T_0 = untreated control; $T_{12.5}$ = 12.5 mg/ml; T_{25} = 25 mg/ml; $T_{37.5}$ = 37.5 mg/ml; T_{50} = 50 mg/ml ; T_m = Mancozeb

Data given are means of four replicates

Table 4. Effect of aqueous plant extracts on seedling emergence, seedling infection and vigour index of two cotton varieties on germination tray

Treatments	*Azadirachta indica*			*Boswellia dalzielii*			*Cassia sieberianna*		
	% seedling emergence	% seedling infection	Vigour index	% seedling emergence	% seedling infection	Vigour index	% seedling emergence	% seedling infection	Vigour index
StamFVariety									
T_0	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}
T_{25}	96±5.47^{a}	4±5.47^{b}	2170±255.34^{a}	98±4.47^{a}	6±5.47^{b}	2370±171.75^{a}	98±4.47^{a}	6±5.47^{b}	2350±187,08^{a}
T_{50}	96±5.47^{a}	4±5.47^{b}	2096±238.81^{a}	96±5.47^{a}	6±5.47^{b}	2216±316.59^{ab}	96±5.47^{a}	8±4.47^{b}	2248±167.54^{a}
T_m	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}
A51 Variety									
T_0	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}
T_{25}	96±5.47^{a}	8±4.47^{b}	2016±204.93^{a}	98±4.47^{a}	6±5.47^{b}	2036±153.23^{ab}	96±5.48^{a}	6±5.48^{b}	2016±149.26^{a}
T_{50}	96±5.47^{a}	6±5.47^{b}	1977±149.56^{a}	98±4.47^{a}	4±5.47^{b}	2112±143.94^{a}	96±5.48^{a}	6±5.48^{b}	1931±146.81^{a}
T_m	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243,31^{ab}	96±5.48^{a}	6±5.47^{b}	1960±243.31^{ab}

*****Means in a column each variety followed by the same letters are not significantly different according to Duncan New Multiple range Test (P = 0.05).

T_0 = untreated control; T_{25} = 25 mg/ml; T_{50} = 50 mg/ml; T_m = Mancozeb

Table 5. Effect of ethanolic plant extracts on seedling emergence, seedling infection and vigour index of two cotton varieties on germination trays

Treatments	*Azadirachta indica*			*Boswellia dalzielii*			*Cassia sieberianna*		
	% seedling emergence	% seedling infection	Vigour index	% seedling emergence	% seedling infection	Vigour index	% seedling emergence	% seedling infection	Vigour index
StamFVariety									
T_0	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.,7.6^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}
$T_{12.5}$	100±0.00^{a}	4±5.47^{b}	2420±164.31^{a}	98±4.47^{a}	4±5.47^{c}	2480±83.66^{a}	100±0.0^{a}	6±5.47^{b}	2520±130.38^{a}
T_{25}	98±4.47^{a}	4±5.47^{b}	2258±273.53^{ab}	98±4.47^{a}	2±5.43^{c}	2368±179.22^{a}	98±4.47^{a}	6±5.47^{b}	2334±191.78^{a}
T_m	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}
A51 Variety									
T_0	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4.47^{b}	22±8.36^{a}	1688±225.87^{b}	88±4,47^{b}	22±8.36^{a}	1688±225.87^{b}
$T_{12.5}$	96±5.47^{a}	8±4.47^{b}	2016±204.94^{a}	98±4.47^{a}	6±5.47^{b}	2036±153.23^{ab}	100±0^{a}	6±5.47^{b}	2600±130.38^{a}
T_{25}	96±5.47^{a}	6±5.47^{b}	1977.6±149.56^{a}	98±4.47^{a}	4±5.47^{b}	2112±143.94^{a}	98±4,47^{a}	3±5.47^{c}	2334±191.78^{a}
T_m	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5.47^{a}	6±5.47^{b}	1960±243.31^{ab}	96±5,48^{a}	6±5.47^{b}	1960±243.31^{ab}

*****Means in a column each variety followed by the same letters are not significantly different according to Duncan New Multiple range Test (P = 0.05).

T_0 = untreated control; $T_{12.5}$ = 12.5 mg/ml; T_{25} = 25 mg/ml; T_m = Mancozeb

DISCUSSION

In the present study, an attempt was made to investigate the effect of aqueous and ethanolic extracts of three local plants; *Azadirachta indica*, *Boswellia dalzielii* and *Cassia sieberiana* extract at different concentrations on seed germination, seed infection and vigour index on two cotton seed varieties treatmentpetri dishes and on plastic trays.

The results showed that the three plant extracts significantly ($P \leq 0.05$) reduced the incidence of seed infection and improved seed germination when compared with untreated control seeds. Percent seed infection was highest with lower concentrations of the ethanolic extracts and lowest at higher concentrations, while with aqueous extracts, no significant difference was found among the different concentration tested. The ability of these plant extracts to increase seed germination could be attributed to the suppression of seed borne fungi that could have consider to kill the embryo of the seeds leading to germination failure. According to Veloz-Garcia et al. (2010), extracts of some higher plants exert antifungal activity against fungi. Best performance in terms of reducing percentage seed infection and increases percent seed germination were obtained through treating cotton seeds with *Azadirachta indica* and *Boswellia dalzielii* extracts. Stimulation of seed germination and suppressing seed infection was reported in rice seed treated with extracts from *A. indica*, (Hassan *et al.*, 2005). Parimelazhagan and Francis (1999) established an increase in germination rates and an improvement in seedling development of rice seeds with leaf extract of *Clerodendrum viscosum*. Also, Hamim *et al*. (2014)reported a highly positive relationship between germination failure and prevalence of seed borne fungal infection on several vegetable seeds.The antifungal principle of these plants tested in this study is unknown, but could be associated to the phenolic compounds known for their antifungal activities (Nwinyi *et al*., 2004; Abdallah *et al*., 2009; Ajayi *et al*., 2011). The bioactivity of *Azadirachta indica* extracts has also been attributed to various compounds found in leaves among which azadirachtin is the most important (Lale and Abdulrahaman1999).

This result also indicates that these extracts probably have some fungicidal properties that could inhibit seed infection. The ethanolic extracts were more effective at lower concentrations in reducing the incidenceof fungi than the aqueous extracts, indicating that active plant compounds are readily extracted in ethanol when compared to water. This corroborates with Parekh *et al.*(2005) who found that plant extracts from organic solvents give more consistent antimicrobial activity compared to those fromwater.Despite the fact that they showlower infection percentage, seed treated with higher concentrations of the ethanolic extracts had lower germination percentage and vigour index than those treated with lower concentrations. Higher concentrations of the extracts could be phytotoxicto the seeds.This indicates that ethanol solvent extracts more active plant compounds that could inhibit seed germination and seed vigour.

CONCLUSION

The present study has therefore shown that these extracts have antifungal effects and can be used as fungicidal seed treatments for the control of cottonseed infection and for increasing seed germination and seedling emergence. Furthermore, these plants, readily available in Chad, could be exploited to reduce the incidence of seed borne infections in cotton. However, further studies should be carried out under field's conditions.

ACKNOWLEDGMENT

The authors are grateful to Pr. Ghogomu, R., Head, Department of Plant Protection, and Head of Laboratory of Entomology, FASA and Pr. Kuiate J.R., Head, Department of Biochemistry, and Head of Laboratory of Microbiology and Antimicrobial Substances, University of Dschang for the provision of technical facilities. The corresponding author also thanks to Dr.Lekefack Martin and Dr.Chofong Gilbert for the proofreading of the manuscript.The first author also thanks the authorities of the Chadian Institute of Agronomic Research for Development (ITRAD) for the provision of cotton seeds.

REFERENCES

Abdallah EM, Khalid AS, and Ibrahim N. (2009). Antibacterial activity of oleo-gum resins of Commiphoramolmol and *Boswellia papyrifera* against methicillin resistant *Staphylococcus aureus* (MRSA). Scientific Research and Essay, 4: 351-356.

Alkail, A.A. (2005). Antifungal activity of some extracts against some pathogenic fungi. Pak. J. Biol. Sci. 8(3): 413-417

Al-Reza, A. Rahman, M.A.Sattar, M.O. Rahman, H.M. Fida, (2010). Essential oil composition and antioxidant activities of *Curcuma aromatic* Salisb.Food and Chemical Toxicology, 48: 1757

Bateman, G.L. and Kwasna H., (1999). Effects of number of winter wheat crops grown successively on fungal communities on wheat roots. Applied soil Ecology, 13: 271-282

CEEAC (Communauté Economique Etats de l'Afrique Centrale), (2011). Stratégie régionale pour le développement de la filière-textile-confection en Afrique Centrale, 115p.

Eisa (Nawal) A., El-Hubbaa G. M., Abdoul-Ella M. F. & Hassan S. R., (2007). Associated fungi with seeds of some Egyptian cotton cultivars and their effect on the plant mortality production and oil content. 15p.

Gustavo, D.B. and Marina, S., (2010). Use of plant extracts as natural fungicides in the management of seed borne diseases *In*: Management of fungal plant pathogens edited by Arun A. and Analia E.P. p. 51-66CAB International.

Hamim, I., Mohanto, D. C., Sarker M. A. and. Ali M. A., (2014). Effect of seed borne pathogens on germination of some vegetable seeds.Journal of Phytopathology and Pest Management 1(1): 34-51

Hasan M.M, S.P. Chowdhury, S. Alam, B. Hussain and M.S. Alam. (2005). Antifungal activity of plant extracts on seed-borne fungi of wheat seed regarding seed germination, seedling heath and vigour index. . Pak. J. Biol. Sci.8: 1284 – 1289

Jeyalakshmi, C., Doraisamy, Sabitha and Valluvaparidasan, V. (1999). Studies on the seed borne mycoflora of MCU cotton cultivars, their effect and biological control.J. Cotton Res. Dev.13: 35-39.

Khanzada K.A, Rajput M.A., Shah G.S., Lodhi A.M. Mehbood F. (2002). Effect of seed dressing fungicides for the control of seed borne mycota of wheat.Asian Journal of Plant Science1: 441-444

Kuri SK, Islam RM, Mondal U. (2011). Antifungal potentiality of some botanical extracts against important seedborne fungal pathogen associated with brinjal seeds, *Solanum melongena* L. Journal of Agricultural Technology. 7 (4): 1139-1153.

Lale, N.E.S. and H.T. Abdulrahaman, (1999). Evaluation of neem seed oil obtained by different methods and neem powder for the management of Callosobruschus maculates in stored cowpea. *J. stored Prod. Res.* 35: 135-143

Malkhan, S. G., Shahid, A., Masood, A. and Kangabam, S. S. (2012). Efficacy of plant extracts in plant disease management. Agricultural Sciences 3(3): 425-433.

Ministère de l'Agriculture, Tchad, 2007. Appui à la mise en œuvre de feuille de route pour la réforme de la filière de coton, 83p.

Nwinyi FC, Binda L, Ajoku G. A., Aniagu S. O., Enwerem N. M., Orisadipe A., Kubarawa D., Gamaniel K. S., (2004). Evaluation of the aqueous extract of *Boswellia dalzielii* stem bark for antimicrobial activities and gastrointestinal effects African Journal of Biotechnology 3: 284-288.

OCDE (Organisation for Economic Co-operation and Development), (2005). Importance économique et sociale du cotonen Afrique de l'Ouest : Rôle du coton dans le développement, le commerce et les moyens d'existence. Secrétariat du Club du Sahel et de l'Afrique de l'Ouest. Secrétariat du Club du Sahel et de l'Afrique de l'Ouest/OCDE. 72p.

Parimelazhagan, T. and Francis, K., (1999). Antifungal activity of *Clerodendrum viscosum* against *Curvularia lunata* in rice seeds. Journal of Mycology and Plant Pathology 29(1): 139- 141.

Parekh J., Jadeja D. and Chanda S. (2005). Efficacy of aqueous and methanol extracts of some medicinal plants for potential antibacterial activity. Turkish Journal of Biology, 29: 203-210.

Rathinavel R. (2013). Effective seed treatment in Cotton.Cotton Innvate 5:10Res. Dev.13: 35-39.

Smith C. W., (1995). Cotton (*Gossypium hirsutum* L.).Chapter 6.in: Crop production: Evolution, History and Technology. John Wiley and Sons, Inc, New York. 287-349.

Thomas, G.J. and M.W. Sweetingham (2003). Fungicide seedtreatments reduce seed transmission and severity of lupin Anthracnose caused by *Colletotrichum gloeosporiodes*. Australasian Plant Pathology 32: 39-46.

Tomar D.S., Shastry P. P., Nayak M. K. & Sikarwar, P. (2012). Effect of seed borne mycoflora on cotton seed (JK4) and their control.Journal Cotton Restitution of Developpment.26 (1): 105-108.

Tripathi P, Shukla AK (2010). Exploitation of botanicals in the management of phytopathogenic and storage fungi. In: Management of fungal plant pathogens, Arya A, Perello AE (Ed.), CAB International, USA 36-50.

Varadarajan k. and Rao J. S. P. (2002). Effect of ethereal on seed germination and seedling growth of different genotypes of blackgram (*Vigna mungo* L. (Hepper)) under stimulated moisture stress.Indian Journal of Physiology7: 295-97.

Veloz-García, R., Marín-Martínez, R., Veloz-Rodríguez, R., Rodríguez-Guerra, R., Torres- Pacheco, I., González-Chavira, M.M., Anaya-López, J.L., Guevara-Olvera, L., Feregrino-Pérez, A.A., Loarca-Piña, G., &Guevara-González, R.G. (2010). Antimicrobial activities of cascalote (*Caesalpinia cacalaco*) phenolics-containing extract against fungus *Colletotrichum lindemuthianum*, Industrial Crops and Products,Vol. 31(1):134-138

ISSN : 0976-4550

INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

Email : ijabpt@gmail.com

Website: www.ijabpt.com