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Potency of aloe vera (*Aloe barbadensis* Miller) and bell pepper (*Capcicum annum* L.) in the control of *Aspergillus niger* in causing black mold disease of processed groundnut *(Arachis hypogaea* L.) seeds

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Abstract

Isolation and identification of *Aspergillus niger* causing black mold disease of groundnut was carried out on different processed groundnut seeds after five days of inoculation. The processed groundnut, included boiled shelled groundnut, roasted shelled groundnut and roasted unshelled groundnut were collected from hackers in Dutsin-Ma town. Data were analyzed using one way analysis of variance (ANOVA) and significant mean values were separated using DNMRT and standard error of means. The study revealed that all the different processed types of groundnut were infected with *A. niger*. Effect of concentrations of aloe vera and bell pepper extracts at 2g/50 mL, 4g/50 mL, and 6g/50 mL proved effective in inhibiting the growth of the pathogen. It was observed that radial growth in *A. niger* at 2 g/50 mL aloe vera and bell pepper was 23.73 mm and 24.00 mm respectively in boiled shelled groundnut compared to aloe vera and bell pepper at 6 g/50 mL which gave an inhibition of 12.33 mm and 9.53 mm respectively. At 2 g/50 mL of aloe vera, growth of *A. niger* isolated from roasted shelled groundnut was 21.33 compared with 6 g/50 mL when growth was only 13.67 mm. Both aloe vera and bell pepper proved effective at both concentrations in reducing growth of *A. niger* isolated from roasted unshelled groundnut. Bell pepper proved more effective compared to aloe vera in boiled shelled groundnut and roasted shelled groundnut and there was significant difference ($P \leq 0.05$) between concentrations. There was however no significant difference in concentrations of extracts of aloe vera and bell pepper on *A. niger* isolated from roasted unshelled groundnut. This proved that all the concentrations of the extracts were effective against *A. niger* the causal pathogen of black mold disease of groundnut. It is therefore concluded that groundnut seed be treated with aloe vera and bell pepper extracts before processing into various forms for consumption.

Keywords – Groundnut – Inhibition – Mold – Radial Growth – Roasted Unshelled Groundnut – Shelled

Introduction

Groundnut (*Arachis hypogaea* L.) is an essential oilseed leguminous crop in the family

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Fabaceae (Ajeigbe et al. 2014, Karmini et al. 2017) It is one of the major crops cultivated in the Sub–tropical region of West Africa and very rich in fiber, grease, protein and vitamins (Karmini et al. 2017). The crop is mainly grown in countries such as China, India, Indonesia Nigeria and USA (FAOSTAT 2014). Groundnut is ranked as the third largest source of vegetable protein, fourth largest source of edible oil and the sixth most important oilseed crop cultivated throughout the world (Adjou & Soumanou 2013, Kantwa et al. 2014, Koïta et al. 2017). Despite the high volume of production, groundnut is susceptible to not fewer than 55 pathogens which including bacteria, fungi, nematodes and viruses (Damicone 2017, Chile & Gwa 2021). Fungal pathogens are the main causal agents and are responsible for losses of fruits, seeds, vegetables, grains and other plant products both in the field, storage and in transit (Channya & Asama 2019, Gwa 2021, Isalar et al. 2021). *Aspergillus niger* is the causal pathogen of black mold disease of both processed and non processed groundnut thus, reducing yield significantly yearly (Chile & Gwa 2021). Other fungi commonly implicated as rot pathogens are *A. flavus, A. tamarii, A. oryzae, A. tamani, A. pennicillioides Fusarium oxysporum, Lasiodiplodia iranensis, Macrophomina phaseolina, Penicillium citrinum, Rhizopus stolonifer, Paecilomyces lilacinus, Pseudallescheria boydii, Cylindrocarponl ichenicola Cercospora arachidicola* and *Cercosporidium personatum* (Channya & Asama 2019, Neindow et al. 2020, Chile & Gwa 2021, Isalar et al. 2021). These pathogens caused remarkable symptomatic changes such as loss in germination capacity, seed necrosis, vegetative malformation, leaf distortion, discoloration, rotting, shrinking, and toxification of the oilseeds (Chile & Gwa 2021, Isalar et al. 2021). Several control measures are currently in use such as the use of biological control (Nwankiti & Gwa 2018, Gwa et al. 2019, Gwa & Ekefan 2021, Adulkadir et al. 2023). The use of chemicals has been found to be effective with a promising quick action but have some drawbacks such as non target specificity, hazardous to the ecosystem, increasing level of toxicity to humans, animals, plants as well as contamination to soil and water (Lakshmeesha et al. 2013). The use of botanicals has been advocated by many researchers because of its friendly nature to the environment (Okigbo et al. 2015, Zubairu & Gwa 2019, Gwa & Ahmed 2022, Gwa et al. 2021). Plant product have been found to be more friendly to the environment because they are highly biodegradable with no residual effect on the environment, little or no toxicity, ready availability, cheap affordability, and ease of compounding by farmers (Isaac et al. 2018, Sani & Gwa 2018, Yusuf et al. 2022). In the quest to effectively combat black mold disease caused by *Aspergillus niger*, the study is aimed at exploring the efficacy or otherwise of aloe vera (*Aloe barbadensis*) and bell pepper (*Capcicum annum*) in the management of black mold fungi disease of different processed types of groundnut infected by *A. niger* in order to reduce losses and increase quality and quantity of the processed products.

Materials & Methods

Experimental site

Laboratory studies were carried out at the Take–Off site in Microbiology Laboratory, Federal University Dutsin–Ma, Katsina State, Nigeria.

Sample collection

Groundnut samples of Valencia genotype were collected from groundnut hackers in Dutsin–Ma using polyethylene envelopes in 2023 and taken to the Microbiology Laboratory for isolation and identification of *A. niger* the fungus that caused black mold of groundnut seeds. Fresh healthy aloe vera leaves and bell pepper fruits were collected from the University Orchard farm, packaged in sterile polyethelene bags and taken to the Microbiology Laboratory.

Sample sterilization

Samples of different processed groundnut, aloe vera and bell pepper were cut to approximately 2 × 2 mm in diameter and thoroughly washed in running tap water before being dipped in 5% Sodium hypochlorite solution for approximately 2 minutes and then rinsed in three

successive changes of sterile distilled water to remove the remaining part of Clorox (Gwa & Lum 2023).

Isolation and identification of *A. niger*

Seeds of the different kinds of processed groundnut were washed and sterilized in 5% Sodium hypochlorite solution for approximately 2 minutes and blotted dried on sterile Whatman's No. 1filter paper. The seeds were then placed on solidified Potato Dextrose Agar (PDA) and incubated for 5 days. Plates were incubated at 28 ± 5 °C until fungal growth was fully established. After 5 days of incubation, fungal growths were sub-cultured onto freshly prepared PDA to obtain pure cultures. The pure cultures were characterized based on the morphological characteristics of the fungus using a microscope, specifically by identifying the macro and micro conidia, while the culture characteristics were determined by observing the coloration of the mycelium (Gnanasekara et al. 2015). The fungus identity was tallied with the identification guides already established by Agrios (2005).

Pathogenicity test of the isolated *A. niger*

The different kinds of processed healthy groundnut seeds were washed and blotted dried. Small holes were created on the seeds and *A. niger* inoculum inserted to the holes created. Holes of 5 mm in diameter were made and mycelial growth of 5 mm in diameter collected using a cork borer were inserted in the holes made and replicated for three times and incubated for five days. The control experiment has same size of PDA cut instead of inoculum of the pathogen and was inserted in the holes created. Seed were incubated at a temperature of 28 ± 5 °C until visible symptoms of infection were observed. Growth was allowed to fully establish and identification of the morphological and cultural characteristics were observed. Following re-isolation, growth characteristics were noted and a comparison was done between the original infected seeds and the artificially inoculated cultures.

Preparation of plant material

Aloe vera leaves and bell pepper seeds were weighed using an electric weighing machine in exact amounts of 2 g, 4 g and 6 g each using an electric weighing machine. The plant materials were separately pounded using pistil and mortal and separately added to 50 mL conical flasks filled with 50 mL sterile water. The mixtures were vigorously stirred and filtered through three layers of muslin cloth. Concentrations of 2 g/50 mL, 4 g/50 mL, and 6 g/50 mL of the extracts from the aloe vera leaves and bell pepper seed were made, respectively. Precisely 5 mL of each resulting plant extract combinations depending on the treatments at different concentrations were added to 15 mL of PDA prior to inoculating *A. niger*. Both the PDA and the control experiment were incubated for seven days at room temperature. In the control experiment, exactly 5 mL of distilled water was added in place of the plant extract.

Measurement of radial growth of *A. niger*

The radial growth of *A. niger* was measured using a transparent ruler 24 hours after inoculation for 5 consecutive days and mean values were computed. Effect of toxicity of the extract on mycelia growth was determined based on the mycelial extension observed on the inoculated plates compared with the control plates.

Data analysis

Data were analyzed using a one–way analysis of variance (ANOVA) and significance level of treatment means were separated using the DNMRT and Standard error of means at 5% significant level.

Results

Result of pathogenicity test of *A. niger*

The result of pathogenicity test of *A. niger* on the healthy groundnut seeds revealed that the groundnut seeds inoculated with the pathogen produced symptoms of infection after four days of inoculation of the pathogen. The control experiment that was inoculated with pure strand of PDA produced no symptom of infection. On re-isolation of the pathogen and proper examination of the characteristic symptoms confirmed similar features of the initially isolated *A. niger* from the groundnut seed with the artificially inoculated groundnut.

Antifungal effect of aloe vera on redial growth of *A. niger* isolated from groundnut seeds.

Result presented in Table 1 shows that the growth of *A. niger* isolated from boiled shelled groundnut and cultured on growth media increased from the first to the fifth day. Application of aloe vera extracts at different concentration inhibited the growth of the pathogen from the lowest concentration of 2 g/50mL to 6 g/50mL. However, the control experiment where there was no extract grew unhindered throughout the inoculation period. There were significantly differences ($P \leq 0.05$) between concentrations throughout the period of incubation.

Table 1 Antifungal effect of aloe vera on growth of *A. niger* isolated from boiled shelled groundnut after 5 days of incubation.

	Days of incubation and radial growth (mm)				
Conc.(g/50mL)	1	2	3	4	5
0	13.33a	16.33a	23.00a	30.67a	35.33a
2	11.67b	13.67b	15.00	18.00b	22.33b
4	9.67c	10.33c	13.00	17.00c	18.67c
6	7.67d	9.33d	12.00	15.00d	16.67d
Grand mean	10.58	12.42	15.75	20.17	23.25
S.E ±	0.75	0.62	0.82	0.94	0.74

Means on the same column with same letters are not statistically different ($P \leq 0.05$) using DNMRT; SE± = Standard Error

The result in Table 2 reveals the antifungal effect of different concentration of aloe vera extracts on mycelial growth of *A. niger* after five days of inoculation on roasted shelled groundnut. The highest level of inhibition of *A. niger* was recorded in 6 g/50mL (17.67 mm) of the extract on the fifth day of incubation compared with the other treatment combinations. The result revealed that all the concentrations were significantly different from each other from first day to the fifth day of incubation.

Table 2 Antifungal effect of aloe vera on growth of *A. niger* isolated from roasted shelled groundnut after 5 days of inoculation.

	Days of incubation and radial growth (mm)				
Conc.(g/50mL)	1	2	3	4	5
0	12.67a	16.67a	22.33a	24.00a	31.00a
2	11.00b	13.67b	18.33b	20.33b	25.00b
4	10.33c	12.33c	16.33c	18.67c	21.67c
6	9.33d	13.50d	13.33d	16.67d	17.67d
Grand mean	10.83	12.42	17.58	19.92	23.83
S.E ±	0.70	0.62	0.94	1.23	1.45

Means on the same column with same letters are not statistically different ($P \leq 0.05$) using DNMRT; SE± = Standard Error.

The result in Table 3 presents the antifungal effect of different concentration of aloe vera (*Aloe barbadensis*) on mycelial growth of *A. niger* after five days of inoculation on roasted unshelled groundnut. The result showed that all the concentrations were significantly different from each other from the first day to the fifth day of incubation.

Table 3 Antifungal effect of aloe vera on growth of *A. niger* isolated from roasted unshelled groundnut after 5 days of incubation.

	Days of incubation and radial growth (mm)				
Conc.(g/50mL)	1	2	3	4	5
0	14.33a	17.00a	18.67a	19.33a	23.00a
2	11.00b	13.00b	15.67b	13.67b	18.33b
4	9.33c	10.67c	13.33c	11.00c	17.33b
6	7.33d	8.00d	12.00d	7.67d	16.00c
Grand mean	10.50	12.17	14.92	12.92	18.67
S.E ±	1.41	1.43	1.47	1.22	1.20

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Antifungal effect of bell pepper on redial growth of *A. niger* isolated from groundnut seeds

The result in Table 4 revealed the antifungal effect of different concentration of bell pepper (*Capsicum annum*) on mycelial growth of *A. niger* after five days of inoculation on boiled shelled groundnut. Application of bell pepper (*Capsicum annum*) extracts at different concentration inhibited the growth of the pathogen from the lowest concentration of 2 g/50mL (10.67 mm) to the highest concentration of 6 g/50mL (6.33 mm) on first day. However, the control experiment where there was no extract grew uninhibitedly throughout the incubation period. Significantly differences (P≤0.05) were observed throughout the period of incubation for all the treatments

Table 4 Antifungal effect of bell pepper on growth of *A. niger* isolated from boiled shelled groundnut after 5 days of incubation.

	Days of incubation and radial growth (mm)				
Conc.(g/50mL)	1	2	3	4	5
0	14.67a	17.67a	23.33a	29.33a	35.00a
2	10.67b	12.67b	15.67b	17.33b	20.67b
4	7.67c	9.00c	13.33c	15.00c	18.25c
6	6.33d	6.67d	9.67d	11.33d	13.67d
Grand mean	9.83	11.50	15.50	18.25	21.84
S.E ±	1.02	0.81	0.94	1.35	2.27

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Table 5 presents the antifungal effect of different concentration of bell pepper on mycelial growth of *Aspergillus niger* isolated from roasted shelled groundnut after five days of inocution. The result revealed that the concentration of 2 g/50 mL inhibited the least while the concentration of 6 g/50 mL was the most potent after five days of incubation. Significantly differences were observed from the first day to the last day of incubation.

The result in Table 6 reveals the antifungal effect of different concentration of bell pepper on mycelial growth of *A. niger* isolated from roasted unshelled groundnut after five days of incubation. Increase in concentration from first day of incubation brings about decrease in mycelia growth of the pathogen at the end of incubation period. The result showed significant a difference (P≤0.05) among treatments from the first day to the last day.

Table 5 Antifungal effect of bell pepper on growth of *A. niger* isolated from roasted shelled groundnut after 5 days of incubation.

	Days of incubation and radial growth (mm)				
Conc. (g/50 mL)	1	2	3	4	5
0	12.67a	14.67a	18.00a	22.67a	25.67a
2	8.67b	11.67b	14.67b	19.00b	21.00b
4	7.67c	9.67c	11.00c	15.00c	17.67c
6	8.67c	8.33d	8.33d	12.67d	14.33d
Grand mean	9.42	11.08	13.00	17.33	19.67
S.E ±	0.94	1.03	1.05	1.45	1.78

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Table 6 Antifungal effect of bell pepper on growth of *A. niger* isolated from roasted unshelled groundnut after 5 days of incubation.

	Days of incubation and radial growth (mm)				
Conc. (g/50 mL)	1	2	3	4	5
0	13.33a	17.00a	23.60a	30.00a	24.33a
2	9.67b	14.00b	16.00b	18.33b	19.00b
4	7.33c	13.60b	14.00c	15.33c	16.33c
6	7.67c	9.67c	11.00d	12.33d	13.33d
Grand mean	9.50	13.50	16.00	19.00	18.25
S.E ±	1.70	1.50	1.00	1.08	1.29

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Effects of concentrations of aloe vera and bell pepper extracts on radial growth of *A. niger*.

The result in Table 7 presents the effect of concentration of aloe vera leaf and bell pepper on mean radial growth of *A. niger* isolated from boiled shelled groundnut after five days of incubation. The result showed that there were significantly differences among concentrations with the least radial growth in 6 g/50 mL (12.33 mm) compared with control (23.73 mm).

Table 7 Effects of concentrations of aloe vera and bell pepper extracts on mean radial growth of *A. niger* isolated from boiled shelled groundnut.

	Concentration (g/50mL) and radial growth (mm)				
Extract	0	2	4	6	**S.E** ±
Aloe vera	23.73a	16.13b	13.73b	12.33b	2.13
Bell pepper	24.00a	15.80b	12.60bc	9.53c	1.85

Means on the same row with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

The result in Table 8 reveals the effect of concentration of aloe vera and bell pepper extracts on mean growth of *A. niger* isolated from roasted shelled groundnut. The result showed that all the concentrations were significantly different (P≤0.05).

The result in Table 9 shows the effect of concentration of aloe vera and bell pepper extracts on mean radial growth of *A. niger* isolated from roasted unshelled groundnut. The result showed that all the concentrations differed significantly (P≤0.05) to one another.

Table 8 Effects of concentrations of aloe vera and bell pepper extracts on mean growth of *A. niger* isolated from roasted shelled groundnut.

Concentration (g/50mL) and radial growth (mm)					
Extract	0	2	4	6	**S.E** ±
Aloevera	21.33a	17.67ab	15.87b	13.67b	1.67
Bell pepper	18.73a	15.00ab	12.20bc	10.47c	1.32

Means on the same row with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Table 9 Effects of concentrations of aloe vera and bell pepper extracts on mean radial growth of *A. niger* isolated from roasted unshelled groundnut.

Concentration (g/50mL) and radial growth (mm)					
Extract	0	2	4	6	**S.E** ±
Aloe vera	18.47a	14.33ab	12.33b	10.20b	2.10
Bell pepper	21.53a	15.47b	13.31c	10.80d	2.60

Means on the same row with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

The result in Table 10 reveals the comparative effect of concentrations of aloe vera and bell pepper on mean radial growth of *A. niger* isolated from boiled shelled groundnut. The result showed that the concentrations of 2 g/50 mL and 4 g/50 mL of the extracts were not significantly different (P≤0.05) while concentrations of 6 g/50mL of the extracts produced significant difference to each other with bell pepper reducing more radial growth in *A. nier*.

Table 10 Effects of concentrations of aloe vera and bell pepper extracts on mean radial growth of *A. niger* isolated from boiled shelled groundnut.

Concentration (g/50mL) and radial growth (mm)			
Extract	2	4	6
Aloe vera	16.13	13.73	12.13a
Bell pepper	15.80	12.60	9.53b
S.E ±	0.12NS	0.61NS	0.86

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

The result in Table 11 reveals the comparative effect of concentrations of aloe vera and bell pepper on mean radial growth of *A. niger* isolated from roasted shelled groundnut. The result showed that the concentrations of both extracts were significantly different with bell pepper performing better than aloe vera in reducing radial growth of *A. niger* at their respective concentrations.

Table 11 Effects of concentrations of aloe vera and bell pepper extracts on mean radial growth of *A. niger* isolated from roasted shelled groundnut.

Concentration (g/50mL) and radial growth (mm)			
Extract	2	4	6
Aloe vera	17.67a	15.87a	13.67a
Bell pepper	15.00b	12.20b	10.47b
S.E ±	0.87	0.91	0.76

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

The result presented in Table 12 reveals the effect of concentration of aloe vera and bell pepper on mean radial growth of *A. niger* isolated from roasted unshelled groundnut. The result showed that the concentrations were not significantly different from one another.

Table 12 Effects of concentration of aloe vera and bell pepper extracts mean radial growth of *A. niger* isolated from roasted unshelled groundnut.

	Concentration (g/50mL) and radial growth (mm)		
Extract	2	4	6
Aloe vera	14.33	12.33	10.20
Bell pepper	15.47	13.31	10.80
S.E ±	0.53Ns	0.48NS	0.32NS

Means on the same column with same letters are not statistically different (P≤0.05) using DNMRT; SE± = Standard Error.

Discussion

Aspergillus niger is one of the fungi majorly associated as rot causing fungus in groundnut. It is not uncommon that this fungus is found in different kinds of processed groundnut (boiled shelled groundnut, roasted shelled groundnut and roasted unshelled groundnut) in the study area. The finding of *A. niger* in different kinds of processed groundnut agreed with the result of Asama & Channya (2018) that isolated *A. niger, A. flavus, Alterneria dianthocola, Curvularia lunata, C. apellesecens, Fusarium oxysporum, F. equiseti, Microphomina phaseolina, Rhizopus stolonifer, Penicillium digitatumare* on different varieties of groundnut in Hong, Adamawa State of Nigeria and found *A. niger* as the most frequently occurring fungus.

Similarly, Isalar et al (2021) isolated and identified *A. tamarii*, *Lasiodiplodia iranensis*, *M. phaseolina*, *P. citrinum*, *A. oryzae*, and *A. pennicillioides* in groundnut and found them to be responsible for rot resulting in decreased productivity. In a related development, Tobin–West et al (2018) identified *Aspergillus, Penicilium, Mucor, Rhizopus* and *Fusarium* species on different processed groundnut seeds and found *Aspergillus* sp. as the most predominant species. Kigigha et al (2016) also found *A. niger* in unpeeled groundnut sold in Yenagoa metropolis. The pathogenicity test on the different processed groundnut seed showed varying levels of infection with the highest infection in shelled boiled groundnut. This result is similar to the work of Chile & Gwa (2021) that found high level of infection of *Aspergillus* sp. in shelled groundnut seeds in same location.

The use of plant extracts in controlling fungal pathogens of groundnut have been demonstrated both in storage and in the field (Chile & Gwa 2021, Isalar et al. 2021). Pintos et al (2018) evaluated the fungicidal properties of the phenolic extracts from industrial residues of *Aloe vera* against fungal phytopathogens and found the extracts effective in controlling the pathogens. Neindow et al. (2020) demonstrated the effect of some plant extracts for the management of Cercospora leaf spot of groundnut and found the extracts effective in managing the fungus. Ikhimalo et al. (2018) showed the efficacy of Aloe vera on *A. flavus* and *A. niger* isolated from groundnut seed. On the contrary, Akinnibosun & Osawuru (2015) reported *Fusarium* spp., *Rhizopus* spp., *Mucor* spp. and *Penicillum* spp. as the most abundant fungi in peeled and unpeeled groundnut in Benin City, Nigeria.

The action of bell pepper in reducing the radial growth of *A. niger* more than aloe vera may be due to the quality of phytochemicals present in the plants. Ngegba et al. (2017) attributed the potency of extracts to differences in the nature of the active ingredient or phytochemical present in the plants. Nwankiti & Gwa (2018), Gwa (2021) opined that the efficacy of the extract may be due to the amount of the active ingredients in the plant, the nature of the plant, the type of plant, the age of the plant, the part of plant used, the solvent used for extraction and the duration taken for

extraction of the compounds present in the plants. It was observed that the higher the concentration of the extract the more the inhibition hence the lower the radial growth of the pathogen. This supports earlier report by Okigbo et al. (2015), Gwa & Akombo (2016) that the more the concentration the more the inhibition of the pathogens because of the presence of more compounds in the plants.

Increase in virulence of *A. niger* isolates in the shelled groundnut may be due to the exposure of the groundnut seeds to unfavourable external environmental conditions which predisposes them more to the attack by the pathogen. The results presented in this study have significant implications for the management of *A. niger* isolated from *Arachis hypogaea* (groundnut) using aloe vera and bell pepper by farmers.

Conclusion

The study confirms the presence of *A. niger* as a pathogen of different kinds of processed groundnut in the area. The study also demonstrated the potency of different concentrations of aloe vera and bell pepper extracts in reducing the radial growth of *A. niger in vitro.* The study revealed that all the concentrations of the extracts were effective against the rot causing pathogen, *A. niger*. The study further showed that the concentrations of 6 g/50 mL of both extracts were more effective compared with 2 g/50 mL and 4 g/50 mL in managing the pathogen. Although the extracts both proved effective, it is concluded that bell pepper was more potent than aloe vera in reducing the radial growth of *A. niger* isolates from the different kinds of the processed groundnut. Consumers should therefore be always aware that the different kinds of hacked groundnut whether shelled or unshelled, roasted or not roasted are all contaminated with *A. niger* the pathogen that caused black mold in groundnut.

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