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OCCURRENCE OF DETERIORATING SEED-BORNE PATHOGENS AND WEEVILS *(CALLOSOBRUCHUS MACULATUS(F.) BRUCHIDAE COLEOPTERA)* AND THEIR ECONOMIC IMPACTS ON MARKETING OF STORED COWPEA GRAINS IN MAIDUGURI, BORNO STATE

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ABSTRACT
The experiment was conducted to investigate the economic impacts of fungi seed-borne pathogens and cowpea grain weevil (*Callosobruchus naculatus* (Fab.) *BRUCHIDAE COLEOPTERA)* on stored cowpea grains which include kananado, Biu-Fari, Bornoji, Kirikiri Banjara jaa, Warware-Bashi, Bonjera and Rangen. The experiment was conducted in a completely randomized design (CRD) in the Crop Protection Laboratory, University of Maiduguri. Blotter's paper seed plating and Agar methods were adopted for the purpose of the investigation. Each cowpea sample were surface sterilized with 10% Sodium hypochlorite for 1-2 minutes and rinsed thrice with sterile distilled water. Ten (10) surface sterilized seeds were aseptically plated per moistened Petri-dishes using a sterilized forceps and incubated at temperature of 21±2 ^{0}C for 7 days. Results showed that there were significant differences ($P \leq 0.05$) on germination percentage, 1000 seed weight (g) and disease incidence among the Cowpea variety seeds tested. Higher germination percentage were observed among Kanannado and Bornoji, while Wareware-Bashi had the lowest from 24 to 120 hours after plating (HAP) compared to other Cowpea varieties respectively. Biu-Fari significantly recorded the highest 1000 seed weight and the highest disease incidence from 72 to 120 (HAP). Bornoji recorded the lowest disease incidence from 24 to 120 (HAP) compare to other varieties respectively. Fungal isolates which include *Aspergillus niger, Aspergillus flavus, Mucor racemosus and Trichoderma harzianum* were isolated from the infected cowpea seeds and identified. The isolates colony pure culture on Potato Dextrose Ager (PDA) were greenish (*Aspergillus flavus*), black to dark brown (*Aspergillus niger*), whitish (*Mucur* recemoses) and light yellowish (T*richoderma harzianum*) respectively Disease causing pathogens posed a dangerous health threat and perforation inflicted on the grains by the weevils can lower the market value. Hence, proper seed handling, disease monitoring and safe storage environmental conditions become very necessary in order to prevent seed damage and contamination by the fungal pathogens and *C. maculatus*.

Keywords: Stored cowpea grains, Pathogens, Fungal isolates, *Callosobruchus maculatus*, Disease, Economic impact, Marketing impact

INTRODUCTION

Cowpea (*Vigna unguiculata* (L.*) Walp)* is among the major economic leguminous cash crop and staple protein food grain crop grown in Nigeria and other parts of the Worldwide. Cowpea is also a profitable income crop for most developing nations (Singh *et al.,* 2003). It ensures food security for many small scale farmers in West Africa (Abbadasi, 2015; Diaw, 1999; Kristjansen *et al*. 2005; Muhammad, 2018). Cowpea seeds contain 24.6% protein, anti-nutritional factor and several vitamins, fibers, minerals such as iron, potassium, and amino acid, tryptophan, lysine and low fat (Wikipedia, 2020). The seeds contain bioactive compounds that serve as better nourishment for growing tissue in the body (Dobaldo *et al.*, 2005).

The fresh succulent green pods and leaves serve as source of food calories for the teaming population in Nigeria and other parts of Africa. In Nigeria the dried seeds can be ground into flour for preparing varieties of consumable food such as moi-moi and beans cake. The grains are used for livestock feed formulation and while the dried or fresh leaves serves as fodder for feeding farm animals. It is also employed as a rotational and cover crops for maintenance and improvement of soil fertility (Alemu *et al.*, 2016). Hence, cowpea serves as one of the major food security crop the developing Countries. Nigeria is among the higher cowpea growers and per capita consumption is about 25 to 30kg per annum (FAO, 2007). Cowpea grain storage is a lucrative business and a good source of income to poor-resource farmers and also sustained food security in Maiduguri. But unfortunately and surprisingly, substantial quantities of the stored grains hardly reach markets in good condition because of their vulnerability to attack and spoilage by myriad of fungal pathogens and insect-pests which degrade and transform them into economically unattractive and unacceptable, unfit for human consumption and unmarketable as well. As a result of this scenario, many cowpea grain sellers often encounter huge losses at short and long run due to pathogenic fungal attack, spoilage and contamination. Incidentally most of the seed-borne pathogens gained entry into the seeds right from the field by adhering on the seeds. The penetrate using their hyphae or through openings bored by cowpea bruchid, there they survive, multiply and perpetuate seasonally under unprotected storage conditions and inflict damage to the grains. Abdullahi and Dandago (2021) highlighted that inappropriate storage and packing systems with higher humidity and temperature allow the growth and proliferation of aflatoxins producing fungi. Almeida *et al* (2015) reported that insect-pests are also intimately involves in facilitating the initiation and development of many crop diseases. Among the insect-pests of cowpea in West Africa, cowpea grain weevil *(Callosobrochus maculatus (F.) COLEOPTERA BRUCHIDAE)* is the most economic important grain weevil which can inflict up to 100% damage to cowpea in a few months after storage (Sallam, 2011). Documented records have shown that 30 million per annum is lost too C. macuiatus damage in Nigeria. The presence of these pests in stored grains can results to seed rotting, loss of viability, low seed weight, poor seed germination, mycotoxin contamination and discoloration (Dawar *et al*., 2016: Taylor and Nganjah, 2016; Zanjere *et al*, 2020). Diseased seeds ultimately result to poor performance and reduction in crop productivity (Enyiukwu and Maranzula, 2017). Similarly, Richard et al. (2021) revealed that the seed-borne disease infection is counter-productive at both field and storage levels. This ugly situation has become a major source of concern not only among the grain sellers but also among the teaming consumers in Maiduguri and other cowpea growing regions. There is dearth of information on the occurrence of the pathogens associated with cowpea seeds and consequence of their presence on food grains in Maiduguri. Hence, the study was conducted to investigate the occurrence of fungal pathogens and Cowpea grain weevil (*Callosobruchus maculatus* (F.)) on cowpea and their economic impacts on marketing of stored cowpea grains in Maiduguri, Borno State.

MATERIALS AND METHODS

The in vitro study was conducted in the Plant Pathology Laboratory of the Department of Crop Protection, Faculty of Agriculture of the Federal University of Maiduguri Borno State which lies between latitude 10^0 02 N and 13^0 04 N and longitude 11^0 04E and 14^0 04E. The experiment was carried out in a completely randomized design (CRD). The treatments were arranged in this design and replicated 3 times

Sample Collection

Four different Cowpea seed varieties were collected from Custom, Bulumkutu, Monday and Muna garage markets all located within Maiduguri Metropolitan (Figure 1**)**: The sourced grain samples were then kept in a clean air-tight polythene bags and taken to the Plant Pathology Laboratory of Crop Protection Department for in vitro investigation.

Seed observation: The grains collected from the four locations were carefully observed for the presence any insect-pest particularly *Cowpea bruchid (Callosobruchus maculatus L.) COLEOPTERA BRUCHIDAE)*

Surface Sterilization

The seeds from each cowpea sample were surface sterilized with 10% Sodium hypochlorite for 1-2 minutes and rinsed thrice with sterile distilled water to knock-off surface contaminants.

Plating of Seeds and Incubation

Blotter's paper seed plating and Agar methods were adopted in this investigation following the standard of the International Seed Testing Association (ISTA, 2020). For each cowpea variety, ten surface sterilized seeds were aseptically placed on moisten blotters inside plastic Petri-dishes using a sterilized forceps and incubated at temperature of 21±2 ^{0}C for 7 days.

Isolation and Identification of Fungi Isolates

Slides were prepared from 7 days incubated old culture. A sterilized inoculating needle was used to pick a small portion (mycelia/spores) of incubated cowpea grain showing disease infection and placed on a slide containing one drop of sterile distilled water, a drop of Lacto phenol cotton blue stain was added and the slide was cover with a slide cover. The slide was then passed through a Bunsen flame to expel the air bubbles and mounted on Stereo-binocular compound microscope connected with micrographic digital camera for observation. The fungi isolates observed were snapped and identified using Mycological compendium.

Culturing and Sub-culturing

Potato Dextrose Agar (PDA) media was prepared and used for consistent sub-culturing to obtain the pure culture of each fungus isolates. Slides were also prepared and viewed on the compound microscope, snapped as above for accurate identification and confirmation.

Data collection and observation

Data on 1000 seed weight, seed germination percentage and disease incidence**s** were collected and whereas the colony color of each fungal isolate were observed and snapped.

One thousand seeds weight (g): One thousand seeds were picked at random from each cowpea variety and weight separately using a sensitive electronic weighing scale (Model TL.300, Made in England).

Germination percentage (%) count of plated seeds

The numbers of cowpea seeds that germinated in each Petri dish were recorded, divided by the total number of seeds plated in the Petri dish and multiply by one hundred.

Disease incidence on cowpea seeds (%)

The disease incidences were recorded at 24, 48, 72, 96, and 120 hours after plating (HAP) respectively. The numbers of diseased seeds inside the Petri dish were counted, divided by the total number of seeds in Petri dish and then multiply by 100 using the formula.

Incidence of disease

$$= \frac{\text{Number of infected seeds in the Petri dish}}{\text{Total number of seeds in the Petri dish}} \times \frac{100}{1}$$

Data Analysis

Data generated were computed and subjected to analysis of variance (ANOVA) at 5% level of probability using statistics V.8.0. The mean separation was done using Duncan's New Multiple Range Test (DNMRT).

Table1: Cowpea Seeds collected within Maiduguri Markets.

Varieties	Seeds	Colors	Locations
Kanannado		White	Monday Market
Biu-Fari		White	Custom Market
Ohow		White	Bulunkutu Market
Wareware -Bashi		White	Muna-Garage Market
Kirikiri Banjara jaa		Red	Muna-Garage Market
Rangen		White	Bulunkutu Market
Banjera		Grey	Monday Market
Bornoji		Brown	Custom Market

RESULTS AND DISCUSSION

Germination percentage (%) of some cowpea seed varieties

The results on germination percentage of some cowpea variety seeds at 24, 48, 72, 96 and 120 hours after plating (HAP) in 2021 are presented in (Table 2). Among the cowpea varieties, Kanannado significantly recorded the highest germination percentage with 83.3, 90.0, 90.0, 90.0 and 90.00 % at 24, 48, 72, 96 and 120 (HAP) respectively; this was followed by Bornoji while Wareware-Bashi varieties recorded the lowest seed germination with 20.0% at 24 HAP and 26.67% from 48 to 120 HAP respectively compared to other cowpea varieties. The observed variation on seed germination percentage among the cowpea varieties could be as a result of their genetic, seed health status and pathogen load associated with the seeds. This result is in agreement with Iyanyi *et al.* (2015) who reported that pathogenic microorganisms has varying degree of inhibition on seed germination and seedling growth. This could also be due to the penetration by pathogenic fungi hyphae into the seeds were they obtain their nutritional requirements seed substrates which consequently resulted to low seed weight and poor seed germination. Kareem *et al.* (2018) also reported that the production of cowpea can be hindered by an array of pest and disease which affects yield, seed viability, seed quality and quantity; whereas, Jabir (2018) reported that fungal infection in seed tissue can reduce the germination, viability, longevity and vigor of seeds.

Table 2: Germination Percentage (%) of some cowpea seed varieties at 24, 48, 72, 96 and 120 hours after plating (HAP) in 2021.

Varieties	Germination Percentage (%)				
	24 HAP	**48 HAP**	**72 HAP**	**96 HAP**	**120 HAP**
Kanannado	83.33[a]	90.00[a]	90.00[a]	90.00[a]	90.00[a]
Biu-Fari	56.67[b]	66.67[bc]	66.67[b]	70.00[abc]	70.00[bc]
Bornoji	80.00[a]	86.67[a]	86.67[a]	86.67[ab]	86.67[a]
Kirikiri Banjara jaa	33.33[cd]	43.33[de]	50.00[c]	50.00[c]	50.00[c]
Ohow	56.67[b]	76.67[ab]	80.00[ab]	83.33[ab]	83.33[ab]
Bonjera	56.67[b]	80.00[ab]	80.00[ab]	83.33[ab]	83.33[ab]
Rangen	46.67[bc]	50.00[cd]	50.00[c]	50.00[c]	50.00[c]
Wareware-Bashi	20.00[d]	26.67[e]	26.67[d]	26.67[d]	26.67[d]
SE±	6.78	6.19	7.66	9.66	10.86
CV	14.55	8.75	16.44	20.71	23.28

Means in the same column followed by the same letter(s) are not significantly different (P≤ 0.05) from each other. SE± = Standard Error, CV = Coefficient of variance, HAP = Hours after seed plating.

One thousand seeds weight (g) of stored cowpea grain varieties

The result on one thousand seeds weight (g) among some Cowpea varieties evaluated in 2021 cropping season is presented in (Table 3). Result study revealed that there was significantly difference (P≤ 0.05) on one thousand seeds weight among the cowpea varieties. Biu-Fari variety recorded the highest one thousand seeds weight with 329.17(g); this was followed by Banjara with 207.80g and whereas Rangen recorded the lowest one thousand seeds weight with 144.83g compared to other cowpea varieties respectively.

Table 3: One thousand seeds weight (g) of some cowpea varieties.

Varieties	1000 seeds weight (g)
Kanannado	178.77[d]
Biu-Fari	329.17[a]
Bornoji	173.60[e]
Kirikiri Banjara jaa	191.67[c]
Ohow	173.00[ef]
Banjara	207.80[b]
Rangen	144.83[h]
Wareware-Bashi	147.47[g]
SE±	1.35
CV:	87

Means in the same column followed by the same letter(s) are not significantly different (p≤ 0.05) from each other. SE± = Standard Error, CV = Coefficient of variance, HAP = Hours after seeds plating

Disease incidence at 24, 48, 72, 96 and 120 hours after seeds plating (HAP)

The results on disease incidence among some cowpea seed varieties at 24, 48, 72, 96 and 120 hours after seed plating (HAP) in 2021 are presented in (Table 4).

The result revealed that there was significant difference (P≤0.05) on disease incidence among the cowpea varieties from 24 to 120 (HAP). Result showed that at 24 HAP Wareware-Bashi significantly recorded the highest disease incidence with 1.33% compared to other varieties. But at 48 (HAP) Rangen and Warware-Bashi recorded highest disease incidence with 1.33% each compared to other cowpea varieties. Biu-Fari and Bornoji recorded the lowest disease incidence with 0.0% each; the two cowpea varieties did not show any visible disease infection compared to others at 48 HAP. On the same trend, Bue Fari significantly (P≤ 0.05) recorded the highest disease incidence with 2.33, 4.67 and 6.0 % at 72, 96 and 120 (HAP) respectively, whereas Bornoji recorded the lowest disease incidence with 0.0, 0.0 and 0.33% at 72, 96 and 120 (HAP) accordingly compared to other cowpea varieties. The occurrence and variation of pathogen incidences among the cowpea grains corroborate with Richard *et al.* (2021) who reported that seed-borne fungal pathogens associated with grains can cause serious damage and economical huge yield losses, thereby making the grain inaccessible and expensive. By implication, the presence of the pathogens in infected and contaminated food grains could be the major reason for chronic and acute human ailments after consumption. This observation agreed with Akinmusire (2011) who reported that spoilage means food becoming unfit for consumption for human due to chemical change. On that note, Kebede *et al*. (2020) revealed that the hazardous effects of mycotoxins contamination are more common in African countries due to poor socio-economic conditions, and whereas Aldars-García *et al.* (2016) said that their occurrence is a threat to food safety during storage and distribution globally.

Table 4: Disease incidence of some cowpea seeds at 24, 48, 72, 96 and 120 hours after plating (HAP) in 2021.

Cowpea varieties	Disease incidence (%)				
	24 HAP	48 HAP	72 HAP	96 HAP	120 HAP
Kanannado	0.00^{b}	0.33^{ab}	0.33^{bc}	1.33^{bc}	1.33^{bc}
Biu-Fari	0.00^{b}	0.00^{b}	2.33^{a}	4.67^{a}	6.00^{a}
Bornoji	0.00^{b}	0.00^{b}	0.00^{c}	0.00^{c}	0.33^{c}
Kirikiri Banjara jaa	0.33^{b}	0.33^{ab}	0.33^{bc}	1.00^{bc}	3.33^{abc}
Ohow	0.00^{b}	0.67^{ab}	1.00^{bc}	1.33^{bc}	4.00^{ab}
Bonjera	0.00^{b}	0.33^{ab}	1.00^{bc}	2.00^{abc}	1.67^{bc}
Rangen	0.00^{b}	1.33^{a}	1.00^{bc}	1.67^{bc}	3.33^{abc}
Warware-Bashi	1.33^{a}	1.33^{a}	1.33^{ab}	2.00^{abc}	2.00^{bc}
SE±	0.29	0.50	0.59	1.51	1.44
CV	0.67	1.09	1.27	3.24	3.10

Means in the same column followed by the same letter(s) are not significantly different ($p \leq 0.05$) from each other. SE± = Standard Error, CV = Coefficient of variance, HAP = Hours after seeds plating

Fungi isolates identified and their pure colony cultures on Potato Dextrose Agar (PDA) media

The colony growth of the four fungal isolates identified from stored cowpea grains on Potato Dextrose Agar (PDA) are presented in (Figure 1). The photo-micrograph of identified isolates are also shown in (Plate 1) *Aspergillus niger* (Plate 2), *Aspergillus flavus,* (Plate 3) *Mucor recemoses* and (Plate 4) *Trichoderma harzianum* respectively. Several scientific researchers have reported that the occurrence of different pathogenic fungi from infected seeds can result to significant economic deterioration, spoilage and yield loss of various agricultural produce. This finding agreed with Enyiukwu and Manranzula (2017) who reported that seed infected by the pathogens can severely affect seed viability, seedling vigor and growth. Peter and Oredoyin (2019.) reported the occurrence of *Aspergillus parasiticus*, Aspergillus flavus, *Aspergillus niger, Rhizopus stolonifer* and *Aspegillus fumigatus* responsible for cowpea seed spoilage and losses in Ibadan, Nigeria. Richard *et al*. (2021) also isolated Trchoderma spp, *Aspergillus niger, Rhizopus spp, Altanaria spp, Aspergillus flavus* and *Chladosporium cladosporides* from an infected sorghum grains obtained from four major markets in Maiduguri, Borno State of Nigeria. Several researchers reported that postharvest grain losses cause great constrain to food and nutritional security (Affognon *et al*., 2015; Likhayo *et al.,* 2018; Mezgebe *et al*., 2016), economy and health (Khaneghah *et al.,* 2018; Kumari *et a*l., 2020). And against this scenario, Richard *et al*. (2021) advocated that disease assessment is an important tool which provides useful clues on when and how to mitigate the disease menace. Similarly, Ora *et al.* (2011) reported that seed health testing to detect seed borne pathogens is a vital step in the management of crop diseases.

Table 1: Pure culture of identified fungal isolates on Potato Dextrose Agar (PDA) media

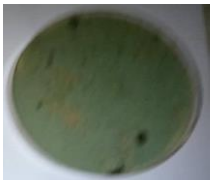
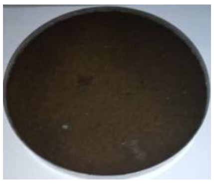
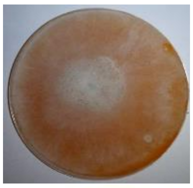
Names	Pathogens	Colony colors
Aspergillus flavus		Greenish
Aspergillus niger		Black to dark brown
Mucur recemosus		Whitish to greyish
Trichoderma harzianum		Yellowish

Photo-Micrographs of The Isolated and Identified Fungal Isolates

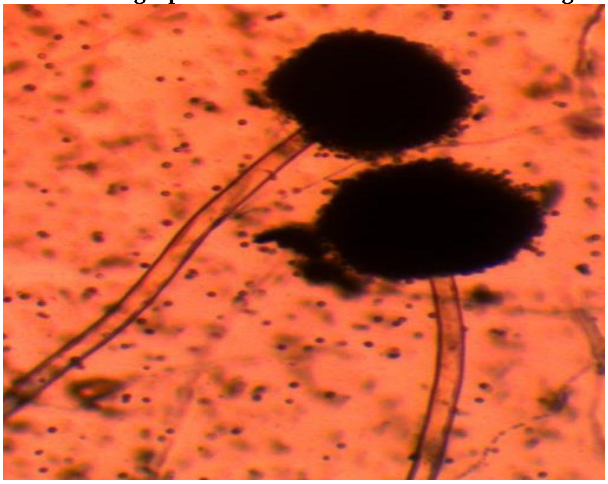


Plate 1: *ASPERGILLUS NIGER x 1000*

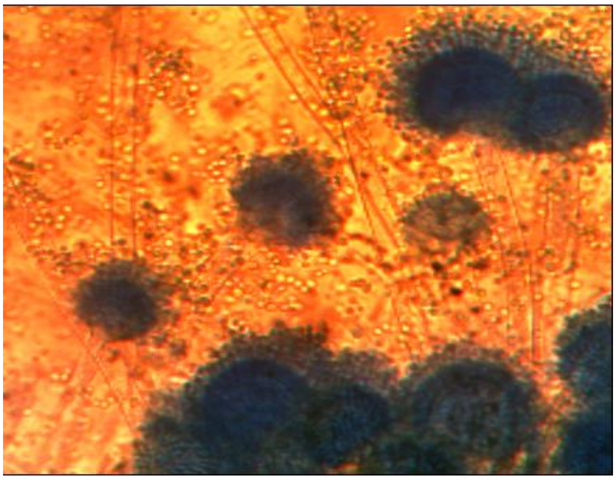


Plate 2: *Aspergillus flavus x 1000*

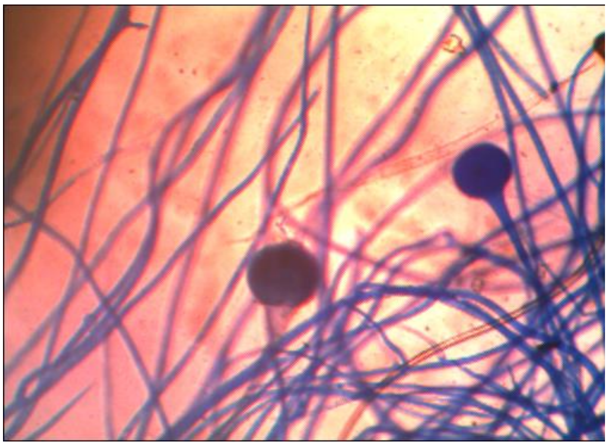


Plate 3: *Mucor recemosus x 1000*

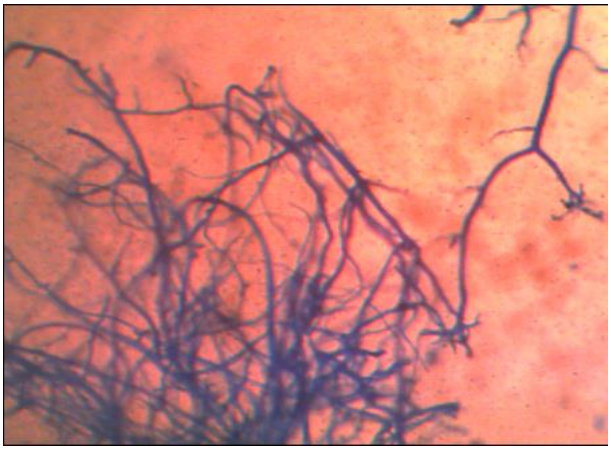


Plate 4: *Trichoderma harzainum*

Economic impact of cowpea bruchid *(C. maculatus (Fab)* on stored cowpea grains

The seed collections were critically examined and some of the cowpea seeds were discolored and severely damaged beyond use for human consumption or as an animal feed (Plate 1). The observed grain samples also contained both live and dead *C. maculatus* (Plate 2and 3); with whitish milky colored egg loads and holes bored by the cowpea grain weevil (Plate 4). Thus, the voracious feeding of noxious weevil and damages that have inflicted to the grains could have attributed to poor seed germination and lower 1000 seed weight as observed in Table 1 and 2 respectively. These observations corroborate with finding of (Goutam *et al*, 2016; Kpoviessi *et a*l, 2019) who reported that the vulnerability of cowpea to grain weevil can result to severe yield losses during storage periods. Sekou *et al*. (2001) also indicated that seeds perforation, reduction of grains weight and poor seed germination due to bruchid damage constitutes a big economic loss and challenge. Based on the same observation, it also concurred with the findings of several researchers who reported that bruchid species occurs wherever the crop is grown and frequently infests up to 100% of the stored seeds within 3 to 5 months under ordinary storage conditions (Booker, 1967, Caswell and Akibu, 1980.; Redden, et al., 1983, Singh, Singh, 1980.;1977., Southgate, 1978) Therefore, *C. maculatus* infestation, colonization and fast ravaging of stored cowpea grains is presently a consequential issue which has economic and marketing implication at short and long run if protection precautions are not put in place.

Impacts of *C. maculatus* on marketing of stored cowpea grains

Marketing of damaged and deteriorated insect infested grains is not a profitable business venture in Maiduguri and other parts of the county. It is even an offensive transaction to the consumer and to large extend can cause an embracement to the grain seller. The grain weevil larvae feed voraciously on the endosperm which ultimately affects the nutritional contents and value of the grains. Thus, the quantitatively and qualitatively reduction of the grains, this is coupled with the visible *C. maculatus* whitish egg loads on the grains, exoskeletons of dead grain weevils and holes perforated on the grains can make the grains unattractive and unacceptable to the buyers. The decline in market value of the commodity due to the damage by C. *maculate* can put the grain seller in a big fixed or dilemma; and ultimately he will be compelled to dispose them at a cheaper price or at a giveaway rate. Such incidence usually results to disappointment and gross profit loss. This observational report (plate 4) also agreed with (Singh, et al.,1 983) who reported that losses in seed germination due to *C. maculatus* attack and damage may reach 100% for grain with four holes per seed. Adedire et al. (2011) reported that the bruchid can cause huge weight loss and reduced the commercial value of cowpea seeds. By and large, those holes that the grain weevils left behind may serve as an easy entry point for fungal pathogens to facilitate further deteriorate and contaminate the left-over grains with mycotoxins. This makes the grain commodity useless, unappealing, unmarketable and finally unprofitable. Atanda *et al*. (2012) reported that the losses could be due to contamination with mycotoxins after primary infestation compromising the nutritional composition of the cowpea grains. About 30 to 80% of the total production of cowpea valued at over US 300 million dollars is either lost or suffers damage annually as a result of bruchid infestation (Ohiagu, 1985). In Nigeria alone, over $30 million per annum is lost as a result of cowpea weevil damage. Similarly, Caswell (1981), revealed that the damage pattern caused by *C. maculatus* to stored cowpeas was studied in northern Nigeria in an open market survey over an 8-yr period showed that each larva consumed an average of 10% of one seed and that an estimated 30,000 tons was lost to bruchids annually. This is a very serious agronomic constraint to cowpea production in Sub-Saharan Africa and other parts of the World.

Uzeozor (2005) revealed that the various damages subjected to the grains by *C. maculatus* can lead to economic loss to the farmers and grain sellers who are compelled to disposed them as the pest hinders long-term storage and thereby making it impossible for them to reap the benefit that they should have obtained as a result of shift in price increase during storage periods. Lale, (2002) also pointed out that such losses continue to occur due to poor threshing, cleaning, drying and storing techniques used for cowpea production in Africa.

The cowpea weevil, *Callosobruchus maculatus (F.) (Coleoptera: Bruchidae)*, is a cosmopolitan field-to-store pest ranked as the principal post-harvest pest of cowpea in the tropics which can cause substantial quantitative and qualitative losses manifested by seed perforation and reductions in weight, market value and germination ability of seeds if not protected.

Plate 1: Spoiled cowpea Seeds

Plate 2: Live Bruchids feeding on cowpea seeds

Plate 3: Dead cowpea grain weevils

Plate 4: Perforated (damaged) Cowpea Seeds

SUMMARY AND CONCLUSION

Fungal pathogens invasion, spoilage and contamination of grains and other food commodities pose a health threats, economic challenge, and unforeseen danger to man as well as livestock. This research has revealed the presence of *Aspergillus niger*, *Aspergillus flavus, Mucor recemoses and Trichoderma harzianum* in stored cowpea seeds obtained from the four major Maiduguri markets which has economic risk implication Thus, it was observed that the infected seeds were covered with mats of fungal hyphae which implies that the seeds were used as food substrate by these pathogens. This ultimately resulted to qualitatively and quantitatively serious damaged; deterioration, unrecovered and unreasonable economic profit. Additionally, apart from the negative effect of *C. maculatus* on cowpea seeds, the possibility cannot be rule out that this pest could be a potential dispersal agent or carrier of fungal pathogen spores from an infected seed to healthy ones since they are field-to-store insect-pest. Hence, the economic impacts and marketing risk of perforated cowpea seeds caused by *C. maculatus*, coupled with health threat posed by these obnoxious disease pathogens is major source of concern which requires urgent preventive and control attention. Certified healthy seeds are indispensable economic resources which play prime importance in agricultural production for the ever-increasing human population in Nigeria and around the globe. Therefore, consistent and collective scientific efforts should be made to prevent the fungal pathogen frequent rout of occurrence so as to maintain good food value and also protect the seeds against pathogen invasion, spoilage, contamination and food insecurity in the state and the country at large.

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