

## Research Paper

# Effects of inclusion of local pepper powder or salt to cowpea seeds during storage

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The study investigated the effect of inclusion of local pepper powder and salt admixture on cowpea seeds during storage. One gram of pepper powder was added to two kilograms (kg) of cowpea seeds and packaged inside bagco® bag, also one gram of pepper powder with one gram of salt were added to two kilogram of cowpea seeds and packaged inside bagco® bag while two kilograms of cowpea seeds only was packaged inside bagco® bag and serves as a control for aforementioned two samples. The three samples were stored at ambient condition for five weeks and the number of weevil and the weight of each sample were recorded every week. The results showed that the number of weevil in control sample during storage ranging from 18 to 20 while other two samples ranging from 3 to 5 weevils. Also, during the storage period, the weight of control sample decreased from (2.00 to 1.73) kg, but the weight of

sample with pepper powder increased from (2.00 to 2.04) kg while the sample with pepper powder and salt increased from (2.00 to 2.08) kg. The results showed that the reduction of the weight of control sample may be attributed to weevils' infestation of the cowpea seeds during storage. The increase in the weight of other two samples may be attributed to preservation (pepper powder and salt) added to the sample during storage. The study showed that the preservatives used for cowpea seeds retard the growth of adult and larva weevils during storage period. Therefore, usage of pepper powder and salt could be useful for the preservation of cowpea seeds during storage without any adverse effect.

**Key words:** cowpea seeds, local pepper powder, salt, preservatives, storage, weevil infestation.

## INTRODUCTION

Cowpea legume is a plant in the family *Fabaceae* (or *Leguminosae*). These, are grown agriculturally, primarily for their food grain seed pulse for livestock forage and silage, and as soil – enhancing green manure Anonymous, (2004). Legumes are notable for symbiotic nitrogen- fixing bacteria in structures called nodules well; known legumes include alfalfa, (lover, peas, beans, lentils, lupines, carob, soybeans, peanuts, tamarind, and the woody climbing vine wisteria, legume trees like the locust trees or the Kentucky coffee tree *Gymnocladus dioica* can be used in perma culture food forests Anonymous, (2004).

Legumes are low in fat, free of cholesterol and rich in fiber; their high protein content makes them suitable substitutions as meat analogue, like soybeans. Cowpea (*Vigna vnguiculata*) is one of several species of the widely cultivated genus of vigna, four subspecies are recognized, cowpea is one of the most important food legume crops in the semi-arid tropics. A drought tolerant and warm weather crop, are well adapted to the drier regions of the tropics, where other food legumes do not perform well. It also has the useful ability to fix atmospheric nitrogen through its root nodules. Cowpea is a plant of the pea family native to the old world tropics. It

is an important pulse for animal feed and human consumption.

Cowpea's adaptability to different types of soil and intercropping systems its resistance to drought, and its ability to improve soil fertility and prevent erosion makes it an important economics crop in many developing regions the sale of the stems and leaves as animal feed during the dry season also provides a vital income for farmers (Oyewole and Oloko,2000).But synthetic chemicals as preservatives are most effective, giving several fold increase in grain yield (Aliyu and Ahmed, 2006). However the danger of the use of synthetic chemicals which could accelerate environmental pollution, toxicity to mammals, hazards to users and consumers (Olorifa and Erhun,1988), have given it a restrains. Alternative control measures are being sought. Total abandonment of chemicals could however, spell doom to man as this will worsen the present food situation (Periera, 1983).

Beans and cowpea seeds are often rendered worthless by weevils (Oyewole and Oloko, 2000) . The most commonly reported insect pests of beans are weevil (*callosobruchus naculatus*) and the bean weevil *acanthoseelides abtectus* are the insect usually blamable for this damage (Oyewole and Oloko, 2000).The infestations usually originate in the field but reproduction of the weevil continues in stored seed as long as temperature is sufficiently high until the entire lot of seed is completely without value (Ashaye et al., 2006 ).

Herbs and Spices have been used for thousands of years to enhance the flavor, color and aroma of food; additionally, they are known for their preservative and medicinal value (Arowona, 1999). Black pepper (*Piper nigrum* L., *Piperaceae*) is used to treat asthma, chronic indigestion, colon toxins, obesity, sinus, congestion and fever (Rosa, 1974; Okafor,2012).Black pepper and a white pepper are made from the *Pipers nigrum* plant. The black pepper and white pepper powder are used to make medicine, people take black pepper for stomach upset, bronchitis, and career, they take white pepper for stomach upset malaria, cholera, and cancer, black pepper is sometimes, applied directly on the skin for treating nerve pain (neuralgia) and a skin disease called cabbies black pepper and white pepper are also used topically as a counter-irritant for pain (Adegoke et al., 2000 ).

It has been shown that pepper has antimicrobial activity (Bawa and Webster, 1992) and some have already produced compounds, effective against antibiotic resistant strains of bacteria (Bawa and Webster, 1992). They have a pungent taste and cause salivation and numbness of the mouth (Ndukwu and Ben-nwdibia, 2005).

It has been reported that the fruits extract of the plant had anti-depressant, anti-conceptive, anti- inflammatory, antioxidant, anti-cancer, anti-diabetic, antibacterial, anti-fungal, anti-tumor, anti-allergic, anti-asthmatic, anti-

fertility, antiulcer, antihypertensive, anti-platelet, anti-thyroid, immune-modulatory, anti-amoebic, hepato protective, vasodilating, insecticidal and mosquito larvicidal activities (Zaveri et al., 2010; Manoj et al., 2004)

Antioxidant properties of spices have been recognized about six decades ago when it was demonstrated that spices effectively increased the antioxidant capacity of foods and that their effects depend on food matrices. The use of local spices to control the activities of micro-organisms in food has been reported by (Akpomedaye and Ejechi,1988).Apart from antimicrobial activities, spices are believed to have medical value. Black and white pepper might help fight germs (microbes and cause the stomach to increase the flow of digestive juices (Cunningham et al.,2009). There is conflicting evidence about their role in cancer some evidence suggests pepper might protect against color cancer, but other evidence suggests it might promote liver cancer (Cunningham et al., 2009)

Preservation usually involves preventing the growth of bacteria, Fungi (such as yeasts), and other microorganisms as well as retarding the oxidation of fats which cause rancidity (Oluwaniyi et al., 2009). Food preservation is the process of treating and handling food to stop or slow down food spoilage, loss of quality, edibility, or nutritional value and thus allow for longer food storage (Reddy and Biradarpatil, 2012).A number of methods of prevention can be used that can either totally prevent delay or otherwise reduce food spoilage, preservatives can expand the shelf life of food and lengthen the time long enough for it to be preserve, processed, sold and kept in the consumers home for a reasonable length of time (Oluwaniyi et al.,2009). *Aframocuum danielli* (alligator pepper) is a parental crop with erect stems with about 50 species over West and some East African countries Anonymous, (2004. The antimicrobial activities of its crude extract against a number of micro-organisms have been established Fasoyiro et al., (2001). A host of bacteria including *Salmonella enteritis*, *Pseudomonas fragi*, *Pseudomonas fluorescens*, *Proteus vulgaris*, *Streptococcus pyogenes*, *Straphylococcus aureus* and molds *Aspergillus flavus* and *Aspergillus higher* has been reported inhibited by the same extract. Also, the nutritive status of *Aframonum danielli* has been reported by Fasoyiro et al., (2001), that it can cause the inhibition of some food spoilage yeasts (*Candida torulopsis*) at concentration of 100 to 200 ppm, the anti-oxidative activities of alligator pepper and the evaluation of its preservative action as a substitute for sorbic acid in treated bread has been discovered. *Aframonum danielli* was used to control ochratoxin A in kunun-zaki. Adegoke et al. (2007) reported that *Aframonum danealli* can be used in food processing and preservation.

This approach shall help the farmers preserve their cowpea all year round and help against food poisoning and toxicity that may possibly come from chemical

preservatives. It has become necessary to search for an option that can produce satisfactory result in a way that such option is not only acceptable to the farmers, but must also be feasible from a socio-economic stand point. In the present circumstance, an approach that would rely on the use of plant products (without involving synthetic pesticides) appears to hold the greater hope for cropping system throughout the tropics and sub-tropics, including Nigeria. The non-availability and high cost of synthetic pesticides to the environment, human and grain import to livestock have necessitated the search for a more acceptable method of controlling insect pests to be able to meet up with the food demand of its cowpea in storage. This study was therefore carried out to proffer an alternative cowpea preservative method that is cheap, available, and affordable and has Preservative effect and which is indigenous to farmers, marketers and consumers of cowpea.

## MATERIALS AND METHOD

Local variety of cowpea seeds and bagco<sup>®</sup> bag purchased from open market, kontagora, Niger state, Nigeria were used for the study. Bagco<sup>®</sup> bag was used as a packaging material for the storage study. The bag had a suitable air pore that afforded an efficient air tight circulatory condition. Two storage local material spices, namely pepper and salt were used as preservatives. Sewing machine was used to resize the bags and help sew the pepper and salt preservative impregnated bags on the bagco<sup>®</sup> bag at equidistance of the length.

### Methods

Two grams of pepper powder was added to 2 kg of cowpea seeds and packaged in bagco<sup>®</sup> bag. For second sample, 2 g of pepper powder and 2 g of salt were added to 2 kg of cowpea seeds and also packaged in Bagco<sup>®</sup> bag. However, 2 kg of cowpea seeds was packaged in bagco<sup>®</sup> bag without any preservative and this served as a control. The three samples were stored for five weeks and number of weevil and weight of cowpea seeds were determined on each sample every week. The weight of each sample was determined using weighing balance while number of weevil was determined by counting of the weevil in each sample.

### Statistical analysis.

Simple average mean summation was done to ascertain values. The experimental counting was done three times on weevil and weight weighting.

## RESULTS AND DISCUSSION

Table 1 shows the effect of grounded local pepper and

salt on cowpea seeds storage for five weeks. At first week, the sample with pepper and sample with pepper and salt recorded similar results with the seeds having no weevils while control sample recorded a high number (18) of weevil's infestations on seeds. Two samples showed similar results while the control recorded the highest number (18) of weevil infestation and lowest weight of the seeds (1.90 kg) from second week. At third week, the two samples showed similar results while the control recorded the highest number (18) of weevil infestation and lowest weight of the seeds (1.78 kg). At fourth week, the two samples showed similar result while the control recorded the highest number (18) of weevil infestation and lowest weight of the seeds (1.75 kg) This agrees with result on using Moringa oil seed for a week storage of cowpea seed (Ilesanmi and Gungula, 2013). At fifth week, the two samples showed similar result while the control recorded the highest number (20) of weevil infestation and lowest weight of the seeds (1.73 kg).

The weevil number was affected by the interaction of pepper spices and longevity of period of airtight storage , this agreed with the report of Aguru *et al.* (2015 ) who assert that seed longevity and viability vary from species to species even when given identical treatments and storage conditions. The highest numbers of weevil were not attached to the cowpea seeds at one week when pepper and salt were used to preserve the cowpea seeds. The result of second week showed that salt and pepper may not have caused weight loss in stored cowpea seeds with the control sample having similar weight loose. There was increase in numbers of weevil number from zero to four, respectively with a positive difference in pepper and salt admixture effects. The slight increase however not incremental could be due to chemical or radical scavenging ability of the spice used (Zaveri *et al.*, 2010). The result of third week showed that the various number of weevil mortality in stored cowpea seeds reduced with pepper and salt compared with the control sample which may be due to capsaicin content of the pepper probably been active (Taylor *et al.*, 2007). The result obtained for the fourth week is in line with the study reported by Taiwo, (1998). The airtight storage and local preservatives are very good condition for storage cowpea seeds without pesticide, and this will effectively control cowpea weevil infestation .The effect of these preservative (salt/ pepper and pepper) longevity of period of storage did not significantly affect weight loss in cowpea. The result of fifth week showed that there were decreases in numbers of weevil number from five to four in the two samples while there was increase in the control sample (20). The application of salt and pepper affected weevils while a higher number was recorded in control sample (week 5) ,while least was recorded from other two samples,the result affirmed the study report by Nasiru, (2010) who investigative the profiles on seed viability using pepper. The weights of cowpea seeds with preservative were above initial 20 kg and this may be due

**Table 1.** Effect of grounded local pepper and salt on cowpea seeds storage for five weeks.

Sample	Week1		Week2		Week3		Week4		Week5	
	Number of weevil	Wt (kg)	Number of weevil	Wt(kg)	Number of weevil	Wt (kg)	Number weevil	Wt (kg)	Number weevil	Wt (kg)
control	18	1.93	18	1.90	18	1.78	18	1.73	20	1.73
CPO	0	2.05	4	2.06	3	2.05	5	2.05	4	2.04
CPS	0	2.05	4	2.07	3	2.07	5	2.07	4	2.08

Values are means from three averages readings of the experimental counts and weight

Control – cowpea seeds only

CPO – cowpea seeds with pepper

CPS – cowpea seeds with pepper and salt

wt =weight of sample in kg.

to hygroscopic nature of the salt and pepper. The attached action of salt / pepper admixture could have affected parent larva weevil (that laid the eggs) thus a reduction in egg and even the ones that succeeded in hatching to larva and adults were also further reduced.

## CONCLUSION

The study showed that the preservation used retard the growth of both adult and larva weevils during storage period. Thus, usage of pepper powder and salt could be use for the preservation of cowpea seeds during storage without any adverse effect. The use of pepper and salt as a natural biocide may open a new window in the scientific method of handling cowpea seed which may be extended to other known seeds. It is therefore suggested that more intensive research is required in this area to further elucidate the biocidal effect of of pepper on different biotic agents of cowpea seeds such as spoilage bacteria, especially during fermentation or cook stay of cowpea.

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