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RESEARCH ARTICLE

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Sensory Evaluation of Cowpea (*Vigna unguiculata* (L.) Walp.) Grain Treated with Neem-Afri Bio-Pesticide

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ABSTRACT

A study was conducted to determine the effects of Neem-Afri bio-pesticide in comparison to synthetic Permethrin (0.60%) as conventional pesticide on the organoleptic quality of cooked cowpea grain after a month storage period. Scores of 10-panelist based on 5-point hedonic scale (rated from poor to excellent) was used to evaluate the effects on cooked cowpea grains served. The result showed that cowpea grains treated with Permethrin (0.60%) recorded higher score on taste (3.40±0.23), odour (3.60±0.12) and appearance (3.73±0.17) of the cooked grain. The overall acceptance of the qualities assessed revealed that cowpea grains treated with Permethrin (0.60%) recorded non-significantly higher score of 3.58±0.12 in comparison to 3.11±0.17 of Neem-Afri treated seeds. The study showed that Neem-Afri biopesticide treated grains could also be welcomed by the general public.

Keywords; Biopesticide, Neem-Afri, Organoleptic, Permethrin (0.60%)

INTRODUCTION

The risks and benefits of chemical pesticides known and documented worldwide probably give an inaccurate perception of the hazards they present to the peasant farmers (who applied them) and the communities within which they live [1-2].

The high risk that arose from the use of pesticides may be the consequence of food poisoning- resulting from direct or indirect food-pesticide admixture, biological magnification or pesticide drift [3], environmental pollution and insect resistance [4-7]. These have encouraged the search and use of plant materials to serve as alternative for chemical pesticides in pest control. Natural products used for the control of pests are generally referred to as bio-pesticides and/or botanicals, when these products are of plant sources.

As many as 2000 plant species are being used today in the control of insect pests, most of which are used traditionally as food or medicines by humans [8]. The plant materials provide small-scale farmers with bio-degradable, risk-free and inexpensive method for the control of pests [9]. The effects on pests, of a particular plant powder or extract, vary with the susceptibility and type of pest, and with environmental conditions including temperature, pesticide concentration and method of application [9-10].

Neem, *Azadirachta indica* A. Juss (Family Meliaceae) is a well known plant that is being used traditionally in the control of many pests both in field and during storage. Different formulations of Neem powder and its extracts have been tested for their efficacy on stored product pests in comparison with other botanicals under field and laboratory

settings [11-12]. The presence, in varying concentration, of azadirachtin pigment in the plant have been related to the plant's high insecticidal activity [11][13]. Phytochemical analysis of neem leaf extract indicates the presence of saponins, tannins, phenols cyanogenic and cardiac glycosides [14]. Boeke *et al.* [15] reviewed the uses and effects of Neem powder and its extracts on human, insect pests and other animals. Azadirachtin naturally acts to prevent insects' respiration, digestion and general metamorphosis.

Traditionally, farmers admix neem powder or its extract directly with produce in hermetic containers, almost immediately after harvest until when needed. Neem leaf is also used traditionally as smoke-repellants against flying and crawling insects especially in the dusk [11]. Neem extracts are also known for their anti-inflammatory [16], and healing properties [17].

The continuous interest in the use of plant derived pesticides for the control of both field and storage pests have led to standardization of the plant products, including neem, to produce much stronger formulations [5]. However, the extent of any pesticide acceptance also relies on the availability of raw materials and residue effects on consumer-which include changes that affect those aspects of treated food as experienced by senses i.e. organoleptic properties [18]. As a result, this study is designed to determine the effects of commercial Neem Afri on the organoleptic qualities of treated cowpea seeds.

MATERIALS AND METHODS

This study was conducted at Zoology Laboratory, Department of Biological Sciences, Usmanu Danfodiyo University Sokoto. Under ambient environmental conditions.

2.1 Collection and Preparation of Test material

Neem Afri Biopesticide was purchased at Abubakar Rimi Market Sabon Gari, Kano, Nigeria. It is a product of Adebar Trade and Industries Ltd, Maiduguri, Borno State. Neem Afri is made from *Azadirachta indica* leaf and is composed of 3000 ppm Azadirachtin, 0.4% Nimbin and 0.56% Salanin. Neem-Afri is a contact pesticide, but it also function as repellant. Produced as a broad spectrum insecticide, it controls about 600 insect species. Hundred (100 cm^3) of distilled water was added to 1 cm^3 of the emulsifyable pesticide to make up the required dose ratio of 100:1 of the pesticide. Treatment doses of 2.5, 5.0 and 10.0 cm^3 each were also added to 100 cm^3 of water in separate jars. Neem Afri was compared with a Permethrin (0.60%) as conventional chemical pesticide.

2.2 Seed Preparation

Four hundred (400) grams of healthy cowpea grain were placed each in the glass jars containing varying concentrations of emulsified pesticide and allowed to soak for three minutes. Treated grains were removed and spread on a laboratory table and allowed to dry for 24 hours. Another set up was prepared using graded concentration of Permethrin (0.60%) powder. Equal grams of healthy cowpea grains were also soaked in a distilled water to serve as standard. Samples are then kept aside, untouched in an air-tight plastic container for a period of one month post treatment following the procedures of Okunola *et al*. [19] and Udo [20].

2.3 Organoleptic Evaluation

To determine the organoleptic qualities of cooked cowpea grain, the modified procedure of Okunola *et al.* [19] was adapted. One hundred (100) grams of the treated and untreated cowpea grain were measured and rinsed with clean water before cooking.

Samples were cooked separately, each with 200 $cm^3$of water for forty minutes under moderate temperature on an electric cooker (Binatone, Japan). Small amount of cooking salt was added to each sample to add taste. Cooked grains were served warm in labeled containers to a team of ten panelists. Questionnaires were administered to assess the effect of treatment on the taste, odour and appearance of the treated grains. A 1 to 5-Point hedonic scale (ranging from Poor to Excellent scores respectively) was used for assessment.

2.4 Data Analysis

Panelist responses collected were analyzed by ANOVA, and Duncan Multiple Range Test was used for mean separation. To normalize the variances, data were square root transformed before it was subjected to analyses. Back transformed means are presented in Table 1.

RESULTS AND DISCUSSION

Panelists' response on the effect of natural and synthetic pesticides on the organoleptic qualities of the treated cowpea grains are graphically presented in Figure 1 below. Among the treated samples, highest score was recorded in seeds treated Permethrin 0.60% in both taste, odour and appearance of the seeds. However, the scores are insignificantly lower than that of untreated (check) cowpea seeds.

From figure 1 below, comparatively lower mean scores were recorded in cowpea grains treated with Neem Afri across all qualities. The overall acceptance (determined as the average of taste, odour and appearance of the cooked grains) showed that both Neem Afri and Permethrin 0.60% recorded significantly lower scores compared to the untreated (check) cowpea grains.

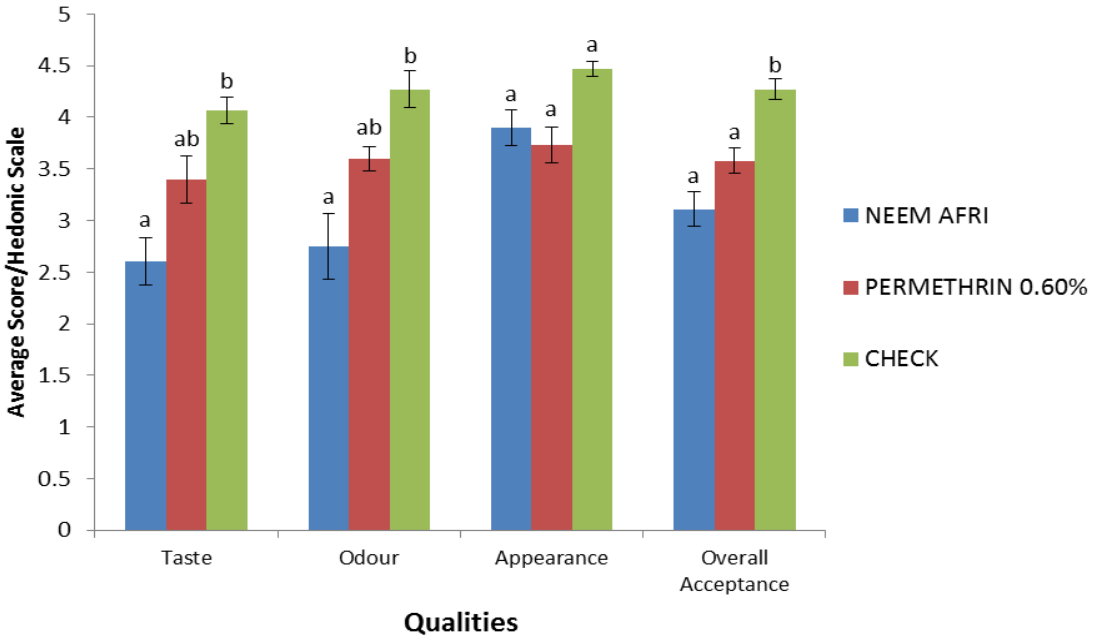

Figure 1. Mean score per quality of cooked cowpea seeds treated with various doses of Neem Afri Bio-pesticide and Synthetic Permethrin (0.60%). Note: Colored Bars (grouped under the same quality) followed by similar alphabets are statistically the same at p≥0.05 using DMRT. Line bars represents SE.

The minimum scores recorded on the bio-pesticide treated seed were probably due to faulty taste and smell. Generally, seeds treated with lower doses of pesticides are more preferable. Rubasinghege *et al.*[18] reported that characteristic odour in oil-treated grains was due to the absorption of oil pesticide. Although some of the active ingredients may be poisonous to human [15], Isman [21] reported that much of the plant derived pesticides tested in laboratories are not effective in long term storage. In addition, the phytochemical constituents of neem leaf are reported to be very important and beneficial in industrial science. Medically, it is used in the treatment of hyperglyceamia, and as anti-oxidant, anti-ulcer and in weight loss [22]. Neem leaf powder and extracts are being used traditionally either as medicine or as contraceptive [11]. Schumacher *et al*. (2010) reported that *A. indica* extract have an anti-inflammatory properties. Bwala *et al*. [17] also showed that neem oil can act as a cheaper and conveniently effective wound healing ointment especially in rural areas where veterinary services are not available.

CONCLUSION

Despite its comparatively lower scores, Neem Afri biopesticide can be considered fairly acceptable by the general public considering its pesticidal efficacy, healing and other medicinal values, in comparison to conventional Permethrin 0.60%.

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