BABCOCK UNIVERSITY
ILISHAN-REMO, OGUN STATE, NIGERIA

COLLEGE OF POSTGRADUATE STUDIES
2022/2023 PhD Thesis Abstract

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RT: **Alfatocixicological Studies of *Vigna subterranea (l.) verdc*. and *Circultus colocynthis (L.)Schrad.* from North Central and South-West Nigeria**

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AB: Aflatoxins are a group of highly toxic secondary metabolites produced mainly by filamentous fungi such as *Aspergillus flavus* and *Aspergillus parasiticus*. Fungal contamination of food commodities is a global food security challenge that impacts negatively on the health of consumers. There is a paucity of information on aflatoxin-producing fungi in *Vigna subterranea* and *Citrullus colocynthis* seeds. This study was designed to determine the aflatoxicological potential of *Vigna subterranea* (Bambara nuts) and *Citrullus colocynthis* (melon seed) from North Central and South-West, Nigeria.

Random sampling technique was used to select 120 samples of Bambara nuts and melon seeds from markets in North-Central and South-West Nigeria namely; Kwara, Kogi, FCT, Nasarawa, Oyo, Ogun, Lagos and Ekiti States in wet and dry seasons. Fungi were isolated and identified by molecular method. Aflatoxins were evaluated and quantified using Thin Layer Chromatography with a scanning densitometer. For toxicological studies, 50 Wistar rats (six weeks old) with a weight range of 100 to 105 g were divided into five groups of 5 rats per group. They were fed by incorporating 1 g and 5 g of aflatoxin contaminated *V. substerranea* and *C. colocynthis* pellets in 25 g of feed. The control and test groups were fed with respective uncontaminated and contaminated feeds for two weeks (acute toxicity study) and four weeks (chronic toxicity study). The rats were sacrificed by cervical dislocation. Toxicological analyses were carried out on vital organs (kidney and liver) while full blood count was analyzed. Data were analyzed by descriptive statistics.

Twenty-four toxin-producing fungal isolates were identified from *V. subterranea* comprising of *Aspergillus* species (8), *Macrophomina phaseolina* (6), *Fusarium* species (4), *Rhizopus*

species (3), *Talaromyces pinophilus* (1), *Ceriporia lacerata* (1) and *Phanerochaete chrysosporium* (1); while in *Citrullus colocynthis*, eighteen isolates including *Aspergillus* species (12), *Rhizopus* spp (2) *Macrophomina phaseolina* (1), *Penicillium aurantiocandidum* (1), *Neurospora crassa* (1) and *Lichtheimia hyalospora* (1) were identified. In *V. subterranea*, 537, 332, 253, 223, 191 and 158 parts per billion (ppb) of aflatoxin B_1 obtained from Nasarawa, Ogun, FCT, Ekiti, Lagos and Kwara States respectively were higher than the permissible limit for aflatoxins in animal feed (≤50 ppb). In *C. colocynthis*, 652, 335, 294, 175 and 144 ppb of aflatoxin B_1 obtained from Oyo, Ekiti, Nasarawa, FCT and Kogi States respectively were higher than the normal permissible limits for aflatoxins in animal feed. Groups fed with contaminated pellets had derangements including mildly enlarged urinary gaps, which affected the kidney's regular function. Toxicological analysis revealed dilation of the hepatic sinusoid causing hepatic nerve flow blockage due to capillary expansion. Normal hepatocyte was found in the control groups which had flawless histology. Haematological tests conducted on the blood sample of the Wistar rats fed with aflatoxin-contaminated pellets showed changes in the PCV: 34 – 35% (control group: 40 – 51%) and Hb: 11.2 – 15.0 g/dL (control group: 13.5 – 17.0 g/dL).

This study concluded that the consumption of *V. subterranea* and *C. colocynthis* and their derived products can expose consumers to aflatoxin-associated diseases. The study recommends periodic screening and proper storage of *V. subterranea* and *C. colocynthis* for consumers' safety.

Keywords: Aflatoxin, *Citrullus colocynthis*, Metabolites, *Vigna subterranea*, Wistar rats

Word Count: 493

Abbreviations: RFN: Researcher's Full Name, RD: Researcher's Department, RS: Researcher's School, RE: Researcher's Email, RAE: Researcher's Alternate Email, RP: Researcher's Phone Contact, RT: Registered Title, MS: Main Supervisor, ME: Main Supervisor's E-mail Address, SP: Main Supervisor's Phone Contact, CS: Co-Supervisor, CE: Co-Supervisor's E-mail Address, CP: Co-Supervisor's Phone Contact, AB: Abstract

Suggested Citation: Odetunde, S.K., Fapohunda, S.O., and Jonathan, S.A. 2023. Alfatocixicological Studies of *Vigna subterranea (l.) verdc*. and *Circultus colocynthis (L.) Schrad.* from North Central and South-West Nigeria. PhD Thesis Abstract, College of Postgraduate Studies, Babcock University.
https://doi.org/10.61867/pcub.1(5).170