EVALUATION OF THE USE OF OGIRI FROM CASTOR OIL SEED AS BAIT IN TRAPPING OF INSECT IN A FALLOW PLOT IN AWKA, NIGERIA

AKUNNE, C. E., EWUIM, S. C., CHUKWUNYERE, L. C., ABAJUE, M. C. and ONONYE, B. U.
Department of Zoology, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

Corresponding Author: Akunne, C. E. Department of Zoology, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. **Email:** ce.akunne@unizik.edu.ng, **Phone:** +234 8060682395

ABSTRACT

Pitfall traps were used to study insect fauna in a fallow plot at Nnamdi Azikiwe University Temporary site, Awka. The study was carried out for a period of seven weeks in the months of June and July 2013. The pitfall traps were baited using ogiri made from castor oil seed. The pitfall traps were used to investigate the activities and the relative abundance of insects in the study site. A total of 137 adult insects were trapped. From the overall results, eight insect orders, seventeen families and twenty-two species were found to be associated with the ogiri from castor oil seed in the fallow plot in Awka during the study period. Hymenoptera having the highest relative abundant (30.60%) followed by Collembola (15.67%) while both the Dictyoptera and Isoptera had the least relative abundance (3.73% each). However, analysis of variance showed that castor oil seed ogiri had significant effect on Diptera at p<0.05. The factors responsible for the presence and recovery of insect species from the bait include; accidental dropping into the pitfall traps, foraging activities on the bait, and oviposition resources.

Keywords: Ogiri, Castor oil seed, Pitfall trap, Insects fauna, Fallow plot, Awka, Nigeria

INTRODUCTION

Ogiri is one of the condiments consumed in the Eastern and Western parts of Nigeria (David and Aderibigbe, 2010). The seeds of castor oil (*Ricinus communis*) are one of the various substrates accentuated by many authors (Odunfa, 1985; Jideani and Okeke, 1991) on the production of *ogiri*. Other substrates used for the production of *ogiri* include the seeds of water melon (*Citrullus vulgaris*) (Odunfa, 1981), creeping melon (*Colocynthis vulgaris*) (Odibo, 1985; Jideani and Okeke, 1991; David and Aderibigbe, 2010) and seed of fluted pumpkin (*Telfairia occidentalis*) (Odibo and Umeh, 1989).

Contamination of foods by insects remains one of the major public health problems worldwide (Nester *et al.,* 1998). Food-borne diseases are endemic in many developing countries and constitute a major cause of mortality in these areas. Insects represent a large portion of identified species on the planet; a small number of insect species are food pests, in that they compete for or damage food resources, decreasing the amount available and/or acceptable for human consumption. According to Gorham (1979) these insects can infest our food through physical attack, mechanical transmission, and production of toxins and allergens leading to conditions such as nausea, intestinal trauma and allergic reactions.

Oluwabukola *et al.* (2012) documented information on soluble nutrient values of *ogiri* while Barber *et al.* (1988) reported on the microbiology of *ogiri* production. However, no work has been reported on the insects associated with *ogiri,* a food condiment made from castor oil seed. There is therefore the need to study the insects associated with food condiment using pitfall trap. Hence this investigation of insects associated with *Ogiri* becomes imminent.

MATERIALS AND METHODS

Study Area: The study was carried out in a fallow plot in Awka located at the temporary site of the Nnamdi Azikiwe University, Awka. Awka is the capital of Anambra State and is located in the lowland rain forest zone of Southern Nigeria (Keay, 1965; Charter, 1970). The fallow plot is located between latitude 6.2295°N and longitude 7.0612°E, position accuracy; 184m, altitude; 73m, altitude accuracy; 230.46m. The plot is characterized with varieties of leaf litters. The tree species dominated in this area include the *Diallum guineensis, Elaeis guineensis and Combretum molle.*

Sampling: The sampling technique used was pitfall trap. The study was carried out at one week interval for a period of seven weeks in the months of June and July, 2013. Six pitfall traps made of plastic containers; with mouth diameters of 11.3cm and depth of 14.6cm were used. The traps were buried after excavating the soil such that the rims of the containers flushed with the surface of the soil. The traps were placed at random (about 1m apart) with the bait hanged on the plastics using a stick. The traps were filled to about one-third of the volume with water. The traps were recovered after one week, and the insects caught were sorted counted under a dissecting microscope and preserved using formalin. The insects were identified (Medler, 1980) and authenticated by an entomologist at the Department of Crop Protection, Institute of Agricultural Research, Ahmadu Bello University Zaria, Nigeria. The voucher specimens were also kept in the departmental museum for reference purposes.

Data Analysis: The data collected was analyzed in percentages and presented as relative abundance.

RESULTS AND DISCUSSION

The results indicated that eight insect orders, seventeen families and twenty two species were found to be associated with the *ogiri* from castor oil seed in the fallow plot in Awka during the study period (Table 1).

The activities of insect in the fallow plot were high with Hymenoptera having the highest relative abundant (30.60%) followed by Collembola (15.67%) while both the Dictyoptera and Isoptera had the least relative abundance (3.73% each). The total of 137 insects was collected from the pitfall traps baited with *ogiri* from castor oil seeds.

Analysis of variance showed that *ogiri* from castor oil seed had significant effect on Diptera ($F = 8.550$, $P= 0.03$) while it showed no significant difference on other insect orders including Coleoptera, Collembola, Dermaptera, Dictyoptera, Hymenoptera, Isoptera and Orthoptera at 5% probability level.

The present study revealed that the use of *ogiri* from castor oil seed as bait attracted a total of 137 adult insects. This number is probably an indication of the nesting and foraging activities of these insects at fallow plot. Pitfall trapping is most productive in open habitats because catches can be compromised by vegetation complexity (Greenslade, 1964).

The high number of the family Formicidae trapped was in line with the previous findings of Ewuim (1997; 1998), which indicated that the abundance of these ant species were as a result of their nesting foraging activities favoured by the vegetation of the fallow land. Also, Dejean *et al*. (2000) reported that *Camponotus maculatus* exhibit aggregate movement. This may have been responsible for their recovery in high numbers from the traps, even though most ants are not specific to a particular host plant but rather ecologically suitable habitats (Kranz *et al*., 1977). The high number of Hymenoptera species (41) followed by Collembola (21) might be due to the fact that they are omnipresent members of soil, and often occur in large aggregations and inhabits damp habitat and also feed on decaying vegetations and associated bacteria and fungi (Christiansen, 1990).

The highest number of Formicidae (34) followed by Entomobryomopha (21) from the traps might be attributed to olfactory response to the odour from the bait used, since according to Chapman (2003), insects are not only able to

Table 1: Insect catches in pitfall traps baited with ogiri from castor oil seed in a fallow plot in Awka

Order	Family	Species	Total catches	Relative abundance (%)
Coleoptera	Carabidae	*Metagonum subvitescens*	5.00	13.43
	Scarabaedae	*Onthophagus gazelle*	4.00	
		Aulacoserca sp.	3.00	
	Ostomatidae	*Tenebriodes* sp.	6.00	
Collembola	Entomobryomopha		21.00	15.67
Dermaptera	Carcinophoridae	*Anisolabis* sp.	8.00	5.97
Dictyoptera	Blattidae	*Blatella* sp.	5.00	3.73
Diptera	Chloropidae	*Steleocerellus singularis*	1.00	14.18
	Muscidae	*Atherigona* sp.	1.00	
		Coenosia sp.	1.00	
		Musca scintillans	2.00	
	Calliphoridae	*Chrysomyia albiceps*	2.00	
		Chrysomyia chlorogyga	8.00	
	Stratiomyiidae	*Sagaricera* sp,	1.00	
	Therevidae	*Schoutedenomyia* sp.	3.00	
Hymenoptera	Formicidae	*Dorylus afinis*	6.00	30.60
		Pheidole sp.	7.00	
		Camponotus maculatus	15.00	
		Camponotus perrisi	6.00	
	Eurytomidae	*Eurytoma* sp.	4.00	
	Braconidae	*Microdus* sp.	3.00	
Isoptera	Termitidae	*Termes bellicosus*	5.00	3.73
Orthoptera	Gryllidae	*Acheta lefevrei*	20.00	14.93
Total			137	100

discriminate between odours but tend to exhibit a sensory response to many odours in the environment. In the blow fly (Calliphoridae) for instance the palpus is equipped with small sensilla basiconica and sensilla chaetica which provide sensory reception for detecting environmental information (Ngern-Klun *et al.*, 2007).

The species from the family Muscidae were also present in the traps. They are known to be among the most cosmopolitan of all insects of which many are merely scavengers (Chapman, 2003). Diseases such as dysentery, cholera, typhoid fever, anthrax and African sleeping sickness may be transmitted on their feet and mouth parts (Archer and Elgar, 2003)

Evidently, this study, has revealed that the factors responsible for the presence and capturing of insect species from the bait include; accidental dropping into the traps, foraging activities on the bait, use of the bait as food and oviposition resources thus predisposing them to falling into the pitfall traps containing the bait.

REFERENCES

ARCHER, M. S. and ELGAR, M. A. (2003). Female breeding site preferences and larval feeding strategies in carrion feeding Calliphoridae and Sarcophagidae (Diptera): a quantitative

analysis: *Australian Journal of Zoology,* 51(2): 165 – 174.

BARBER, L., ACHINEWHU, S. C. and IBIAMA, E. M. (1988). The microbiology of *Ogiri* production from castor seeds (*Ricinus communis*). *Food Microbiology,* 5: 177 – 182.

CHAPMAN, R. F. (2003). Contact chemo-reception in feeding by phytophagous insects. *Annual Review in Entomology*, 48: 455 – 484.

CHRISTIASEN, K. A. (1990). Insect: Collembola. Pages 965 – 995. *In:* DINDAL, D. L. (Ed.), *Soil Biology Guide*, *John Wiley and Sons, New York.*

DAVID, O. M. and ADERIBIGBE, E. Y. (2010). Microbiology and proximate composition of *Ogiri*, a pastry produced from different melon seeds. *New York Science Journal,* 3(4): 18 – 27.

DEJEAN, A., BOURGOIN, T. and OLIVE, L. J. (2000). Ant defense *Euphyonarthex phyllostoms* (Homoptera: Tettigomettr-idae) during trophobiotic associations. *Biotropica*, 32(1): 112 – 119.

EWUIM, S. C. (1997). A comparative study of ant species sampled from a tropical rain forest and a fallow farmland using pitfall technique. *Journal of Science, Engineering and Technology,* 4(1): 496 – 702.

EWUIM, S. C. (1998). Use of pitfall trapping technique in sampling ants from contrasting farmlands in Awka, Nigeria. *Journal of Science, Engineering and Technology,* 3(1): 331 – 338.

GORHAM, J. R. (1979). The significance for human health of insects in food. *Annual Review of Entomology*, 24: 209 – 218.

GREENSLADE, J. M. (1964). Pitfall trapping as a method for studying populations of Carabidae (Coleoptera). *Journal of the Animal Ecology,* 33: 301 – 310.

JIDEANI, I. A. O. and OKEKE, C. R. (1991). Comparative study of microorganisms and sensory attributes of condiments from the fermentation of different seeds. *Plant Food and Human Nutrition*, 41: 27 – 34.

KEAY, R. W. J., ONOCHIE C. F. A. and STANFIELD, D. P. (1964). *The Nigerian Trees.* Volume II, Federal Forestry Research, Ibadan, Nigeria.

KRANZ, J., SCHMUTTERER, H. and KOCH, W. (1977). *Disease, Pests and Weeds in Tropical Crops.* Second Edition, John Wiley and Sons, New York.

MEDLER, J. T. (1980). Insects of Nigeria-Check List and Bibliography Memoirs of the American Entomological Institute, Number 30, American Entomological Institute, Michigan, USA.

NESTER, E. W., ROBERTS, D. G., PEARSELL, C. E., ANDERSON, D. G AND NESTER, M. T. (1998). Microbiology: A Human Perspective. Second Editions, WCB/McGraw-Hill, Boston, USA.

NGERN-KLUN, R., SUKONTASON, K., METHANITIKORN, R., VOGTSBERGER, R. C. and SUKONTASON, K. L. (2007). Fine structure of *Chrysomya nigripes* (Diptera: Calliphoridae), a fly species of medical importance. *Parasitology Research,* 100: 993 – 1002.

ODIBO, M. C. (1985). Microbiology of melon seed fermentation for *Ogiri* production. *B.Sc. Project Report, Department of Microbiology, University of Nigeria, Nsukka.*

ODIBO, F. J. C. and UMEH, A. I. (1989). Microbiology of the fermentation of *Telfairia* seeds for *Ogiri* production. *Journal of Applied Microbiology and Biotechnology,* 5: 217 – 222.

ODUNFA, S. A. (1981). Microbiology and amino acid composition of *Ogiri*—a food condiment from fermented melon seeds. *Die Nahrung,* 25: 811 – 816.

ODUNFA, S. A. (1985). Microbiological and toxicological aspects of fermentation of castor oil seeds for *Ogiri* production. *Journal of Food Science,* 50: 1758 – 1764.

OLUWABUKOLA, O., AGNES, A. and MAYOSORE, F. (2012). Comparative soluble nutrient value of *Ogiri* from melon seed (*Coumumereopsis manni*). *Food Science and Quality Management,* 4: 10 – 16.