

## INCIDENCE OF PARASITE EGGS AND LARVAE ON VEGETABLES SOURCED FROM KWARIN GOGAU AND SHARADA IRRIGATION SITES, KANO METROPOLIS, NIGERIA

<sup>1</sup>Miga, H.I., <sup>2</sup>Bukar, A. and <sup>3</sup>Imam, T.S.

<sup>1</sup>Department of Zoology, Bayero University, PMB 3011, Kano, Nigeria.

<sup>2</sup>Department of Microbiology, Bayero University, PMB 3011, Kano, Nigeria.

<sup>3</sup>Department of Applied Biology, Bayero University, PMB 3011, Kano, Nigeria.

\*Correspondence author: al\_amsak2004@yahoo.com

### ABSTRACT

*A parasitic survey on vegetables sourced from irrigation sites in Kano metropolis was conducted for the discovery of helminth eggs and larvae. Two species of vegetable, Lettuce (*Lactuca sativa*) and Spinach (*Amaranthus spinosus*) were selected. All vegetable leaves were washed with a hard brush, and presence of parasites were determined using sedimentation and flotation methods. Eggs of six (6) species of parasitic eggs (*Taenia* sp., *Ascaris lumbricoides*, *Fasciola* sp. Hookworm sp., *T. trichiura*, and *Hymenolopis nana*) were recovered. Of the parasites recovered, *Taenia* sp. was found to be higher 34(42.50%), followed by *Ascarid* eggs 27(33.75%), *Fasciola* sp. 19(23.75%), Hookworm sp. 17(21.25%), as well as *T. trichiura* 12(15.50%) and the least observed was *Hymenolopis nana* eggs 10(12.50%). The recovery rate of parasites observed among Lettuce and Spinach shows that Lettuce had the higher infestation level 26(65.00%), while Spinach had 18(45.00%). The result also indicates that Kwarin gogau irrigation site had the higher infestation on vegetable by parasites with 25(62.00%), while Sharada irrigation site had the least infestation level of 19(47.50%). There was significant difference between the sites and vegetables studied ( $p \leq 0.05$ ). The vegetables sold in irrigation areas in Kano metropolis were to some extent contaminated with parasitic eggs, larvae and cysts. Thorough washing of all vegetables with clean water and little addition of chlorine or vinegar prior to consumption is recommended.*

**KEYWORDS:** Wastewater, Irrigation sites, parasite eggs, Vegetables.

### INTRODUCTION

Vegetables are primary sources of food for human beings and even for animals. They are important sources of nourishment and vital ingredients in healthy and balance diets, so are expected to be consumed on a daily basis (Oguntola, 2010). Vegetables contain various constituents such as minerals, vitamins, proteins, iron and water. These constituents are necessary for a human body (Sheela et al., 2004).

Vegetables not only quench hunger, also boost immunity. They help to prevent symptoms of cancer, arthritis, builds up blood and gives energy, strengthens the metabolism and stimulates hormones. However, despite their importance to human nutrition and health, they are common vehicles for transmission of parasites such as *Ascaris*, *Fasciola* sp., *Taenia* sp., Hookworm, *Hymenolopis nana* and some intestinal protozoans, which are most common causes of food borne infection. This is becoming increasingly health concern as a result of expansion in the number of susceptible people.

Parasites are organisms that drive nourishment and protection from other living organisms known as hosts. They may be transmitted from animals to humans, from humans to humans or from humans to animals. Several parasites have emerged as significant causes of food borne and waterborne illness. These organisms live and reproduce within the tissues and organs of infected hosts, and are often excreted in faeces (Ochel and Kolhatkar, 2007). The types of

parasites that contaminate vegetables consist of tiny protozoa and helminthes which can only be seen under the microscope, parasitic worms and flukes which are larger, and they are spread to fruits and vegetables by air, wastewater, insects, animals and human excreta (Beuchat, 1996).

It has been found that food borne diseases are partly caused by contaminated vegetables across various countries like Germany, India, China, U.S.A and Nigeria (Derover, 1998; Anonymous, 2002). In Kano, most farmers use wastewater in irrigated areas for raising their products, while some farmers use groundwater. Unhygienic use of wastewater can render vegetables contaminated by pathogenic organisms, especially intestinal parasites. It is common practice among people both poor and rich to consume raw vegetables. Generally their consumption could be a major public health hazard to consumers. It is in view of the use of wastewater in irrigation area's that this study was carried out to determine the degree of contamination by parasites on vegetables cultivated in Kwarin gogau irrigation farm land using pre-urban wastewater for irrigation and Sharada irrigation farm land that uses borehole(ground) water for irrigation.

### MATERIALS AND METHODS

#### Study area

Kano metropolis (12°N,8-5.75°E) is an urban closed settled zone, a densely populated city with a population of 9,401,288.

It is a center of major trans-Saharan commercial activities; located within the semi-sudan savanna zone of West Africa about 847km from the edge of the Sahara desert (Mukhtar *et al.*, 2010). The sampling sites comprised of two irrigation areas in Kano metropolis. Kwarin gogau irrigation farm land which is located in Fagge local government area along kofar Wambai road and Sharada irrigation site which is located along Yahaya Gusau road, Gwale local government area.

### Collection of samples

This study was carried out during the early dry season October - December, 2010. The samples of vegetables used in this study included Lettuce (*Lactuca sativa*) and Spinach (*Amaranthus spinosus*). They were purchased very early in the morning at the irrigation areas. To obtain a qualitative estimation of parasitic contamination of these vegetables, 80 samples were collected randomly from the irrigation sites. The samples were collected into clean polythene bags and transported to the laboratory for analysis.

### Processing of the samples

Hundred milliliter (100mL) of sterile normal saline was used to wash 20g each of the vegetable samples in a 2000 mL capacity beaker. The washed water was poured through a sieve into a centrifuge tube. Two (2) drops of formalin were added and centrifuged at 2500 rpm for 2 minutes. The supernatant was discarded. A pasture pipette was used to transfer the sediment onto a clean slide and a drop of 1% iodine was added. A cover slip was gently placed on the preparation and examined under x10 and x40 objectives (Cheesbrough, 2003). Sedimentation method is very important as some helminth eggs such as eggs of trematodes (*Fasciola hepatica* or *Fasciola buski*) and unfertilized eggs of *Ascaris* are heavy and may not float and therefore adhere to the cover slip using floatation method (Ochel and Kolhatkar, 2007).

Identification of the parasites was done by reference to a Laboratory Manual of parasitological and bacteriological Techniques (Ayres and Mara, 1996), and with the assistance of technical staff in Department of Biological Science, Bayero University, Kano.

### Statistical analysis

Test of goodness of fit [Chi-square( $X^2$ )] was used to determine whether there was significant difference between the two sampling sites and the number of parasites on the vegetable samples.

## RESULTS AND DISCUSSION

A total of eighty (80) samples of two different vegetables were collected for the analysis of parasites present. The result obtained indicated that Kwarin gogau irrigation site had the higher level of infestation of vegetable by parasites with

25(6.50%), while Sharada irrigation site had the least infestation level of 19(47.50%) as shown in the Table 1. Statistically there was a significant difference  $X^2 = (p > 0.05)$  in the level of infestation among the two study areas. This might be due to the use of wastewater for crop irrigation in Kwarin gogau. This agrees with the results reported by Choi (1972), that showed the presence of these parasites on vegetables in comparison, when wastewater was used for crop irrigation. In another research by Chiba (1928); Chyu (1957); Choi (1967) and Kwon (1969), it was shown that the number of parasitic species recovered from vegetables was similar to that from examination of human excreta. Application of sewage sludge or irrigation water to soil is one avenue through which parasites can contaminate fruits and vegetables (Beuchat, 1996). According to Okoronko (2000), when irrigation wastewater flows into vegetable fields, the ova of worms that find their way into the water through human wastes get deposited.

At Sharada irrigation site, borehole (ground water) was used for irrigation. However there is still the presence of parasites in vegetable purchased which is probably due to presence of parasitic ova and larvae in the soil sample. This collaborates with the report of Choi (1972), which showed that soils taken from green house are contaminated by high degree of intestinal parasites and as such could get in to fruits and vegetables.

The lettuce leaves analyzed from both Kwarin gogau and Sharada irrigation sites had the higher infestation by parasites with 26(65.00%) than the spinach leaves with 18(45.00%) (Table 2). These differences are probably due to differences in size of the leaves of the vegetables. This correlates with the result of Hook (2003), where he examined five (5) species of vegetables, (lettuce, spinach, coriandar, cereley and persely). He revealed that coriandar and lettuce were more contaminated followed by others due to the size of its leaves.

The most prevalent parasites detected was *Taenia* sp. 34(42.50%), which may cause tapeworm infection (Table 3). The presence of *Taenia* egg indicates contamination by animal faeces (Ochel and Kolhatkar, 2007). *Ascaris lumbricoides* was found to be second most frequent helminth 27(33.75%) from all the sampling sites. This could be probably due to the flicker shell of *Ascaris* egg that is able to resist environmental condition (Arora, 2005). This agrees with the result reported by Choi *et al.* (1969). *Ascaris lumbricoides* may cause intestinal obstruction that requires surgery (Bethony *et al.*, 2006). The least observed was *Hymenolopis nana* eggs 10(12.50), and none have been found from Sharada irrigation site. This is because *Hymenolopis nana* eggs can only be found in faeces (Ochel and Kalhatkar, 2007).

Recently, it has been suggested that individuals having helminth infection may fail to develop protective immune responses when exposed to unrelated pathogens, such as *Plasmodium* (causing malaria), *Mycobacterium* (causing tuberculosis) and HIV (causing AIDS). These findings highlight that public health implications of helminth infection are much greater than previously realized and that helminth infection

may indirectly contribute to significant mortality worldwide (WHO, 2006).

The unhealthy environment that exists in many communities provides a good avenue for contamination. In slums and rural areas where garbage is indiscriminately disposed off, the risk of contamination is high (Umoh et al., 2001). Unsafe disposal of faeces accounts for parasites ova in soil, these ova eventually find their way to food, fruits and vegetables (Umoh et al., 2001).

**Table 1: Distribution of parasites ova on vegetables in Kwarin gogau and Sharada**

Study area	Number Examined	Number positive	Percentage positive (%)
Kwarin gogau	40	25	62.50
Sharada	40	19	47.50
Total	80	44	

**Table 2: Rate of infestation of parasites on the vegetable samples by study area**

Vegetable	Study area		Number examined	Number positive(%)	Total (%) positive
	Kwarin gogau Number examined	Sharada Number positive (%)			
Spinach	20	10(50.00)	20	8(40.00)	18(45.00)
Lettuce	20	15(75.00)	20	11(55.00)	26(65.00)

Key:- Number in parenthesis indicates the percentage positive for the different vegetable studied.

**Table 3: Frequency (%) of occurrence of parasites in all the vegetable studied.**

Parasite ova	Number positive		Total (%)
	Kwarin gogau	Sharada	
<i>Taenia</i> sp.	20	14	34(42.50)
<i>Ascaris lumbricoides</i>	16	11	27(33.75)
<i>Fasciola</i> sp.	11	8	19(23.75)
Hookworm	10	7	17(21.25)
<i>T.trichiura</i>	7	5	12(15.00)
<i>Hymenolopis nana</i>	10	0	10(12.00)

Key:- Number in parenthesis indicates the percentage positive in each study area for each parasite observed.

## CONCLUSION

The results of the research have shown that all the vegetable leaves were contaminated with different types of parasitic eggs, but Kwarin gogau irrigation site had the highest level of infestation of vegetable by parasites than Sharada irrigation site. The contaminants were viable eggs of *Taenia* sp., *Ascaris lumbricoides*, *Fasciola* sp., *T.trichiura* and *Hymenolopis nana*. These parasites causes diseases such as ascariasis, anaemia, kwashiorkor etc. infection by these parasites is typically most intense and debilitating, resulting in malnutrition, physical and intellectual growth retardation and educational deficient when such vegetables or fruits are consumed.

## RECOMMENDATIONS

Farmers should avoid rinsing their produce with wastewater as some parasites may adhere to the surface of vegetables leading to contamination of such produce. Farmers are also advised to avoid usage of night soil (faeces) as fertilizer. Also consumers should wash all fruits and vegetables thoroughly with safe running water before eating. Great emphasis should also be placed on health education with respect to personal hygiene practices in gardens and markets.

It is also necessary for the authorities concerned to intensify health inspection in places where vegetables are grown. People should also thoroughly wash their vegetables with clean water and little amount of chlorine or vinegar prior to consumption.

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