

**Research Article**

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Parasitic Flora of *Megaphrynium Macrostachyum* Leaves sold in Popular Markets in Benin City, Nigeria

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Megaphrynium macrostachyum is a perennial leafy vegetable, up to 4m tall, with rhizome up to 6m long, stems bearing an inflorescence and a single subtending leaf and numerous leaves arising directly from the rhizome. The importance of this plant cannot be over emphasized as its leaves are used for different activities in Africa which includes cooking, wrapping, packing, thatching, and serving food to mention but a few. The leaves of *M macrostachyum* are used primarily for cooking, wrapping, packaging, and serving food in several African countries including Nigeria. In recent years, food-borne illnesses caused by intestinal parasites have been identified as a major source of public health threats. This study was designed to determine the parasitic flora of *M macrostachyum* leaves sold in popular markets in Benin City, Edo state. A total of 335 samples collected from six selected markets in Benin City; the leaves were washed in physiological saline and examined microscopically using saline and iodine preparations. Our results showed *M macrostachyum* is not a potential means for the transmission of intestinal parasites contrary to previous studies. However, proper hygiene and sanitation is advocated for to minimize risks illnesses due to food-borne parasites.

Keywords: Intestinal; Parasite; Contamination; Transmission; Infection**Introduction**

M macrostachyum are usually collected from the wild, sometimes found in cocoa intercropping system, or cultivated. *M macrostachyum* reproduce rapidly and abundantly by sprouting from rhizomes or seed. The leaves are large and are found in the rainforest of west and Central Africa. *M macrostachyum* leaves are harvested and used for wrapping and boiling food as a way of extending the shelf life of the food. The young leaves of *M macrostachyum* are consumed as vegetable by humans and these can be agents of transmission of protozoa cysts and helminthes eggs and larva. Vegetables can become contaminated with parasitic pathogens throughout the process of planting to consumption which can lead to intestinal parasitic infections. The parasites are not easily detected when they get to the human body, hence, can live in human body for long without being diagnosed. The detrimental effects of parasites have been established to be species specific.

The extent of contamination depends on so many factors which may include application of Nitrogen in the soil, animal manure, the use of untreated wastewater, water supplies contaminated with unhygienic practice by farmers during harvest, post-harvest handling by vendors, poor hygienic conditions of preparation in food service or home settings [1]. There are thousands of types of gastrointestinal parasites that live in the human body and occurrence of these parasites have usually caused serious health conditions by weakening body immune system, thereby increasing its vulnerability to viral, fungal and bacteria diseases as well as chemical and metal poisoning worldwide. Globally, 3.5 billion people are affected with intestinal parasitic infections, with 450 million symptomatic and more than 1.2 million deaths being reported annually. In developed countries, an estimated one-third of the population is affected by intestinal parasitic agents each

year but the infections are more severe in the tropical regions of the world. In addition, poor sanitary and environmental conditions are known to be relevant in the propagation of these infectious agents. The objective of this study is to determine the parasitic flora of *M macrostachyum* leaf, and types of parasites found in some commercially sold *M macrostachyum* leaves in the study area. We also determined the sales outlet with the highest level of contaminated produce and the likely factors responsible for this trend with a view to proffering measures to curb contaminations. Our null hypothesis was that *M macrostachyum* leaves do not have parasitic flora, while our alternate hypothesis was that *M macrostachyum* leaves have parasitic flora.

Materials and Method

The study was carried out in various markets in Benin City which is the capital of Edo state and the city is occupied by both indigenous and elite residents. It covers an area of 19,794 Km² and a provisional population of 2,159,484 million people with that of Benin City estimated at 1,147,188. The *M macrostachyum* leaves used for this study were purchased from local vendors at Oba, Osa, uselu, Ikpoba hill, and Oka markets all within select local government areas in Edo State viz. Ikoba Okha, Oredo, and Ovia northeast local government. Sample size was determined by the formula; $N = \frac{Z^2 \cdot P \cdot C}{P^2}$ Where: $Z = 1.96$ (for 95% confidence level) $P =$ prevalence rate (as obtained from literature review) $C = 0.05$ (confidence interval or tolerance error) $N =$ required sample size. The prevalence rate from literature review = 31.7%. The minimum sample size when calculated was *M macrostachyum* leaves were bought from the traders in the markets at different locations in the market between 7:00am to 11:00am. A total of 335 leaves were sampled. The leaves were collected into sterile, labelled polythene bags and transported to the laboratory for further processing.

Specimen Analysis

The parasitological analysis of these products was carried out at the Department of Medical Laboratory Science Research Laboratory, Benin City, Edo state, Nigeria. The leaves were analyzed in the laboratory using sedimentation method [2].

Parasitological Examination of the Samples

100g of each batch of the leaves was chopped into small pieces and placed into a clean small plastic bucket containing 100ml of normal saline (8.5g of sodium chloride salt in 1000ml of distilled water). Each batch was agitated and washed well to ensure that as much material on the surface of the leaves sample as possible were discharge into the normal saline solution. We placed them to stand on the bench for few hours for proper sedimentation to occur in accordance with the procedure described by Alli et al. [2]. The suspension was strained through a sterile sieve to remove extraneous debris. About 10ml of the filtrate was dispensed into a clean centrifuge tube and centrifuged at 3000rpm for 5 minutes. The supernatant was discarded into a disinfectant jar and the deposit, resuspended [3]. A drop of the resuspended sediment was placed on a clean glass slide and covered with a cover slip. A drop of lugol's iodine solution was placed on a slide and a drop of the resuspended deposit was added and covered with a cover slip. The prepared slides were examined microscopically for the presence of ova, cysts of parasites [4].

Results

A total of 335 samples were examined for parasitic contamination, out of which none was positive for parasitic contamination. The location of the samples did not significantly affect the parasitic contamination of the study. Samples from all the six markets had no parasitic contamination (Table 1) (Figure 1).

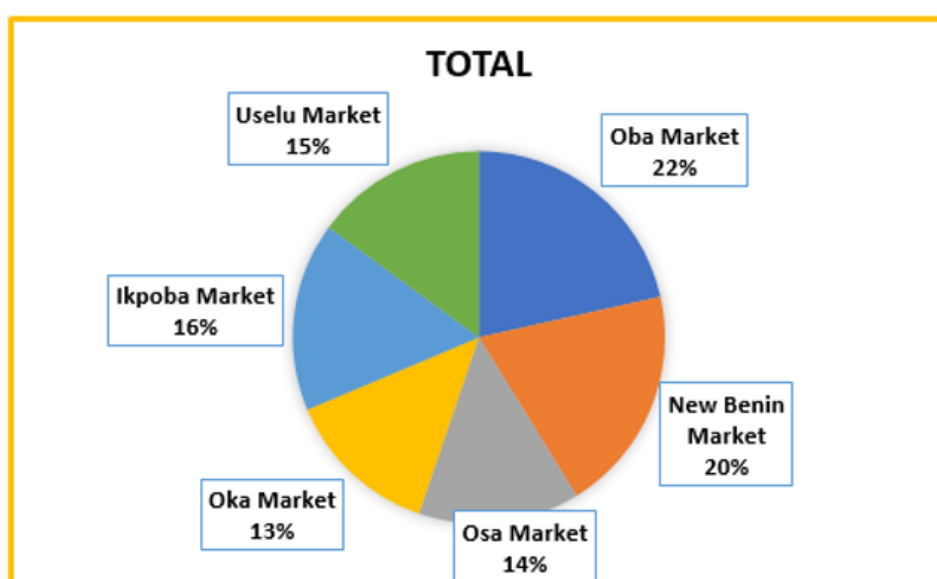


Figure 1: Pie chart showing percentage of samples not contaminated from markets.

Table 1: Relationship of location with parasitic contamination.

Location	Number Tested	Positive Cases	Negative Cases
Oba market	72	0	72
New Benin market	66	0	66
Osa market	47	0	47
Oka market	45	0	45
Ikpoba market	55	0	55
Uselu market	50	0	50
Total	335	0	335

Discussion

The contamination of vegetables by parasites has long been established. Amongst the classes incriminated are Protozoa, Cestodes, Trematodes and Nematodes [5, 6]. These parasites could infect humans because of consumption of contaminated, uncooked, or improperly washed vegetables [7]. Preservation methods of *M macrostachyum* leaves cannot be overemphasized as the preservation methods employed for commercially sold *M macrostachyum* leaves has a direct correlation with the likelihood of parasitic contamination. Our study found that *M macrostachyum* leaves are sold fresh in the early hours of the day, with very few or no remainder for the next day. We found that this habit may prevent chances of humid environmental condition and temperature that could otherwise encourage the preservation and proliferation of geohelminths if stored for long. Our study found that *M macrostachyum* sold in popular markets in Benin City were free from parasitic contamination. An overall prevalence rate of 0% of parasitic flora of *M. macrostachyum* sold in popular markets in Benin. However, the overall result is not in exact representation of the findings of previous studies because the areas of study differ both in geographical location, climatic, environmental conditions, the general behavioral attitude to hygiene and the social-economic activities of sellers/traders. In contrast with our study, some other researchers had earlier on reported a 2.7% parasitic contamination of some commercially sold vegetables in Kerela state, India [8], 2.5% for cysts and 4.3% for parasite ova were reported in Southern Nigeria by OS Omowaya and PA Audu. The location of the samples did not significantly affect the parasitic contamination in our study as samples from all six selected markets were not contaminated and had the same percentage. Though, vendors may get their supplies from different sources, this study shows that parasitic contamination may not involve the diversity of source. Vendors serve as intermediaries between the farmers and the consumers, they play an important role in the chain of distribution of produce also may also play a role in the contamination and distribution of contaminants. The questionnaire distributed during this study provided more information on the sources and cleanliness of *M macrostachyum* leaves available in the marketplace. Our study has shown that an average of 10% of the end users purchased

their produce from middlemen, 55% got theirs directly from farmers while 35% obtained theirs from the harvesters. It was also discovered that the vendors washed their produce irrespective of the source before display for sale.

Conclusion

This study has shown that *M macrostachyum* leaves have minimal tendencies of serving as a source of parasitic infection when sold commercially. Although, washing of these leaves with just water alone is inadequate to remove all contaminating pathogens, proper hygiene and good environmental sanitation should be maintained by all vendors to avoid contamination and distribution of parasitic contaminants [9-19].

Acknowledgement

None.

Conflict of Interest

None.

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