

# ANTHELMINTIC EFFICACY OF AQUEOUS EXTRACT OF SEEDS OF SOME PLANTS USED TRADITIONALLY AS SPICES IN NIGERIA

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## ABSTRACT

The anthelmintic efficacy of aqueous seed extracts of *Monodora tenuifolia* and *Piper guinense* against strongylid nematodes of small ruminants was evaluated using the *in vitro* egg hatch assay method. The extracts of the two plants produced significant anthelmintic effect through reduction in nematode egg hatch. At the 100, 50 and 25 mg/ml dilutions of the extracts, the reduction in egg hatch was 93, 87 and 74% respectively for *M. tenuifolia* and 90, 67 and 37% respectively for *P. guinense*. The reduction in egg hatch produced by both plant extracts was concentration dependent suggesting that their effects may be pharmacological. *Monodora tenuifolia* produced relatively higher percentage reductions in egg hatch than *P. guinense* at all the concentrations tested. At the highest concentrations tested (100 mg/ml), the percentage reduction in egg hatch produced by both plant extracts was comparable to that of albendazole (92 - 97%). The results suggest that the traditional medicinal use of these plants have pharmacological basis and thus illustrate the possible benefit of the use of these plants as anthelmintics.

**KEYWORDS:** Anthelmintic activity, *Piper guinense*, *Monodora tenuifolia*

## INTRODUCTION

The control of nematode infections, especially parasitic gastro-enteritis (PGE), is based primarily on an early and accurate identification of the condition and the treatment of affected individuals (Soulsby, 1982; Nwosu *et al.*, 1996, 2007). In this regard, many conventional anthelmintics are commercially available but their cost, scarcity and the lack of professionals or experts to administer them frequently preclude their usage by local herdsman. Consequently, the herdsman, who are mostly in rural locations, depend heavily on traditional plant preparations for the control of nematodiasis and related conditions in their livestock.

*Monodora tenuifolia* and *Piper*

*guinense* are two plants that grow chiefly in the lowland swampy forests of eastern and western Nigeria where they are used as condiments or spices for various traditional dishes (Daziel, 1954; Burkill, 1985). *Monodora tenuifolia* belongs to the family Anonaceae, while *P. guinense* is of the family Piperaceae. Traditional medicinal preparations of various parts of the two plants are said to be effective against several ailments of man and animals including intestinal helminthiasis (Oliver, 1960; Irvin, 1961). The plants are known by different names in different tribes in Nigeria including *Ehuru* (in Igbo), *Gyada mia* (in Hausa) and *Lekoshe* (in Yoruba) for *M. tenuifolia* and *Uziza* (in Igbo), *Mosoro* (in Hausa) and *Eru* (in Yoruba) for *P. guinense*. In this paper, the water extracts of

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the seeds of *M. tenuifolia* and *P. guinense* were investigated for anthelmintic efficacy against nematode parasites of goats by the *in vitro* egg hatch assay.

## MATERIALS AND METHODS

### Plant materials

The seeds of *Monodora tenuifolia* and *Piper guinense* were collected in August 2002 from Umuahia in Abia State, Nigeria. The plants were identified and authenticated by Dr. S. S. Sanusi, a botanist in the Department of Biological Sciences, University of Maiduguri where voucher specimens were deposited.

The seeds of the two plants were separately processed. In each case, the seeds were carefully peeled, sun-dried for 10 days, pounded and pulverized in a mortar. They were sieved to remove coarse material and stored at 4 °C until used. The extracts were prepared using standard methods (Mittal *et al*, 1981; WHO, 1992). Two hundred and fifty grams of each of the powdered seeds was mixed with 1 litre of distilled water in a 2-litre beaker, boiled for 1.5 hours and allowed to cool to 40 °C. It was then filtered using a Whatman No. 1 filter paper and the filtrate concentrated in a rotary evaporator. The extracts were stored at 4 °C until used. The extract yield was 11.8% w/w for *M. tenuifolia* and 21.4% w/w for *P. guinense*.

### Faecal material

Faecal samples were collected directly from the rectum of goats of various breeds immediately after slaughter at the Maiduguri Metropolitan Abattoir. Nematode egg counts were determined by the modified

McMaster technique using saturated solution of sodium chloride as the floating medium (MAFF, 1977). Only faecal samples with at least 500 eggs per gram (epg) were used in the study. Faecal culture and larval recovery were done using the test-tube filter paper technique (Harada and Mori, 1955). In each case, nematode eggs and infective larvae were identified using standard descriptions (MAFF, 1977; Soulsby, 1982; Hansen and Perry, 1990).

### *In vitro* Egg hatch assay

Each extract was diluted to give 25, 50 and 100 mg/ml concentration. The anthelmintic efficacy of the various dilutions of the seed extracts was determined by the egg hatch assay of Kelly *et al* (1981). Dilutions (6.25, 12.5 and 25 mg/ml) of the proprietary anthelmintic albendazole were used to compare the effectiveness of the extracts in preventing egg hatch. The proportion of unhatched eggs at each dilution of the extracts or albendazole was calculated by relating the number of hatched larvae to the total number of eggs cultured (Chiejina, 1984).

### Statistical analysis

The statistical differences between mean parameters were tested at the 5% level of significance using the analysis of variance (ANOVA).

## RESULTS

Table 1 shows the results of the egg hatch assay using the aqueous seed extracts of *M. tenuifolia* and *P. guinense* in comparison to albendazole, a proprietary anthelmintic.

**Table 1:** *In vitro* egg hatch inhibition assay using aqueous seed extracts of *M. tenuifolia* and *P. guinense* and albendazole

Extract/Drug Concentration	Egg hatch		% hatch	% reduction in egg hatch
	Mean±S.D.	Range		
Water (control)	90±56	9 – 295	100	0*
<i>M. tenuifolia</i>				
100 mg/ml	6±9	1 – 55	7	93 <sup>a</sup>

50 mg/ml	12±11	1 - 61	13	87 <sup>b</sup>
25 mg/ml	23±19	1 - 146	26	74 <sup>c</sup>
<b><i>P. guinense</i></b>				
100 mg/ml	9±10	1 - 55	10	90 <sup>a</sup>
50 mg/ml	30±25	1 - 200	33	67 <sup>b</sup>
25 mg/ml	57±39	1 - 315	63	37 <sup>c</sup>
<b>Albendazole</b>				
25 mg/ml	3±2	1 - 11	3	97 <sup>a</sup>
12.5 mg/ml	5±3	1 - 15	6	94 <sup>a</sup>
6.25 mg/ml	7±5	1 - 24	8	92 <sup>a</sup>

\*Larval recovery from water (control) cultures was used as standard (i.e. 0% reduction in egg hatch), <sup>a,b,c</sup>Figures in same column with different superscripts are significantly different (P<0.05).

Compared to the water (Control) cultures, the aqueous extracts of the two plants produced significant anthelmintic effect through reduction in nematode egg hatch. The highest percentage reduction in egg hatch (93% and 90% respectively for *M. tenuifolia* and *P. guinense*) was produced at the highest concentration of the extracts (100 mg/ml), while the lowest percentage reduction in egg hatch (74% and 39% respectively for *M. tenuifolia* and *P. guinense*) occurred at the lowest concentration of the extracts (25 mg/ml); indicating that the anthelmintic effect on egg hatch was concentration dependent. A similar effect was noted with albendazole. The percentage reduction in egg hatch produced by *M. tenuifolia* was relatively higher than that produced by *P. guinense* at the various concentrations tested. However, at their highest concentrations (100 mg/ml), the percentage reduction in egg hatch produced by the two plant extracts was comparable to that produced by albendazole.

## DISCUSSION

The results of this study showed that the water extracts of the seeds of *Monodora tenuifolia* and *Piper guinense* have anthelmintic efficacy against strongylid nematodes of goats by their ability to significantly limit the parasite eggs from hatching *in vitro*. The inhibition of egg hatch exhibited by the two plant extracts

was dose-dependent thus indicating that their action is pharmacological. That the percentage inhibition of egg hatch exhibited by the dilutions of each of the extracts was comparable to that of albendazole, a known anthelmintic, is an indication of the possible usefulness of the plant extracts as anthelmintics.

Although conventional anthelmintics like albendazole are effective against nematode parasites of man and animals, most rural farmers are precluded from using them because they are usually scarce, expensive and require experts for their administration. In contrast, their being readily available in most parts of Nigeria and thus easy accessibility to the rural herdsmen further enhances the anthelmintic usefulness of the two plants. However, there is need for further studies, especially *in vivo* studies, to confirm the present observations as well as provide a means of standardizing their usage by the traditional herdsmen and possibly commercialize their usefulness as anthelmintics.

In conclusion, the water extracts of the seeds of *M. tenuifolia* and *P. guinense* used traditionally as spices and for the management of certain ailments of man and animals produced a dose-dependent anthelmintic effect by their inhibition of strongylid egg hatch *in vitro*. The results therefore suggest that the traditional medicinal application of *M. tenuifolia* and *P. guinense* appear to have a pharmacological basis.

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