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Investigations into the use of *Xylopia aethiopica* in the treatment of psoroptic mange in rabbits

O. K. Adeyemo[1]*, F. O. Ajasin[2], E. O. Ola-Davies[3], O. O. Taiwo[2]

1. Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Ibadan, Nigeria.
2. Federal College of Animal Health and production technology, I.A.R&T., Apata, Ibadan, Nigeria.
3. Department of Veterinary Physiology and Pharmacology, University of Ibadan, Ibadan, Nigeria.

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Abstract

Objective: To evaluate the efficacy of *Xylopia aethiopica* (XA) in the treatment of mange in rabbits. Materials and methods: The efficacy of dried and grounded 30 g and 40 g of XA respectively mixed with 20 ml of palm oil was tested on different sets of mange infested rabbits and this was compared with sulphur, using 80 g of sulphur mixed with 20ml of palm oil. Results: XA was found to be more potent at 40 g relative to 80 g of sulphur, also the rabbits treated with 30 g and 40 g XA's weight gain during treatment was more significant ($p < 0.05$) than the control. Conclusion: Our study shows that *Xylopia aethiopica* exhibits remarkable anti-mange activity against psoroptic mange in rabbits. Further investigations into the isolation of the active constituent responsible for this action is recommended.

Keywords: *Xylopia aethiopica*, Psoroptic mange, Sulphur, Palm oil

1. Introduction

With the shortage of animal protein in developing countries, the rabbit (*Orytolagus cuniculi*) is fast becoming a popular farm animal [1]. Nigerians are now interested in the production of prolific, good converter of feed and short production cycle animals like rabbits, which can boost the supply of animal protein [2]. Mange is a parasitic disease caused by *Psoroptes cuniculi* in rabbits, it affects the quality of meat in rabbits by causing, considerable irritation, intense itching, inflammation and swelling thereby preventing the animals from concentrating on their feed and hence its effect on the market weight of rabbits [3].

Mange has been treated by farmers in Nigeria using indigenous preparations, which includes gunpowder mixed with oil, sulphur and palm oil mixtures [4] and modern drugs, which are often very expensive; an example is Ivermectin [5].

*Corresponding author
E-Mail: nadeyemo@skannet.com.ng

Xylopia aethiopica (Dunal) A. Rich (Annonaceae) (XA) commonly referred to as Ethiopian pepper, Negro pepper and Guinea pepper is an evergreen, aromatic tree with peppery fruit and is a native to the lowland rainforest and moist fringe forest in the savanna zones of Africa. Largely located in West, Central and Southern Africa [6].

Pharmacological investigations on uses of the plant indicates that XA is used as cough remedy, for stomachache, bronchitis, dysentery, as poultices for headache and neuralgia [7]. Other uses are as preservatives for grains [8], insecticide [9] and as antimicrobial [10 - 12]. However as far as ascertained no report of its use in the treatment of mange is found in the literature.

In this study, an attempt has been made to investigate the efficacy of a mixture of dried and grounded *Xylopia aethiopica* and palm oil in the treatment of psoroptic mange in rabbits relative to a mixture of sulphur and palm oil; a well established traditional preparation [4, 13].

2. Materials and methods

2.1 Materials

Dried fruits of X*ylopia aethiopica* and sulphur were purchased locally from native herb sellers in Ibadan, Nigeria where they are locally referred to as "Eeru" and "Imi ojo" respectively. They were identified in the department of physiology and pharmacology, university of Ibadan, Ibadan, Nigeria and reference specimens of the two has been kept in our laboratory. Palm oil was also purchased from Bodija market in Ibadan, Nigeria.

2.2 Animals

Eighteen mange infested adult rabbits (*Oryctolagus cuniculus*) weighing between 0.90-1.42 kg of either sex were purchased from different farms in Ibadan.

The animals were kept at the southern farm rabbitry unit of Institute of Agriculture, Research and Training (I.A.R&T.), Moor Plantation, Ibadan at room temperature of 30 ± 1°C and 56-66% relative humidity with a 12 h light/dark cycle. They were divided into three groups (A, B and C) and allotted into hutches at three per treatment group with replicates for each group.

Groups A and B were treated with 30 g and 40 g of mixture of XA and palm oil, while group C, the control was treated with a mixture of sulphur and palm oil. The animals had access *ad libitum* to water and standard rabbit pellets (Animal Care Feed, Lagos, Nigeria). Prior to the commencement of the study, the hutches were disinfected using Iodasteryl® twice at one-week interval; the hutches were then rested for another week after the second disinfection.

2.3. Chemical analysis

Xylopia aethiopica was subjected to quantitative chemical analysis of the constituents using standard methods [14].

2.4. Ecto-parasite screening

The mange infested areas of the skin of rabbits from each group was scraped into petri dishes with the blunt end of scalpel blade until blood starts to ooze out. 10% potassium hydroxide was added to the scrapings to dissolve the tissue debris. Two drops of the dissolved tissue debris was then put on glass slides and viewed under a light microscope using 40% magnification to confirm the presence of mites.

2.5. Treatment of mange

The rabbits in each group (A, B and C) and their replicates were treated by topical application of a mixture of 30 g of XA, 40 g of XA and 80 g of sulphur each mixed with 20ml of palm-oil respectively. The respective mixtures were applied on the affected part every morning for a period of six weeks

initially for the three treatment groups, but this was extended for an extra week for the rabbits in group C to ensure complete hair regrowth in the affected areas.

Animals were weighed and observed visually weekly for signs of healing using disappearance of skin lesions, crusts, scabs and hair regrowth as indices. Skin scrapings were also collected weekly and observed under the microscope to determine mite load and the rate of healing.

2.6. Statistical analysis

The results were analysed statistically using student's *t* - test. The minimum level of significance was fixed at $p<0.05$.

3. Results and discussion

All over the world, there is renewed interest in screening plant materials as a potential source of medication. Many commercially proven drugs used in modern medicine were initially used in crude form in traditional or folk healing practices, or other purposes that suggested potentially useful biological activity.

The present study on the use of *Xylopia aethiopica* in the treatment of psoroptic mange in rabbits revealed that XA in its crude form is quite effective in the treatment of mange and this in agreement with the evidence that XA is effective as an insecticide [8, 9]. The result of the chemical analysis revealed the presence of Sulphur (9.42%) and total phenol content of 1.76 %.

Healing was a gradual process for all the animals treated, visual observation and mite load percent per week are combined and presented as Table 1. Visible signs of healing was observed in groups B (40g XA+20ml palm oil) by the 2nd week of treatment and hair regrowth commenced in the 5th week, while for those in groups A (30g XA + 20ml palm oil) and C (80g sulphur + 20ml palm oil) healing didn't commence till the 4th week and hair regrowth in the 6th week for group A and 7th week for those in group C. Result of mite load (%) also showed total disappearance of mites (0%) in groups A, B and C in the 6th, 4th and 8th weeks respectively.

The result of the mean weight gained during the cause of treatment shows that there was a significant ($p<0.05$) weight gain by rabbits in groups A (0.36 ± 0.01kg) and B (0.45 ± 0.03) relative to group C (0.24 ± 0.02). The primary benefits of using plant-derived medicines are that they are relatively safer than synthetic alternatives, offering profound therapeutic benefits and are more affordable [6].

Table 1.
Visual observation (% mite load) per week

Treatment group	Weeks							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
A	- (100%)	- (100%)	- (80%)	DLC (50%)	DP (26%)	HR (0%)	HR (0%)	HR (0%)
B	- (100%)	DLC (80%)	DP (40%)	CDL (0%)	HR (0%)	HR (0%)	HR (0%)	HR (0%)
C	- (100%)	- (100%)	- (100%)	DLC (75%)	DP (50%)	DP (20%)	HR (10%)	HR (0%)

Values in bracket is percent mite load/week; DLC: Disappearance of lesion commences; DP: Disappearance proceeds; CDL: Complete disappearance of lesions; HR: Hair regrowth.

From this study and the indices used, it is obvious that the higher the quantity of XA used in the treatment the more effective and faster the healing process. There is however a need for continued and further exploration of XA in the treatment of mange. The isolation and presentation of the active ingredient responsible for the cure of mange in a refined way and in the right concentration that will make it more effective in the treatment of this condition in rabbits and other livestock and also cost effective should be determined.

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