

**EXTRACTION OF VERNONIA OIL FROM
VERNONIA GALAMENSIS SEEDS
AND ITS AMINOLYSIS TO
VERNOLAMIDES**

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MBUGUA MARTIN NJOGU

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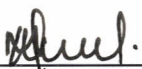
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A Thesis submitted in partial fulfillment for the Degree of Master of Science in the University of Nairobi.

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DECLARATION

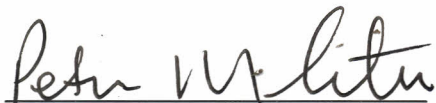
This thesis is my work and has not been presented for a degree in any University.



MARTIN NJOGU MBUGUA

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This thesis has been submitted for examination with our approval as university supervisors.



PROF. PETER M. GITU

DEPARTMENT OF CHEMISTRY

UNIVERSITY OF NAIROBI



DR. BHALENDU BHATT

DEPARTMENT OF CHEMISTRY

UNIVERSITY OF NAIROBI

ABSTRACT

Vernonia galamensis grows as a common weed and is widely distributed in Africa, and its center of diversity is found in East Africa. The dry seeds of *Vernonia galamensis* contains a naturally epoxidized oil that is rich in trivernolin, which constitutes about 80% of the seeds oil. The vernonia oil has a unique structure that makes it attractive for the preparation of novel and useful products.

This study reports on the extraction of vernonia oil and its conversion to vernolamides with higher added value. The oil was extracted from the seeds of *Vernonia galamensis* ssp. *nairobensis* using soxhlet extraction. About 31.6% of crude oil was obtained which after refining gave about 25.2% of oil. The oil was then reacted with 1,6-diaminohexane, 1,8-diaminooctane, 2-aminopyridine, 2-(aminomethyl)pyridine and 2-(2-aminoethyl)pyridine to give the corresponding vernolamides under two varied conditions, temperature (25,70 and 80°C) and solvents (neat, chloroform, dichloromethane and dimethylformamide). In all reactions a mole ratio of vernonia oil to amine (1:3) was used at the reaction time of 12 h.

In all cases, highest yields of the vernolamides (41.2-72.3%) were obtained at 70°C in chloroform, while the lowest yields (21-53.3%) were recorded at 80°C. The reactions at 25°C gave reasonably high yields (17-62.8%), thus aminolysis proceeds even at room temperature. Aminolysis carried under neat conditions also gave relatively high yields (41-64.2%).

The vernolamides were analyzed by thin-layer chromatography (TLC), infrared (IR), electron impact mass spectroscopy (EIMS) and nuclear magnetic resonance (NMR) spectroscopic techniques.

The antimicrobial activities of the products were investigated at concentrations of 100µg, 50µg and 25µg by the disc diffusion method. The vernolamides exhibited only antibacterial activity and was greater against gram-positive (*Bacillus subtilis*) than in gram-

negative (*Escherichia coli*) bacteria. There was no antifungal activity shown on all the fungi that were investigated.