THE SYNTHESIS OF VERNOLAMIDES FROM *VERNONIA GALAMENSIS* OIL

BY:

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DECLARATION

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

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

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ABSTRACT

Vernonia oil extracted from *Vernonia galamensis* seeds constitutes a viable synthetic starting material for obtaining new chemical derivatives with higher added value. The vernonia oil was obtained by soxhlet and cold extraction of *V. galamensis*. The percentage yield of crude oil extracted ranged from 19-31%. Losses of up to 5% of the oil were incurred during the refining process, mainly due to the charcoal treatment (5%). The reaction of vernonia oil with some primary amines resulted in the formation of epoxy amides. The reactions proceed even at room temperature, but for optimum yields, it was done at 50°C.

Vernonia oil was reacted with 1-(2-aminoethyl)pyrrolidine, 1-(3-aminopropyl)imidazole, 4-(3-aminopropyl)morpholine and 1-(3-aminopropyl)-2-pyrrolidinone (molar ratio 1:3) at 50°C to obtain the respective vernolamides: N-2-(1-pyrrolidino)ethylvernolamide, N-3-(1-imidazole)propylvernolamide, N-3-(4-morpholino)propylvernolamide and N-3-[1-(2-oxopyrrolidino)]propylvernolamide. The reactions were complete after 16 -18 hours except for the reaction of vernonia oil with 1-(3-aminopropyl)imidazole which was done for 48 hours in dimethylformamide.

On further reaction of N-2-(1-pyrrolidino)ethylvernolamide with dilute acid and acetic acid at room temperature, the epoxy group was opened up to give 12, 13-dihydroxy-N-2-(1-pyrrolidino)-ethyl-9-octadecenamide and hydroxy ester derivatives. This demonstrates the potential for the development of new applications.

The derivatized compounds were analysed by thin-layer chromatography (TLC), infrared (IR), elctron impact mass spectroscopy (EI MS), chemical ionization (CI) and nuclear magnetic resonance (NMR) spectroscopic techniques.

The antimicrobial activities of the vernolamides were investigated. The vernolamides exhibited both antibacterial and antifungal activity. Both the antibacterial and antifungal tests were investigated at concentrations of 100 μg, 50 μg and 25 μg by the disc method. For the antifungal tests, the vernolamides showed inhibition against *Saccharomyces cerevisiae*, *Trichophyton mentagrophyte* and *Microsporum gypseum*. Moreover, the activity of the compounds was more pronounced against the gram-negative bacteria (*Escherichia coli*) where 20 - 30 mm in diameter (inhibition zones) were recorded as compared to the activity against *Staphylococcus aureus* (gram-positive) and *Bacillus subtilis*.