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## Formulation of herbal repellent from the volatile oils of lemon grass (*Cymbopogon winterianus*)

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Lemon grass (*Cymbopogon winterianus*) has been widely acclaimed to possess therapeutic, cosmetic and insecticidal activities. This study was conducted using a field controlled trial by human volunteers to confirm the effectiveness and applicability of locally-produced Lemon grass oil as a mosquito repellent and adulticidal agent for the prevention of mosquito-borne diseases in Nigeria. Volatile oil was extracted using petroleum ether as solvent while olive oil was used as oil base. The study was conducted between September and October 2017 and made use of 12 volunteers across three locations. The lotions were applied on exposed body parts of the volunteers and they worked three shifts daily. The biting rate, percentage repellence complete protection time and whole night protection were measured and recorded. Topical application of each lotion reduced the biting rate of mosquitoes across the three locations, with the 60% (v/v) exhibiting higher impact of 341 vs. 32; 438 vs. 44 and 388 vs. 33. The 60% (v/v) formulation also had the highest percentage repellence of 91.92% at Location I, offered a whole night protection against mosquito in location I and O and offered a Complete Protection Time (CPT) of 21.6, 18.93 and 20.8 respectively across all three locations. There was a significant statistical association  $r=0.94$  ( $p<0.05$ ) between concentrations of the lemon grass oil formulations and mean duration protection time against mosquitoes. All formulation exhibited adulticidal activities, with the 60% (v/v) formulation having higher impact, causing fast immobilization or paralyzing effect on some mosquitoes that were at close range to treated volunteer's

body. The study concludes that volatile oils of lemon grass possess mosquito (*A. gambiae* and *An. funestus*) repellent and adulticidal effects, especially at higher concentrations and can be used to reduce human-mosquito contacts and hence mosquito-borne diseases and irritation caused by their bites.

Table 2: Monthly percentage repellents of the formulations in the three locations

Formulation/Month	Percentage repellent in the three locations		
	Ihiagwa	Royce Road	Obinze
<b>30% (v/v) of <i>C. winterianus</i> in olive oil (B<sub>1</sub>)</b>			
September	89.80	88.23	88.97
October	85.71	87.35	87.90
Total	87.66	87.77	88.40
<b>60% (v/v) of <i>C. winterianus</i> in olive oil (B<sub>2</sub>)</b>			
September	92.31	90.34	91.92
October	89.39	89.63	91.19
Total	90.62	90.00	91.50

### Biography

Emmanuel Nwanya is a development worker that is desirous to have a hands-on career in public health for sustainable development, human rights and social justice. He holds a bachelor's degree in Environmental Technology and Master of Public Health, with a diploma certificate from West African Postgraduate College of Environmental Health (WAPCEH). He has vast experience in program implementation, monitoring and evaluation, systems strengthening, capacity building, community need assessment and community mobilization. He is readily amenable to newer inventions and methodologies, teamwork for better efficiency and target driven achievements; delighted in facing empirical and research oriented challenges associated with technologies and scientific advancements.

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