REPELLANCY STUDIES ON STRUCTURAL-ELECTRONIC FEATURES OF δ-OCTALACTONE ANALOGUES AND BLENDS AGAINST TSETSE FLIES (*G. pallidipes* and *G.morsitans)*

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ABSTRACT

Tsetse flies (*Glossina spp.*) are insects of veterinary and medical importance since they are the sole vectors of different species of trypanosomes, which cause nagana in livestock and sleeping sickness in humans. In sub-Saharan Africa, the savanna tsetse flies such as *G. morsitans* and *G. pallidepes* are vectors of *Trypanosoma vivax, T. congolese* and *T. brucei* that cause nagana, while riverine tsetse flies such as *G. palpalis* and *G. fuscipes fuscipes* are vectors of *Trypanosoma brucei rhodesiense* and *T. b. gambiense* which cause sleeping sickness. Nagana threatens over 45 million cattle while sleeping sickness threatens over 60 million people. Two approaches have been used to combat the effects of the diseases: parasitic and vector control. Parasitic control with trypanocidal drugs has not been successful due to problems related to their availability, toxicity and resistance development. Attempts to develop vaccines have been futile due to the trypanosomes' antigenic variations. Vector control based on bush clearing, game destruction and use of insecticides are ecologically and environmentally harmful. Sterile insect technique (SIT) only works in ecological islands and, therefore, not effective in most of the African mainland. Community-based bait technologies developed using synthetic combinations based on attractive host odours (ketones, phenols, acetone and carbon dioxide) and visual cues have been relatively successful, except among pastoralists, who move from one area to another in different seasons. Repellant technologies may provide an effective tactic, with potential for use at individual farmer and pastoralist level. A previous study on waterbuck, a tsetse refractory non-host, led to the identification of a blend of 15 electrophysiologically active constituents (six C_8-C_{13} methylketones, two phenols, six C_5-C_{10} straight chain fatty acids and δ-octalactone) that is repellant to savanna tsetse flies. Of these constituents, δ-octalactone has been shown to be a critical component. In an effort to develop more potent tsetse repellants, studies on structural-electronic features related to δ-octalactone will be undertaken. This will involve evaluation of the effect of various structural-electronic features of δ-octalactone on level of repellency against *G. pallidepes* and *G. morsitans*. Targeted δ-octalactone analogues include 2-hydroxy-6-propyloxane, 2-methoxy-6-propyloxane 2-propyloxane and 3-propylhexanone. The structure of the synthesized analogues will be confirmed using GC-MS, IR spectroscopy, ^{1}H and ^{13}C NMR. EAG-active synthesized compounds and blends will be evaluated in wind tunnel assays against savanna tsetse flies. The data obtained will be analyzed using ANOVA.