

Title: Composition and repellency of essential oils of *Tagetes minuta* from different zones in Kenya against brown ear tick (*Rhipicephalus appendiculatus*)

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Ticks are haematophagous ectoparasites capable of transmitting diseases to vertebrates and, therefore, constitute a threat to human, livestock and wildlife health. Though synthetic chemical acaricides have made a tremendous impact over the years in the control and management of the vector on livestock, ticks have developed resistance to most of them. In addition, the chemicals are toxic to non-target organisms. In some parts of Kenya, powdered parts of some plants, including those of *Tagetes minuta* L., are used to control ticks from the animals. The study aimed at characterizing and evaluating the repellency of the essential oils of *T. minuta* obtained from three agro-ecological zones (Nairobi-Kasarani, Western-Bungoma and Nyanza-Bondo) against *R. appendiculatus* Neumann 1901. The essential oils were isolated by hydrodistillation and analyzed by gas chromatography-linked mass spectrometry (GC-MS). The constituents were identified by comparing their mass spectra with those in the National Institute of Standards and Technology (NIST) libraries confirmed by co-injections with standards. The repellency of the essential oils, selected constituents and blends was evaluated using tick climbing assay. The yields of the essential oils varied

Abstract: in the three agro-ecological zones: Nairobi-Kasarani 0.045 ± 0.005 % w/w, Western-Bungoma, 0.039 ± 0.005 % w/w and Nyanza-Bondo, 0.035 ± 0.005 % w/w. That from Nairobi-Kasarani showed the highest repellency (70.06 ± 2.76), followed by that from Western-Bungoma (60.57 ± 2.74) and Nyanza-Bondo (53.26 ± 3.81). The compounds characterized from the oils were mainly monoterpenoids with some sesquiterpenoids. The major constituents were: β -ocimene (13.17 %), guaiacol (13.13 %), allo-ocimene (10.15 %), trans-tagetone (9.39 %), dihydrotagetone (8.20 %) and limonene (6.25 %) in Nairobi-Kasarani oil; 2-pentanone (25.28 %), allo-ocimene (13.89 %), dihydrotagetone (8.73 %), β -ocimene (5.24 %) and trans-tagetone (4.59 %) in Western-Bungoma oil; and, dihydrotagetone (9.46 %), 8,9-dehydrocycloisolongifolene (6.31 %), limonene (4.77 %), caryophyllene oxide (4.21 %) and trans-3,3-dimethyl-1,6-octadiene (2.66 %) in Nyanza-Bondo oil. Of the individual constituents and blends assayed, guaiacol and a blend of guaiacol with alloocimene were most repellent ($p \leq 0.05$, SNK). These results confirm the scientific basis of the traditional use of *T. minuta* to control the ticks and lay down the groundwork for more comprehensive study of local plants for the development of eco-friendly and affordable tools for managing these ectoparasites.