

Abstract

The study compared two sets of bioassays designed to evaluate repellency of *Tagetes minuta* essential oil against climbing response behavior of adult, *Rhipicephalus appendiculatus*, the vector of deadly livestock disease, East Coast fever. The study aimed at evaluating the appropriate bioassay set up suitable for screening repellent essential oils that may become applicable in preventive measures for managing arthropod vectors and vector-borne diseases. All bioassays were conducted under the same laboratory conditions. In both bioassays, repellency was dose-dependent and significant differences between doses remained the same at $P < 0.0001$. However, for the same doses, mean per cent repellency was lower in no-choice bioassay (ranging from $39.30 \pm 2.53\%$ to $69.5 \pm 3.00\%$) than in dual-choice bioassay (ranging from $57.92 \pm 7.11\%$ to 100.00%). This difference was significant ($P = 0.047$) but its underlying mechanism however, remained unknown. In contrast to my initial predictions, using a no-choice tick climbing assay did not increase perceptions of treatment accuracy or a sense of self-efficacy; instead, the assay appeared costly and the repellent effect was comparatively lower. Probit analysis showed that to achieve the same repellent effect, a higher repellent dose is required in no-choice bioassay than in a dual-choice bioassay, hence the former proving unsuitable for screening purposes. Although the dual-choice assay appears to be an ideal method for testing tick repellent products, it requires that during statistical analysis of data generated by the repellency equation, a statistical model that includes all the existing variations and factors that are currently not considered in order that absolute repellency is estimated. These choice bioassays however, provide baseline data against which novel tick repellents/attractants may be evaluated for development into agents suitable for providing prophylactic measures in integrated pest management. Nevertheless, the dual-choice assay proved a more sensitive assay than the no-choice assay.