ABSTRACT

Background: Most odour baits for haematophagous arthropods contain carbon dioxide (CO2). The CO2 is sourced artificially from the fermentation of refined sugar (sucrose), dry ice, pressurized gas cylinders or propane. These sources of CO2 are neither cost-effective nor sustainable for use in remote areas of sub-Saharan Africa. In this study, molasses was evaluated as a potential substrate for producing CO2 used as bait for malaria mosquitoes. Methods: The attraction of laboratory-reared and wild Anopheles gambiae complex mosquitoes to CO2 generated from yeast-fermentation of molasses was assessed under semi-field and field conditions in western Kenya. In the field, responses of wild Anopheles funestus were also assessed. Attraction of the mosquitoes to a synthetic mosquito attractant, Mbita blend (comprising ammonia, L-lactic acid, tetradecanoic acid and 3-methyl-1-butanol) when augmented with CO2 generated from yeast fermentation of either molasses or sucrose was also investigated. Results: In semi-field, the release rate of CO2and proportion ofAn. gambiae mosquitoes attracted increased in tandem with an increase in the quantity of yeast-fermented molasses up to an optimal ratio of molasses and dry yeast. More An. gambiae mosquitoes were attracted to a combination of the Mbita blend plus CO2 produced from fermenting molasses than the Mbita blend plus CO2 from yeast-fermented sucrose. In the field, significantly more female An. gambiae sensu lato mosquitoes were attracted to the Mbita blend augmented with CO2 produced by fermenting 500 g of molasses compared to 250 g of sucrose or 250 g of molasses. Similarly, significantly more An. funestus Culex and other anopheline mosquito species were attracted to the Mbita blend augmented with CO2 produced from fermenting molasses than the Mbita blend with CO2 produced from sucrose. Augmenting the Mbita blend with CO2produced from molasses was associated with high catches of blood-fed An. gambiae s.l. and An. funestus mosquitoes. Conclusion: Molasses is a suitable ingredient for the replacement of sucrose as a substrate for the production of CO2 for sampling of African malaria vectors and other mosquito species. The finding of blood-fed malaria vectors in traps baited with the Mbita blend and CO2 derived from molasses provides a unique opportunity for the study of host-vector interactions.