

# Attractive Toxic Sugar Baits Found to be an Effective Mosquito Control Method in Mali, West Africa

Malaria – one of the most devastating diseases in Africa – is transmitted by vector mosquitoes, known as the *Anopheles gambiae* sensu stricto (s.s.), *Anopheles coluzzi*, *Anopheles funestus*, and *Anopheles arabiensis*. In 2017, the World Health Organization (WHO) estimated that there were 219 million cases of malaria and 435,000 deaths around the globe. To reduce transmission, WHO also indicated a clear need to develop and integrate new vector control strategies.



In a study recently published in *Malaria Journal*, researchers found that attractive toxic sugar baits are an effective control method of the *Anopheles* mosquitoes in Mali, West Africa, where sustained malaria transmission occurs despite the use of other control methods.

“The study provides large-scale field-testing results from West Africa for a new form of malaria vector mosquito control,” said study co-author John Beier, Sc.D., an internationally renowned entomologist and professor at the Miller School of Medicine Department of Public Health

Sciences. “Results show that this simple method can decrease malaria parasite transmission by African malaria vector mosquitoes. It can be used along with long-lasting insecticide-treated bed nets to drive transmission to very low levels.”

The attractive toxic sugar baits method – a mosquito control system that exploits the need for both male and female mosquitoes to take vital sugar meals – significantly diminished effects on the presence of malaria vectors and on malaria parasite transmission.

“While this method is an inexpensive and environmentally friendly way to efficiently control mosquitoes, we are convinced that it should not be used to replace existing control methods, but rather supplement them to achieve true integrated vector control,” said Günter Müller, Ph.D., adjunct professor at Bamako University in Mali, who co-authored the study.

Researchers found that there was a lower number of male and female mosquitoes feeding on the natural sugar sources than on the attractive sugar bait. The deployment of the attractive toxic sugar baits method reduced CDC-UV trap female catches in September – when catches were highest – by 57.4 percent compared to catches in control sites.

Malaise trap catches similarly showed a 44.3 percent reduction of females in August. Pyrethrum spray catches of females were reduced by 48.7 percent in September, and females in human landing catches were lower by 19.8 percent indoors and by 26.3 percent outdoors. The high reduction seen in the rainy season was similar for males. During the dry season, reductions in

population density for both males and females were greater than 70 percent.

“Attractive toxic sugar baits deployment also drastically reduced the *Anopheles* population during the experimental period. The most significant result is the reductions of older females with three or more egg-laying cycles that were recorded every month, which amounted to 97.1 percent in October and 100 percent in December. Reductions in monthly entomological inoculation rates ranged from 78 to 100% indoors and 85 to 100% percent outdoors,” said Yosef Schlein, Ph.D., professor at the Hebrew University of Jerusalem, who co-authored the study.

The number of sporozoite infected females from traps was also reduced by up to 97.83 percent in treated villages compared to untreated control villages.

Mohamed M. Traore, Ph.D., assistant professor at the School of Medicine and Dentistry at the University of Science, Techniques, and Technology of Bamako in Mali, who served as the lead author on the study, said that method “was accepted by communities, which is an important parameter to achieve high coverage of bait stations and subsequently malaria reduction.”

This study, funded by Innovative Vector Control Consortium and two grants from the National Institutes of Health, was conducted in collaboration between Bamako University in Mali, the University of Miami Miller School of Medicine, Hebrew University in Jerusalem, and other institutions.

“This is an exciting finding for vector control in Africa

where there is a widespread report of multiple insecticide resistance in *Anopheles gambiae*, the major malaria vector species,” said Seydou Doumbia, M.D., Ph.D., dean of the medical school and director of the University Clinical Research Center at the University of Bamako, who also served as co-author.

Large-scale epidemiological trials are now underway in Mali, Kenya, and Zambia.