

Agro-allied chemicals, environmental xenobiotics and insecticides resistance in *Anopheles gambiae* in Nigeria

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Mosquito breeding sites were grouped into two different study zones (A and B) on the basis of human related activities taking place in and around the breeding sites. *An. gambiae* larvae collected from ecologically contrasting breeding sites were reared to adults in the laboratory. Adults from the F1 progeny were assayed for resistance against 4% DDT, 0.75% permethrin and 0.1% bendiocarb using the WHO adult insecticide susceptibility bioassay protocol. During mosquito sampling a survey was carried out in each site with the aim of documenting the most widely used insecticide. The levels of the physicochemical environmental factors were measured from the anopheline breeding sites. Results shows that pyrethroids (cypermethrin, lambda-cyhalothrin and cyfluthrin) and organophosphates (dichlofos, dimethoate and chloropyrifos) were most commonly used for crop protection in the agricultural sites, organochlorine (endosulfan and fipronil) and carbamates (carbofuran and carbaryl) were also used to a lesser extent. On the other hand, interview in the residential sites revealed indoor residual sprays (IRS), piya piya sprays (piya piya sprays are formulations produced locally as insecticides sprays and without government approval) and coils containing pyrethroid insecticides with cypermethrin, lambda-cyhalothrin and cyfluthrin as common active ingredients were mainly used for personal protection. The results of measurement of physicochemical parameters showed little variation in the levels of the physical environmental factors (pH and temperature) across the sampling sites in the two zones studied. However, the levels of nitrates, nitrites, phosphates, sulphates and carbon content

were higher in sites located in zone A than those in zone B. Overall, zone A is significantly different from zone B ($p=0.000$). There was evidence of high insecticides resistance among the mosquitoes tested from all the sampling sites. However, mosquitoes from agricultural sites (zone A) recorded higher insecticide resistance when compared to those from residential sites (zone B). These high levels of resistance are probably related to extensive pesticide usage in the zone. This is further supported by higher levels of the environmental chemicals recorded in zone A compared to zone B. These observations could have a significant impact on the environmental management and insecticide based approach to malaria vector control in Nigeria.

Observed in distinct lines revealing diverse Sa2int phages. The genomics data at Korle-Bu Teaching Hospital revealed multiple transmission events involving *S. Aureus* ST15 involves contamination of various surfaces in the emergency pediatric ward where the outbreak occurred.

Conclusion: Dissemination pattern of the ST15 clone in the Korle-Bu Teaching Hospital emergency ward illustrates a fundamental issue with the hospital's disinfection of environmental surfaces. Various phage populations rather than a single highly transmissible type of phage is likely to mediate the high prevalence of pvl genes among the genes *S. aureus* isolates.