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

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Abstract

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 (dichlovos, 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 insecticeds 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.

Mosquito species have diverse rearing propensities, yet most need to lay their eggs close to water – ordinarily in vegetation or in still water. Female mosquitoes can create 100-300 eggs one after another, and the eggs can bring forth into mosquito hatchlings inside 48 hours. For about seven days to 10 days, the hatchling will develop before changing into a pupa until at last rising as a grown-up mosquito around two days after the fact. Inside 14 days, you have an altogether new age of mosquitoes prepared to begin the cycle all once more.

The creepy crawlies possibly become dynamic and start the reproducing cycle when temperatures consistently remain at 50°. They will either vanish or rest – relying upon the species – when temperatures plunge beneath this imprint once more. For the majority of the nation, mosquitoes are just a worry in the mid year months, when temperatures rise. On the off chance that you live in a district with mellow temperatures or early springs, nonetheless, you may encounter a significant long mosquito season. Wherever with still water or overwhelming vegetation can be a sufficient favorable place, and mosquitoes can particularly flourish subsequent to flooding in view of all the still water. They needn't bother with a flood, however. Since their eggs are so small, a mosquito can even utilize a solitary water bottle top loaded up with water to lay eggs.

Here are several ways you can create fewer places for mosquitoes to lay their eggs:

1. Practice good pond mosquito control. If you have a pond or still water on your property, you may not be able to remove it. You can make it less of a mosquito haven, however, by adding mosquito fish – also known as gambusia affinis. A single fish can eat more than 200 mosquito larvae in 60 minutes. Another option for your pond is to introduce bacteria known as Bti (Bacillus thuringiensis) to kill larvae in your pond.

2. Cover rainwater barrels. Keep your barrels covered with a fine mesh fabric to prevent mosquitoes from getting through. You can also keep the barrel covered even when rain isn't coming as a more permanent preventative measure. If covering isn't an option, you can empty out your barrels within 24 hours of a rain before larvae have a chance to hatch.

3. Have a running birdbath. Birdbaths usually contain still water, but you can eliminate this problem by introducing a small pump to keep the water moving. If this keeps the birds away, you can schedule daily replacement of the water to keep mosquitoes from breeding.

4. Eliminate debris and hiding spots on your property. Frequent cleanup eliminates empty containers or surfaces where still water can collect. Regular maintenance can also mean trimming back grasses and other plant life so mosquitoes can't hide there.

5. Take a close look at your garden. Garden ornaments, flowerpots, and even paving stones can collect water and become a breeding ground for mosquitoes. For potted plants, encourage good drainage. This will improve the health of your plants, while also preventing mosquitoes. For garden ornaments, look for hollow pieces with small drilled holes to allow water to drain away.