Building a Larval-Rearing Cabinet to Hatch Field Collected Mosquito Eggs and for Maintenance of Mosquito Larvae used in CMMCP Educational Programs

TODD DUVAL, M.Sc.

Central Mass. Mosquito Control Project
111 Otis St. Northborough, MA 01532
(508) 393-3055 • duval@cmmcp.org

ABSTRACT

As an addition to our normal adult mosquito surveillance activities, CMMCP will begin a project to assess the presence or absence of the invasive Asian tiger mosquito *Aedes albopictus*. Because this mosquito is notoriously hard to catch in our normal surveillance gravid or CDC light traps, we will begin setting small water-filled ovitrap containers to entice tree-hole breeding female mosquitoes to oviposit their eggs onto a removable paper strip. These egg-covered paper strips will be returned to the Project office to be hatched and raised in a Project-built larval rearing cabinet. This custom-built cabinet will allow us to control environmental variables such as relative humidity, temperature and photoperiod which are essential for larval mosquito development. The captured larvae will be raised until they reach the adult stage, where they will be euthanized and identified to species. Using this method, we hope to be able to provide early detection of invasive mosquito problems and will be able to provide an appropriate response.

The use of the larval rearing cabinet is not limited to surveillance; it will be helpful to have a stable source of mosquito larvae of several different species for outreach and education activities, as well as subjects for our in-house bioassay assessments of larval and adult mosquito control pesticides.

Inside the Box: Making a Larval Rearing Cabinet for Asian Tiger Mosquito Surveillance

Todd B Duval[1], Jonathan Briggs, Tim Welch
Central Massachusetts Mosquito Control Project, 111 Otis Street, Northborough, MA 01532
[1] duval@cmmcp.org

Introduction

Recent discoveries of introduced populations of Asian tiger mosquito (*Aedes albopictus)* in Massachusetts have created a need for increased ovitrap surveillance in our district. Ovitrap surveillance requires the capture of mosquito eggs on a substrate, then the subsequent egg hatching and larval rearing of young mosquitoes under controlled conditions. Borrowing an idea from the Warren County Mosquito Extermination Commission (Duryea 2014), we set about sketching, designing and building our own in-house insectary for larval rearing. The project was completed in time for the 2015 surveillance season.

The design is simple; a box or closet which contains a fluorescent light which doubles as a heat source and shelving for samples and storage. Doors and vents help maintain constant temperature (Fig. 1).

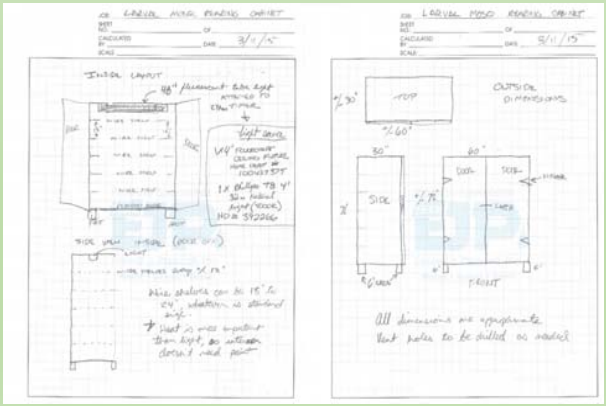

Figure 1. Simple pencil sketch of approximate size and design of larval rearing cabinet

Figure 2. The larval rearing cabinet as built, before fine tuning of photoperiod.

Materials and Use

The cabinet is constructed of simple materials obtained through a local home supply store. Three sheets of ¾ inch birch plywood, one sheet of ½ inch MDF plywood, a few strips of tongue-and-groove paneling, various screws, casters, hinges, a metal shelving unit, a timer and a light fixture. The choice of bulb is important; a 4 foot 32-watt Phillips T8 fluorescent tube putting out ~5000k of natural spectrum light helps maintain temperature. The finished cabinet measures 31” D x 72” H x 60” W, opens like a two-door cupboard and is mounted on casters for easy relocation (Fig. 2). A metal rack system is installed inside to hold larval rearing pans and breeding chambers.

The timer was set to a 12L:12D photoperiod, which was adjusted to 16L:8D in the early spring and late fall to try to maintain a 27-28°C internal temperature (McLean-Cooper *et al*. 2008).

Results and Discussion

The finished cabinet was placed in an unheated garage area, where ambient temperature fluctuated seasonally from ~0 to 30°C (~32 to 90°F). The cabinet was able to maintain consistent internal temperature throughout the breeding season (Fig. 3), with some deviation from the target temperatures during the cooler weather in spring and fall (Fig. 4).

Relative humidity fell far short of the 79-80% necessary to maintain a viable adult population (Fig. 4). Because we were examining larvae and recently hatched adults, we felt that this factor was not important enough to warrant installing a humidifier. To maintain an adult breeding population, a small household humidifier could be easily installed.

Although we did not detect any Asian tiger mosquitoes in our area during the 2015 surveillance season, the larval cabinet provided us with a consistent environment for the raising and identification of mosquito larva and recently hatched adults.

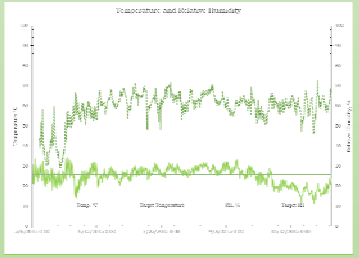

Figure 3. Plot of daily temperature and relative humidity (RH) fluctuations for the 2015 surveillance season. Straight horizontal lines represent target temperature and RH.

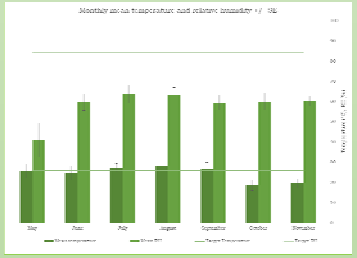

Figure 4. Average monthly temperature and RH for 2015 surveillance season. Error bars represent standard error.

References

Duryea, R. 2014. Colony Rearing Cabinet. NJMCA poster session.

McLean-Cooper, N., N. Achee, T. Foggie, J. Grieco, J. Williams. 2008. Space optimizing methods for laboratory rearing of *Aedes egypti*. Journal of the American Mosquito Control Association 24(3):460-462