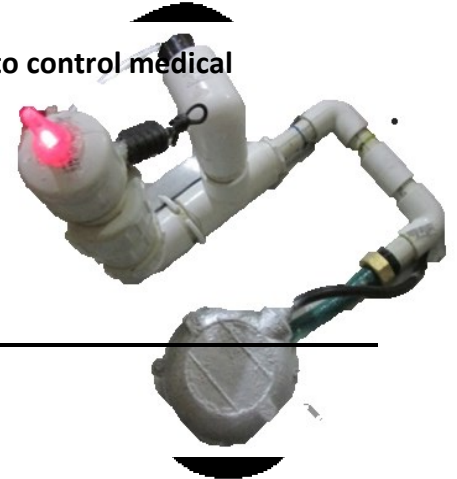




Hydrostatic spectral aquatic robot laser rays, for larval mosquito control medical importance in Public Health.

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Summary

Design and build an aquatic robot to destroy the presence of larvae or pupae of mosquitoes in water containers. It was built and a robot with recyclables built with tubes pipe PVC, magnifier, light sensors and barrier, engine power 110 v, resistors, LCR, charger 9 vy spotlights led, to destroy mosquito larvae was designed in a container of water. As a result there is a zero prevalence Larval rate because the robot detects larval presence sensors and lasers automatically activated with the suction effect and larvae destruction their killing the inner cast off using filters of 10 microns and metal blades, the robot is activated by five to ten minutes to wait automatically turns off the alarm again available as larvae. Conclusion use water in water containers robot is not larval indices and pupae, which can be used as anti larval control for transmitter combat Dengue, Zika, Chikungunya among others.

Keywords. Sensor robot larvae.

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Introduction

By January 2016 El Salvador has reported 3,302 cases of Zika with a rate of 51 x 1000 inhabitants and pregnant with 96 cases. In March 2016 confirmed cases of Zika in 31 countries, which has caused international alarm. Diseases malaria, dengue and Chikungunya have not yet been eradicated, Latin American countries have invested in the health care system millions of dollars to combat the mosquito or mosquito, chemicals like Abbe are already reporting resistance to the larvae. 2014 and 2015 have been crucial to detecting and combating viral diseases, head to the Zika in which have been associated microcephaly in newborns,

Malaria and dengue are two major diseases of medical importance, however the transmitter *Aedes aegypti* transmits three potentially aggressive to human diseases, including dengue, Zika and Chikungunya, when considered epidemiologically as Disease reporting statistical figures increasing by the Ministry of Health. Defined as high risk in endemic areas. Similarly it has been reported today in coastal regions and in urban areas with higher morbidity. Global efforts are sponsored or conducted by WHO, PAHO and others to control and eradicate the vector, but has so far been impossible to achieve promising results. We used various methods of control, in which the use of chemicals in plantations and domiciliary areas highlighted, with the risk of causing poisoning in humans.

When malaria and dengue are two public health problems and governments, because millions of dollars are invested in eradicating the vector and treat disease, derived from the national budget allocated to health, today added Zika.

El Salvador is no exception, because its climate and population density makes favorable transmission, predominantly in the dry and rainy season with temperatures between 22°C to 30°C in coastal areas or tropical savannas and displacement heights less than 300 meters They make ideal conditions conducive for your stay and spread.

80-90% of all cases in the country as reported by Malaria Ministry of Public Health and Social Assistance (MOH), is located in endemic areas mainly on the Pacific coast. Reported rates with larger numbers of cases have been in 2013 with more than 100,000 cases infected with malaria with an approximate rate of 200 to 2.600 X 10.000 inhabitants.

Efforts to eradicate larvae using multiple resources by the Ministry of Health have been systematic and advertising expenses is expensive. greater education and awareness with support for

communities to collective and individual level is needed. When the Abbe intradomiciliar use as prevention and sanitary control without the expected impact is made. Today fry used as fish hatcheries in containers and sanitary control.

Objetives:

Hydrostatic design and build a robot that detects mosquito larvae and destroy larval index down.

Specific objectives:

1. Remove larvae through the hydrostatic robot and destroy them in a container of water.
2. Design an electronic circuit with automatic functionality.
3. Build a robot Hydrostatic with larvicide effect.

Methodological design .

The research is experimental application, with a research period of 15 months. The sample were mosquito larvae stages I, II, III and IV. The independent variables studied are mosquito larvae regardless of the species and the dependent hydrostatic robot preventing diseases like Dengue, Chikungunya and Zika.

Results and discussion.



Lifecycle: In the experiment larvae of several stages were collected, found in its natural form in its life cycle first go through egg lasting from 1 to 3 days being in the water surface, can float without difficulty Malaria, the other species are grouped to float, then pass larvae in 4 stages see Fig 1 that shed their cuticle between each stage that protects and thickens when they reach stage IV, being the smallest initial and immature I that others increase in size at each stage, mosquito larvae need water, have to inhale respiratory oxygen siphon except Malaria larvae but not siphon is placed parallel to the

water surface for breathing. These larvae feed on small organisms and organic material to survive. On

average, each larva is between 2 to 10 mm, has a long thin terminal and tube called a siphon that serves to breathe in the water surface, last in this phase of 10 to 13 days, then pass pupa less dense weight which easily fleet, which is the pre-adult stage mechanical pressure exiting the cuticle, at this stage last 2 to 4 days. Then in adult phase are on average 3 to 6 weeks see Fig 2.3, males live less, the female needs to mate in two days where they need to find water to lay eggs and especially the female needs blood supply, looking male pollen, juices and other foods except blood. As epidemiological and entomological surveillance is necessary to cut the cycle of life here in larval stage among others, and will not transmit viral diseases in its chain of transmission.

Epidemiology: its main habitat is water, need oxygen in larval stage as a preliminary stage to reach adult breathing. The larvae of malaria breeds in clean and contaminated water, dengue, Chickungunya, Zika live in clean water. They live at an altitude less than 600 meters from sea level, are easily adapted to temperate and warm climates.



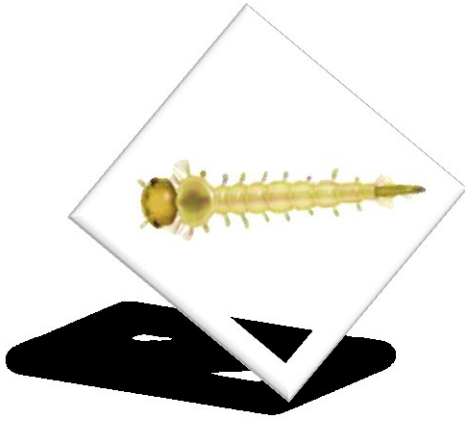
Figure 2. Egg, larva, pupa and adult mosquito life cycle.



Figure 3. Mosquitos adults.

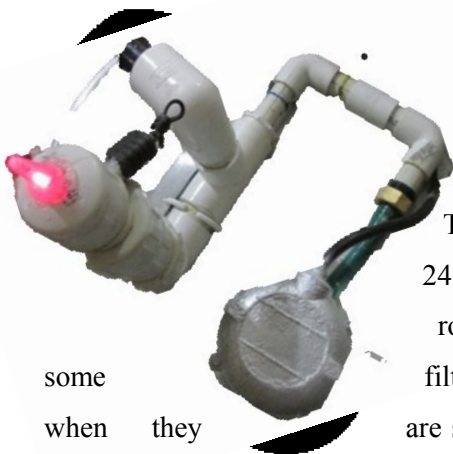
A DAY IN THE LIFE OF A mosquito larvae.

The behavior of larvae for 8 hours was studied in a container of 2700 mts³, resulting larvae stages III and IV come to the surface to take in oxygen are between 5 to 10 seconds, any movement merging up background being between 10 to 15 seconds then go back the surface. The time it takes to get from the surface to the bottom depends on the depth of the container but arrive in 30 seconds and ascend or descend a zigzag other queued between 20 to 30 sec. Stages I and II larvae spend most of the time in the bottom of container until they ss III and IV rise to the surface to take oxygen in the open diameter of) cm container with natural light, known in El Salvador as " water basin not known if they have photo-thermal heat and light receptors in the hair and antennae covering his body, but indicates that if have receptors, and have a pair of antennae on his head. His behavior in the container looking light the biggest stadiums. They are attracted to dark green in the background. It is a frenzy up and down continuously 24 hours a day in the container until they leave adult.



BASIS OF ROBOT HYDROSTATIC.

Hydrostatic robot, by its nature does not move, which is submerged in the water bottom, no danger of electrocution because it has a voltage of 9 is 12 v equivalent to 6 batteries circuit sensor, the engine is a water source increased pressure which is special for tanks without danger of electroshock 110v, the robot has sensors that are activated to interrupt a laser beam, which in turn activate the alarm makes a focus 20-40 lighting turn the engine way aspirator is activated for 5 minutes, then turn off automatically. The laser beam is isolated from submerged water can be sealed for 24 hrs on or as needed, if something happens again a larva or more the robot is automatically activated and the cycle begins again. It has filters and metal cutting Crumbling turbines or destroys the larvae some when they are sucked, then pass the other end unmade, with a high mortality rate in stages II to IV. When using a 10 micron filter mortality is zero prevalence. For proper operation must first turn on the system for the sensors recognize their environment, then turn on the laser so that the system shuts down and then left on the laser 24 hrs for I acted as a barrier and automatically activate the robot to activated by the linear step photon laser light. It should not be handled by children.

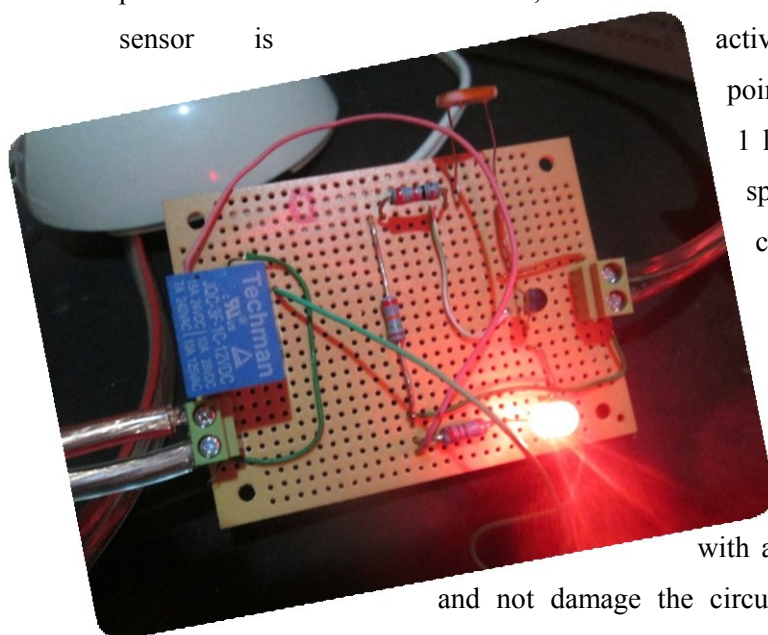


II. ROBOT DESIGN AND CONSTRUCTION OF HYDROSTATIC.

You must be integrated and have basic knowledge of medicine, optics, electronics, physics, electricity, entomology and microbiology for the design and construction of the hydrostatic robot. The electrical circuit has two terminals with positive charge and a negative, creating a closed circuit which activates a load converting electric power of 12 v in a continuous electron flow translated into kinetic energy. In the circuit there is a red LED that indicates that the sensor is activated and a red LED submerged as well. an electronic circuit diagram, with a relay that is out of the water stimulates a source of UV light to another sensor and this in turn automatically starts the engine powering the red LED submerged and a focus of 20 wo 40w built warning that there larvae in the container. Hydrostatic robot consists of electronic material that is the central circuit that processes the electrical information that is out of the water, other material PVC is immersed with LED, filters and turbines, and other underwater sensors and laser rays. The red LED lights submerged when the engine is on. It is constructed of PVC plastic pipe.

ELECTRONIC CIRCUIT DIAGRAM.

In the picture 1 the robot has several fotoresistencias as a signal source that captures light with photon photodetectors several laser beams, which when interrupted the electrical signal, considered a barrier sensor is



activated. The circuit consists of 2 LCR, laser pointer, red led a 2N2222 transistor, one resistor of 1 k 1 220 ohm resistor 1 resistor 2k, a relay, 1 spotlight 20-40 w 1 sensor light, dock connectors. 1 magnifying glass.

PHOTO 1. Diagram electronic circuit

The laser acts as a barrier, which is submerged in the water directed to another signal two fotoresistencias which are coated with a transparent tube to avoid contact with water and not damage the circuit, which receives light laser which faces a distance of 30 cm.

According to the theory

CSF it is designed that their cells capture a mass based on its size, so that the larva is very small so CSF diameter uptake covering with tape is decreased, so is directly proportional to light intensity increases its resistance to high light otherwise least resistance. The laser is monochromatic photon emission in one direction, producing an electromagnetic source, capturing any movement when

passing larvae interrupting the electrical signal, its wavelength is 630 nm from 760 to. Your color is red. This allows the circuit is turned off and turned on again when the laser beam is stopped and the cycle begins again. Tests were made to place more than 5 LCR 5 laser rays and the same results, in our case we use two with decreasing diameter of laser light gathering. test was done on a small scale water out how the laser to pass the larva.

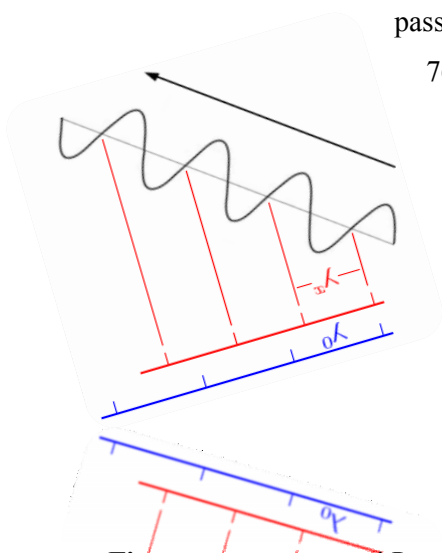


Fig. 4 Length of laser wave ray.

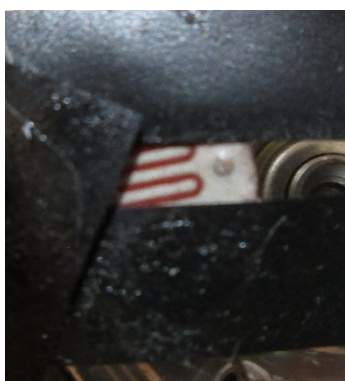
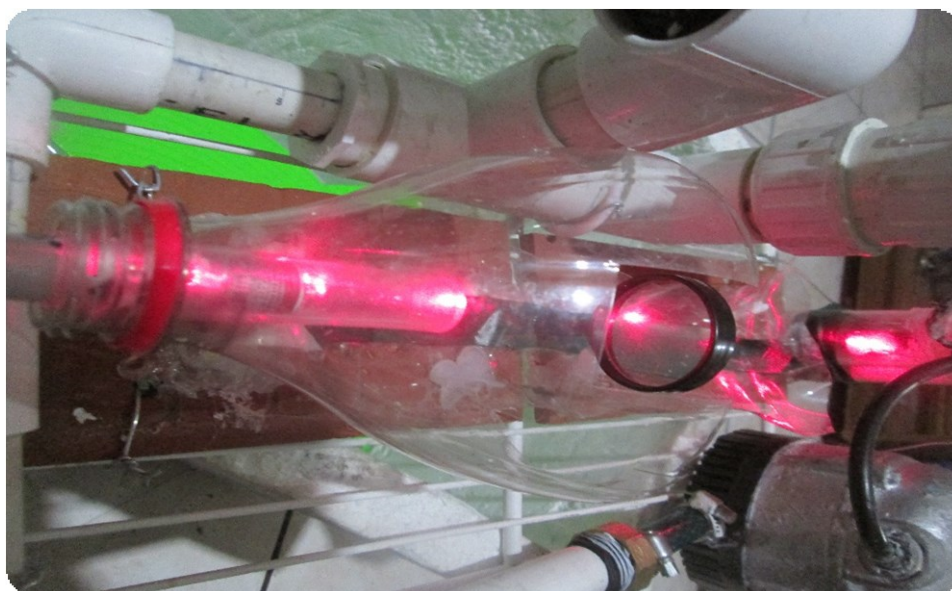


PHOTO 2. LASERS TARGETING EXPANDED CSF. **LCR.**



PHOTO 3. LASERS AND ROBOT MOTOR submerged in water.

In Figure 4 and Photo 2.3. It is observed the robot immersed in water in the presence of laser beams, the larvae when approaching the laser cutting laser light meaning that triggers the activation of the motor to be suctioned and be destroyed having a perimeter scope shaft suction 360 . the red LED at the top indicating that the engine is running and the LED lights of the electronic circuit. Clarifies that only the laser can be turned on 24 hours, also can be constructed with laser diode of a burner with potentiometer to avoid burning the larva, its operation activates the robot when the signal is cut it activates the whole system including the electronic circuit which in turn stimulates the sensor to the engine and red LED submerged focus is scheduled for five to ten minutes or thirty minutes then turns off automatically except the laser is activated. If there is much movement of larvae is not quenched. In summary entire circuit robot has two primary sensors, one motion sensor is converted to light sensor or light sensor that simply is not submerged and the other is the sensor barrier CSF is submerged. The robot is placed at the center of the water container because the larvae need light and oxygen.

The robot generally consists of three parts: the first is the electric circuit containing the LCR submerged, the second light sensor is not submerged, which in turn activates the motor submerged once and a light source not submerged alerting larvae and a red LED indicating the motor is activated and the third signal laser beams is directed to submerged CSF.



PHOTO 4. COMPONENTS OF ROBOT IN THREE PARTS.

ROBOT EFFECT LARVICIDE.

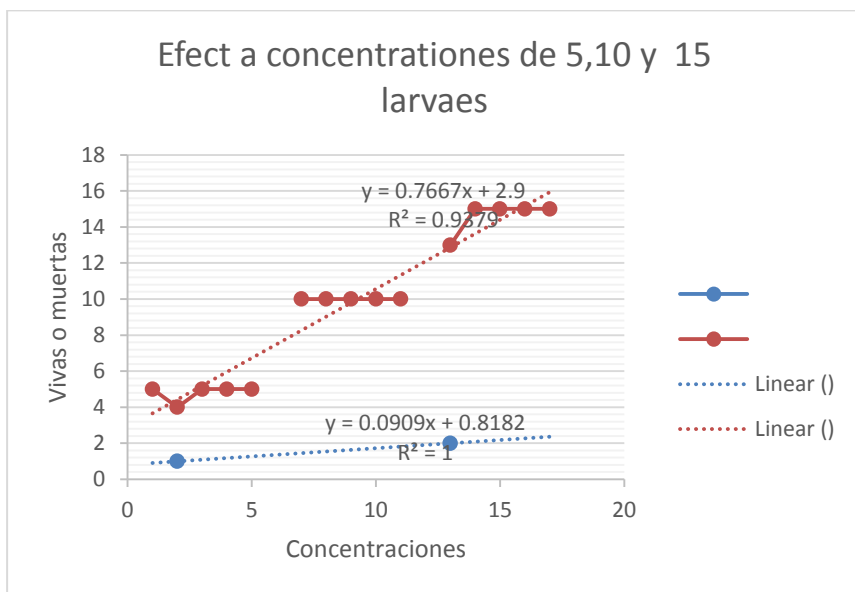


FIGURE 1. Effect at concentrations of 5.10 and 15 larvae when using the robot.

In Figure 1. In the container was found that the robot can destroy or dispose of larvae detection in 99-100% accurate enough larvae, since through the light beam, which is optional the same circuit LCRs have several and several more pointers to more is the probability of detection.

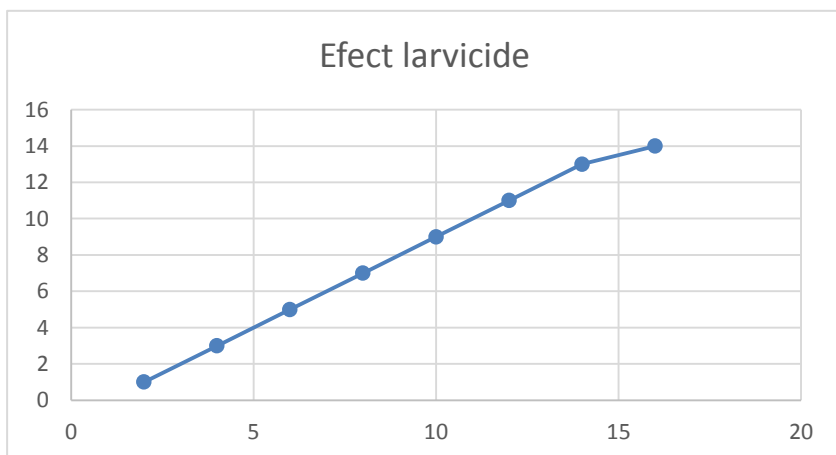


FIGURE 2. Effect larvicide to greater numbers of larvae.

In Figure 2 it was found that the more larvae the robot has a larvicide, capable of automatically activated when cutting the beam of laser light, indicating that there is presence, so the container can be free of larvae effect. Always seek the larvae surface to take oxygen in the light aperture diameter of the container and immersed when in danger. It also detects pre-pupae are adults.

Conclusion.

The water in water containers robot when activated is not larval and pupal indices, which can be used as the transmitter control antilarval combat Dengue, Zika, and Chikungunya among others.

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