Survey study of the Factors Determining Culex pipiens Mosquitoes Residing Strategy in Al-Furat Al-Awsat Technical University Campus

Hamza Ahmed Aziz Al-Aaraji

Assist.Prof. Plant Production Department, Kufa Technical Institute, Al-Furat Al-Awsat Technical University, Al-Kufa, Iraq

Abstract

The present study surveying more than 1909 mosquitoes with their nests arounds all the campus areas and borders through using of both nets and adhesive papers for collection purposes. Data analysis showing a significant effects by each of agriculture (60%), rubbish and sewage puddles factors (16%)in the spreading, reproduction and distribution of *Culex pipiens*spp. in the campus region within probability of $P<0.05$ as an dependent significant result.

Conclusion of our project predicting that the location of campus building will ruled and controlling the percentage of bug's net spreading and reproduction capabilities.

Keywords: *Culex pipiens, Spreading capability, Climate factors,University campus.*

Introduction

The type of mosquitoes most commonly spreading and founded in most of Iraq's governorates are the *Culex pipiens*, or as many peoples called it the house bug, which is classified within the Diptera order. Culex mosquitoes have both the biological abilities and adaptations abled them to lived, reproduced and settled down in Iraq.Bugs of *Culex pipiens*' nutrition based strategically on the blood of vertebrae, as they consume bird's blood (such as pigeons, doves, chickens, crows, etc.) and human blood[(1)]. Indeed, at the last days of the summer season and the start of the fall monthswhich is the time for them to overwinter, *the Culex bug* subsist on sugary and other nectarfood sources in order to inclusion the fat for these critical days.

Culex pipiens characterized by its light-to-pale semi-brown colour, and are stripped with lighter lines on the abdomenal region. In relation to their sizes, these bugs can range between 2.85 and 8.1 millimeters long[(2)]. *Culex* spp. can be characterized by their proboscis presidency,[(5)] in addition to the somewhat long mouthpart that is used for sucking up activities. All those features, in addition to their appendages and brown color wings matching the rest of their bodies[(2)].

The bugs of*C. pipiens* can be spreads in both rural and urban tropical and temperate regions around all the world. *Culex* species (genus), and a huge numbers of other bug's species, yearning for temperate, humid and wet climates. Another notice that *Culex pipiens* do not suffer hibernate during the cold season, that's make them differs from other bugsgenuses[(3)]. However, *Culex pipiens* have the ability to live during season of winter lay their fertilized eggs later during rose season.

Culex species survive by nesting and living in regions screened from the bad weather's effects, such as winds or rain. Some groups of this species also hided in dusty caves during the winter days. Theof overwintering properties based on several factors like degree of the temperature, sunlight duration along the day and location where they lie[(3)].

This study aimed to diagnosis the types of bugs in the campus area in addition to the designation the most effective factors ruling and causing the reproduction and residing of these organisms in this region.

Materials and Methods

1- about 1909 models of bugswere being collected by using both of net method and adhesive paper techniques (national local manufacturing) after distributed in many areas in and around all the campus areas in kufa city, according to[4].

2- Diagnosis and classification of bug's type done in the laboratories of plant production department by using both light and dissecting microscope (Olympus Co. Japan).

3-Determination of the factors related to bug's spreading surveyed optically, by photo capturing and recorded by hand. According to the area and space where nests and insects collected, we registering the information.

4- Biostatisticianjudgments based on tabulated the recorded data and issues according to the SPSS program[5]. Probability fixed using 0.5 extent.

Results

Table-1 below shows the prominent factors which affecting the mosquito's spreading, nests citations and numbers collected in few days of researching plot.

According to the tabulated datum, it is clear that agriculture constant is running about 60% of the gross effects as a whole. Others like growth rates, rubbish, bad habit, and puddles registered a percentage equal to 8 and 7 subsequently. The last two factors (sub-urban and policy of control)rolled the same percentage, 5% approximately.

Table-1: Factors related to residing of bug in the campus area.

Constant	%	Bug nests	No. collected
Agriculture*	60	>100/m2	830
Human population growth*	8	>1/m2	50
Rubbish*	8	>10/m2	200
Bad habits*	7	>1/m2	100
Sewage puddles*	7	>100/m2	600
Sub-urban*	5	>1/m2	100
Control policy*	5	>1/m2	29

*** , this is mean an obvious significant difference in the calculated results.**

For more conformational clarifications, we supposed additional statistical theories to prove our project validity. Here we are designed statistical scheme-1 below as a pyramidal histogram for explaining the most effective constant in comparison with the proposed control normal conditions. Accordingto the scheme-1 below its obvious that analysis can be puts into five discrete trends, as follows:

· Agriculture factors touching about 60% among others in its ruling bug's population in the campus area.

· Sewage puddles and sub-urban constants comes two (7%) in the list of factors pathetic the bug's nests occurrences.

· Rubbish and bad habitsfactors impact the insects population third by a percentage 8% through the amount of nets builds there by the bugs.

· Control policy was come in fourth in terms of its effect on the spread of mosquitoes with a percentage 5%.

· Population growth (8%) showed a less effect in the nesting and spreading efficiency by the bug.

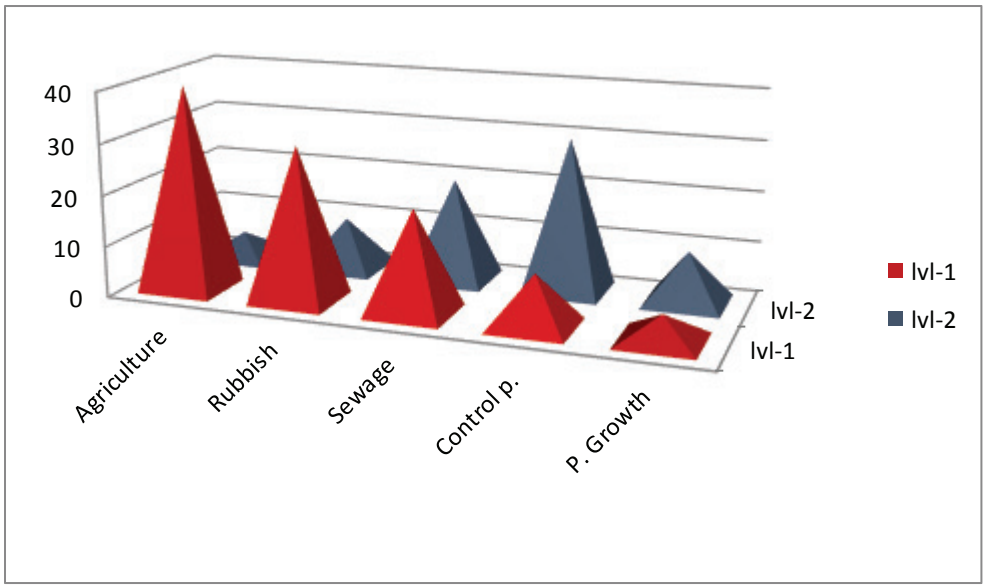

Figure 1 : Statistical histogram analyzed factors affecting residing of mosquitoes in university campus.

This level explains the values dangerouszones of bug distribution.

This level explains the values of control conditions

Macroscopic and microscopic examinations showed that larvae and mature mosquito type belonging to the *Culex pipiens*, look image-1 below. Through investigation the mosquito take on a semi-brown texture, and are stripped with semi-white lines on the abdominal region. Their long size of this mosquito ranges from four and six millimeters. Anothercharacter for this organism is the proboscis inaddition to brown wings.

A satellite image explain the most effective variables and factors affecting the mosquitoes distribution and net building in addition to larvae residing. Look below, image-2.

As it showing the agriculture spaces occupied more of the regions surrounding the campus of the university.

Figure 2: *Culex pipiens* captured in our project research

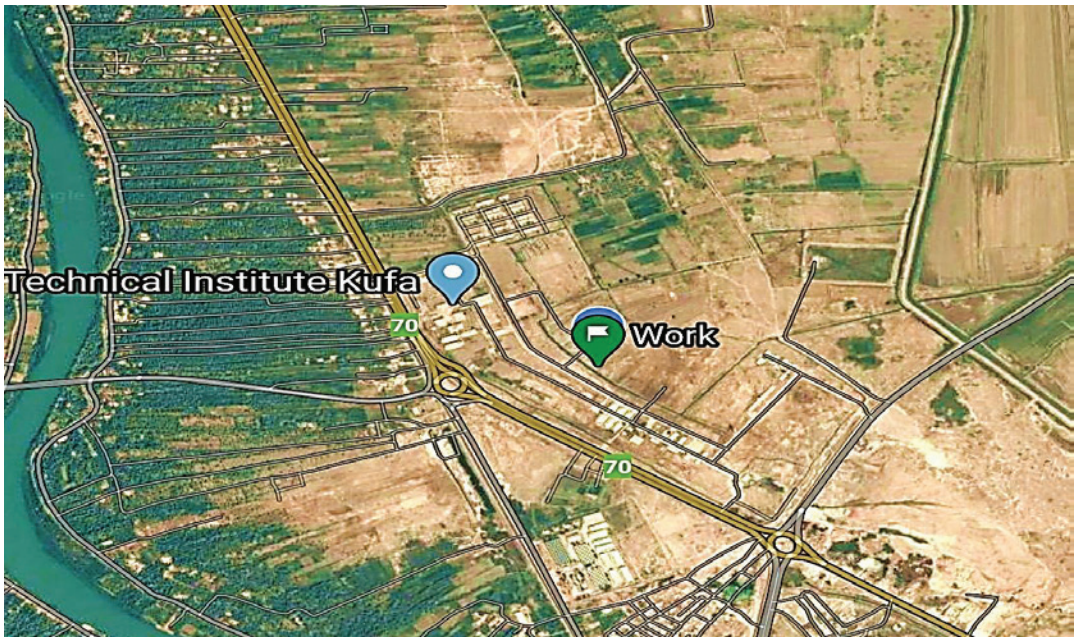

Figure 3: Satellite picture captured for our project research

Discussion

The big influencer for the great ratios of bugs founding in the campus is the climate elements like humidity and temperature all results explained in figure 1; 2, and 3 .

Temperature:

Here the levels of temperature degrees affecting obviously the spreading of the mosquito, that in turn deciding their nesting and reproduction cycle. Factor of temperature playing a major role in the cycle of life for Culex through adjusting the periods of timesneeded for growthwithin the environment of their proper activity. As the temperature declines, the necessary days to grow and getting developmentswill be increases[6].Mosquito larva subjects to the same basis here, so it grows quickly at higher rates of temperatures. Mosquito developed at a range of temperature from 9-26-40°C as considered minimally, optimally and maximally subsequently.

· **Humidity:**

Culex spp. Lives to a greater degree within high humidity conditions. Also the activity of these bug elevated at the same cases of moisture. This is reflects its nocturnal feeding habits. Like temperature, the humidity will relates in indirectproportionto the life of this mosquito if it declined under 60%[8].

· **Rain:**

In campus, we are looking that bug breeding increases during and sfter the rainfall. That is accompanied with transmission of several bug-borne diseases.

Rain assist in the flushing process that's impact on mosquito breeding activities in the areas where they settled down. In some areas bugsfavorites breedingin fresh water not polluted spacesmade after the rainfall[7].

· Joining effects of several climatic variables:

In several conditions the combining of two or more of the climatic factors play a big role in the restriction of the nesting and breeding of the mosquitoes in the areas of research study depending on the insect ability to adapted biologically.

Other non-climatic variables like the type of bug, rural to urbanization, movement of people,the environmental evolutionary programs, migration, human accessibility to correlated pathogen carriers, … etc[9].

Sewer and puncture designation projects:

Lack of interest to the water discharge regulation programs, like ponds, channels of irrigation, dams and others, wereelevated the occurrence of bugs in some areas that are located near such research projects.

The development of agricultural sides represented by developing of irrigation facilitates the nesting and breeding positions for Culex with all its bad outcomes[9]. For example, the irrigation apply to flood such lands during rice season has long been accompained with an elevation in the number of bugs and an obvious increase in the amounts of bugssites and nests. This style of irrigation during rice agriculture and farming was come to be more common in the lands of Iraq.

· **Urbanization models:**

The occurrence of Culexspp. is obviously elevated in rural areas than in urban areas for many aspects. In spite of there are many spaces for mosquitoes breeding in rural regions, those activityspots being limited in the urban spaces due to more houses built there[10].

· **Population migration, travelling and movement:**

The travelling and movements of peoples have an obvious effects on the bug's related diseases transmission. Seasonal workers and laborers movements during agriculture and harvesting make a big assists for completing the life cycle of those insects. These workerswere employed in agricultural areas as daily servants for cropping the rice fields during the seasons of planting and followed by harvesting activity. This areas mostly being worse when accompanied with poorness and bad health care programs[11].

· **Human activity influences:**

The bad control policy of human and government hand in hand affecting the Culex spreading and malaria transmission and its ability to evolute their living manners. So many bad habits correlated with puddling the sewage and rubbishes designation will make the mosquitoes have a brilliant chance tonesting and breeding in these nasty places.Culex spp. Living and surviving in this region being highly endemic make many of the people lives there at risk due to exposing for the diseases borne insects[12].

The weak and slow policy of prevention and control measures were playing a big role in the spreading, breeding and nesting the Culex spp. In the campus area[13]. As a result of bad-term ruling out nesting and spreading of bugs, a local population can lose their nerves and immunity to many noises and diseases carried by these insects[14]. The good policies built on many beliefs including the development of an environment empty of diseases and the human will being one of their priorities. This is demands a lot of efforts to puts a strategies for prevention and control many bad habits and pathogens. Culex spp. Prevention and control considered one of these strategies which is lost in most of our areas and regions.

The conclusion of our study found that campus area occupied by most abundant Culex spp. Bugs that nesting and breeding efficiently due to many conditions like site of the campus, agricultural areas, sewage aggregation and loss of controlling policy.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

Funding: Self-funding

References

1- J M Dickinson, Marc J. Klowden. Reduced Transfer of Male Accessory Gland Proteins and Monandry in Female Aedes aegypti Mosquitoes. Journal of Vector Ecology,2012; 22(1):95-8.

2- Lawrence Hribar. Relative abundance of mosquito species (Diptera: Culicidae) on Big Pine Key, Florida, U.S.A.Journal of Vector Ecology, 2006; 30(2):322-7 .

3- Cheikh Talla,Yamar Ba and Moussa Diallo. Temporal Distribution and Spatial Pattern of Abundance of the Rift Valley Fever and West Nile Fever Vectors in Barkedji, Senegal. Diawo Diallo. Journal of Vector Ecology , 2011;36(2):426-36 · .

4- Jayne M Deichmeister and Aparna Telang. Abundance of West Nile Virus Mosquito Vectors in Relation to Climate and Landscape Variables. Journal of Vector Ecology, 2011; 36(1):75-85 .

5- T.T.H. Nguyen, Tianyun Su and M S Mulla. Bacteria and Mosquito Abundance in Microcosms Enriched with Organic Matter and Treated with a Bacillus thuringiensis subsp. israelensis Formulation. Journal of Vector Ecology, 2000;24(2):191-201 ·

6- Stjepan Krcmar. Seasonal abundance of horse flies (Diptera: Tabanidae) from two locations in eastern Croatia. Journal of Vector Ecology,2007; 30(2):316-21 · .

7- WJ Crans. A classification system for mosquito life cycles: life cycle types for mosquitoes of the northeastern United States. Journal of Vector Ecolog, 2006; 11(10):93 .

8- Leonardo Martín Díaz Nieto, Arnaldo Maciá, Gustavo Parisi, Corina M Berón.Distribution of Mosquitoes in the South East of Argentina and First Report on the Analysis Based on 18S rDNA and COI Sequences. PLoS ONE, 2013; 8(9):e75516 · .

9- Marilyn O'Hara Ruiz, Surendra Karki, Tavis Anderson and Uriel Kitron.Effect of Trapping Methods, Weather, and Landscape on Estimates of the Culex Vector Mosquito Abundance. Environmental Health Insights , 2016;10(10):93 · .

10- Christopher BinckleyThomas. Effects of biopesticides on oviposition site selection in invasive and native mosquitoes in southeastern Pennsylvania.Journal of the Pennsylvania Academy of Science, 2017; 91(2):73 · .

11- Allison M Gardner, Gabriel L Hamer, Alicia M Hines and Marilyn O'Hara Ruiz. Weather Variability Affects Abundance of Larval Culex (Diptera: Culicidae) in Storm Water Catch Basins in Suburban Chicago. Journal of Medical Entomology, 2012; 49(2):270-6 · .

12- Leisnham PT, LaDeau SL, Juliano SA. Spatial and temporal habitat segregation of mosquitoes in urban Florida. PLoS One 2014;9(4):91655-91655 .

13- Makiabadi B, Zakarianezhad M Investigation of Adsorption of the Nitrosamine Molecule as a Carcinogen Agent on the AlN Nanotubes: A DFT Study. Chemical Methodologies , (2020) ;4(2): 191-202.

14- Salleh, S. F., Gunawan, M. F., Zulkarnain, M. F. B., & Halim, A. Modelling and Optimization of Biomass Supply Chain for Bioenergy Production. Journal of Environmental Treatment Techniques, (2019); 7(4),689-695.