MOSQUITO LARVAE ASSOCIATED WITH THE WATER LETTUCE "PISTIA STRATIOTES" IN A LAGOON OF THE MAGDALENA RIVER, BARRANQUILLA, COLOMBIA

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Introduction

Pistia stratiotes

Invasive macrophyte

Tropical wetlands

Excessive grow
High level of competence
Wide rage tolerance environmental
Easy dispersion in wetlands

https://deportescineyotros.wordpress.com

Ecological impacts

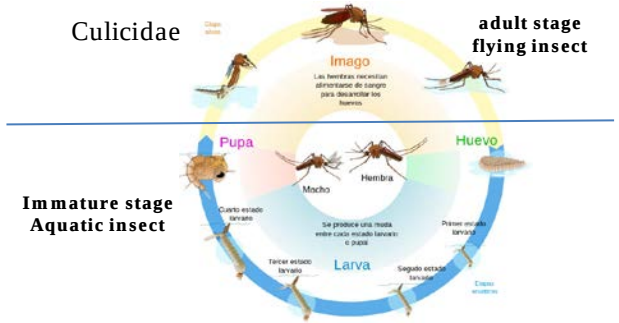
Ecological impacts

https://www.cortolima.gov.co

Native flora reduction
Increase in the levels of organic matter
Phytoplankton reduction
Increase in mosquito production

Breeding areas
Breeding and feeding sites for larvae
Shelter before predators

Culicidae

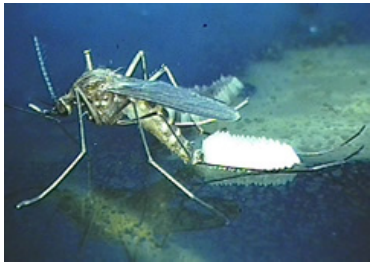


adult stage
flying insect

Immature stage
Aquatic insect

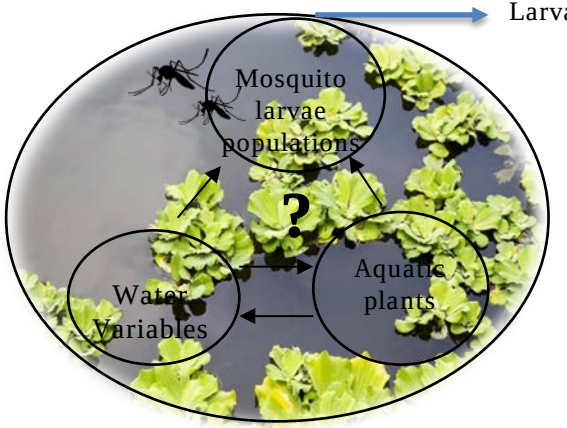
- Organic material
- Nutrients

(Duguma et al., 2013)



Ghosh et al., 2006
Duguma y Walton, 2014
Torretta et al., 2015

Santo Tomás Swamp



Larval habitats

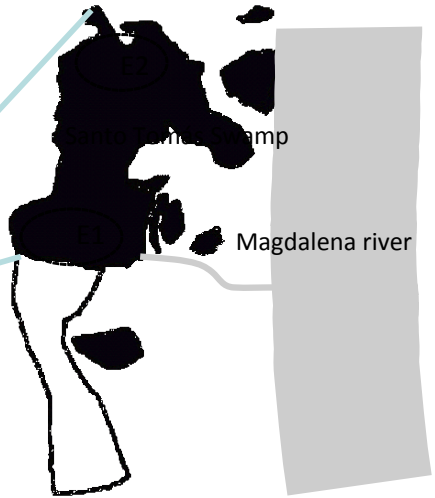
Origin in vector transmission

Methodology

Study area

Santo Tomás Swamp, Atlántico, Colombia

- located between 10 ° 75’78 ’N and 74 ° 74’44 W on the eastern margin of the Atlantic department
- 180 Ha, aproximatelly, 1.5 m depth
- 26-30 ° C
- 1000-1200 mm annual precipitation



Sampling design

Two Stations (E1 and E2)

8 sampling sites
6 sampling campaign (May 2017 - April 2018)
3 data matrices

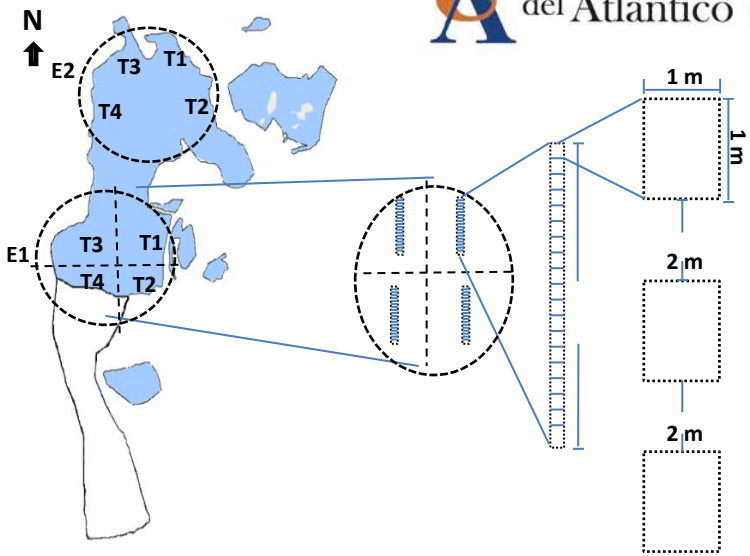
Water Variables

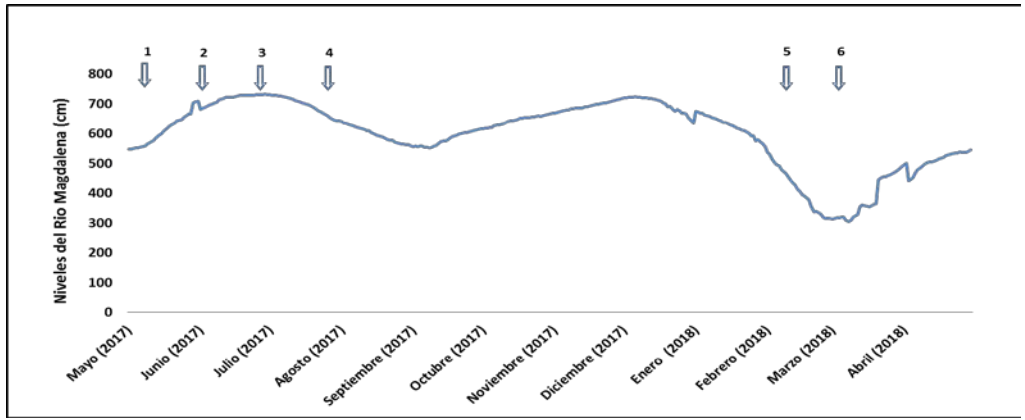
In situ: Dissolved oxygen, pH, Temperature
Electric conductivity, Oxide Potential Reduction
Depth and visibility
Ex situ: Ammonium, Nitrate and Orthophosphates
Coliforms (total and fecal)

Aquatic macrophytes (*Pistia stratiotes* L.)

Vegetable cover
Composition

Culicidae
Composition
Abundance





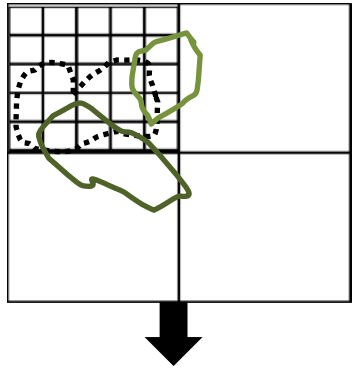
Water levels of the Magdalena River at the Calamar Hydrological Station
www.ideam.gov.co

Data collection

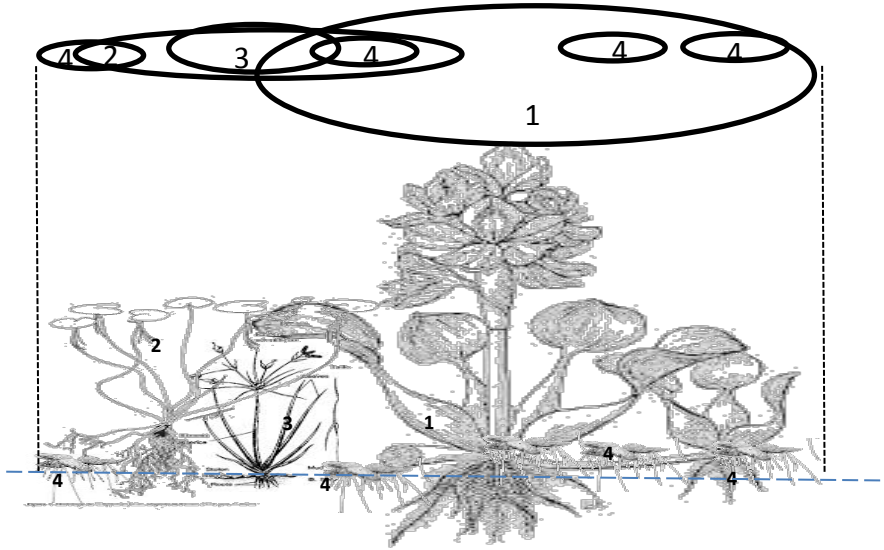
Macrophytes

Grid method, 1 m², 10 times per site
Plant cover
Plant composition

Universidad del Atlántico Herbarium → Gerhard y Beck, 1990
García *et al.*, 2009
Posada y López, 2011
Byng, 2014



1. Data register
2. Photography
3. Sampling



Data collection

Culicidae larvae

"Dipping" and dives ith plastic container (2L)

Plant roots washed NaCl 5%

Whirl-pak bags

Transfer to the Entomology laboratory at the Barranquilla Department of Health

Data analysis

- ANOVA for physicochemical and microbiological variables (sites and samples)
- Kruskal-walys for abundance of mosquitoes and macrophyte coverage (spatially)
- Friedman test for abundance of mosquitoes and macrophyte coverage (between samples)
- Spearman correlation tests (Water variables, macrophyte coverage and mosquito abundances)
- Canonical correspondence analysis (interrelation between matrix variables)

Past 3.0
Statgraphics centurión 17.0

Results and Discussion

Physicochemical and Microbiological Variables

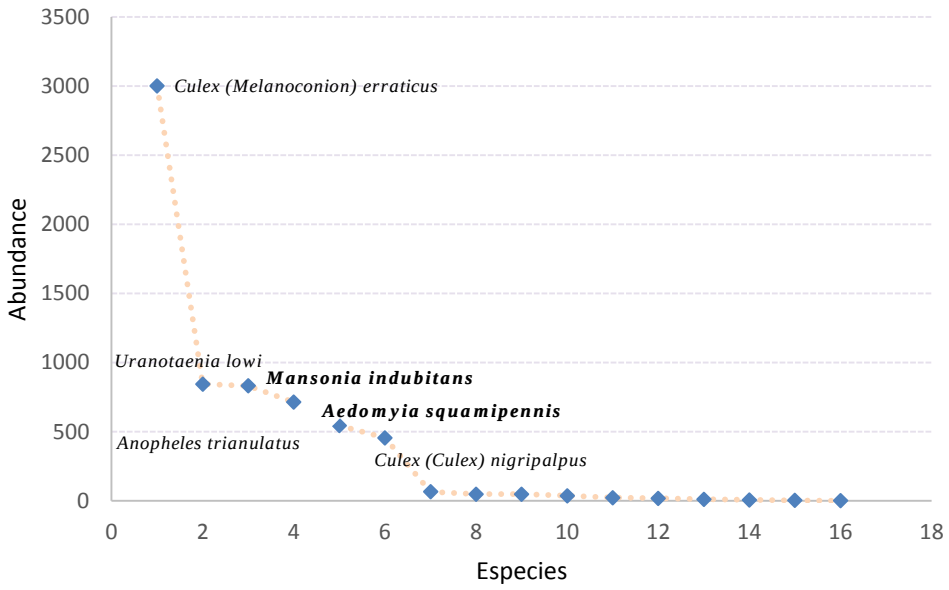
VARIABLES	M1 may2017	M2 jun 2017	M3 jul 21017	M4 aug 2017	M5 feb 2018	M6 apr 2018	Average	standard deviation
pH, Units	7,1	6,8	6,9	6,8	7,2	7,16	7,0	0,2
Conductivity, µS/cm	426,4	156,1	146,9	280,0	695,2	934,1	439,8	316,7
Dissolved Oxygen, mg/L	3,6	1,1	3,3	6,5	1,6	2,9	3,2	1,9
Redox potential, mV	3,0	16,6	-9,5	66,3	179,9	162,5	69,8	82,9
Temperature, °C	31,5	30,6	30,8	29,4	28,0	30,5	30,2	1,2
Transparency, cm	42,1	73,8	66,4	55,0	43,1	27,5	51,3	17,1
Depth, cm	69,6	147,0	140,0	124,4	68,7	46,8	99,4	42,7
DQO, mg/L	35,0	10,1	11,3	30,0	16,4	8,25	18,5	11,3
DBO5, mg/L	35,7	13,0	21,6	13,3	44,8	47,8	29,4	15,6
Ammonia, mg/L	0,8	0,1	0,1	0,1	0,18	0,18	0,3	0,3
Nitrates, mg/L	2,6	2,8	0,3	0,1	0,42	0,55	1,1	1,2
Phosphates, mg/L	1,1	3,6	0,5	0,4	0,37	0,51	1,1	1,2
Total coliforms ,(UFC/100 mL)x10^6	22	245	121	11	7,5	23,2	72	95
Fecal coliforms ,(UFC/100 mL)x10^6	0	2	1	0	0	1	1	1

ANOVA for sampling sites = $p > 0,99$
ANOVA between samples ($p=0,97$)

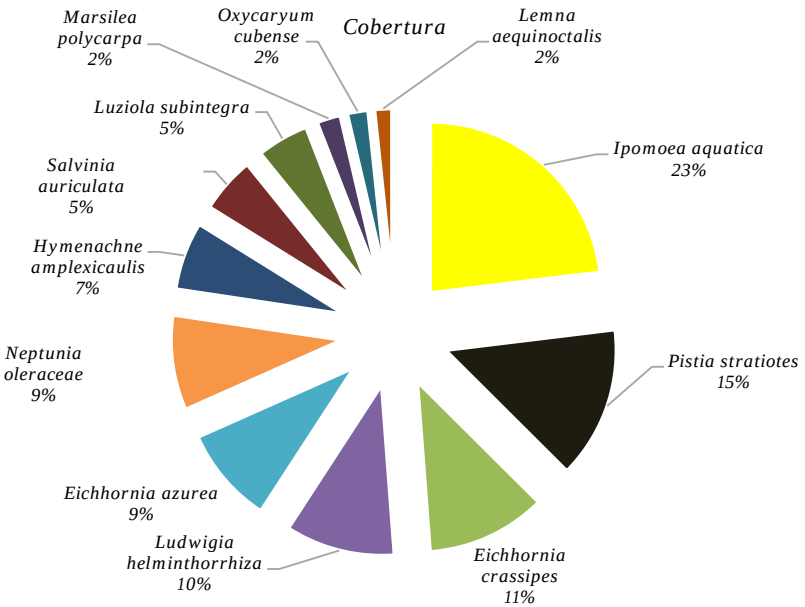
Results

Mosquitoes and Macrophytes composition y abundance

Subfamily	2
Genus	5
Species	16
Individuals	6654

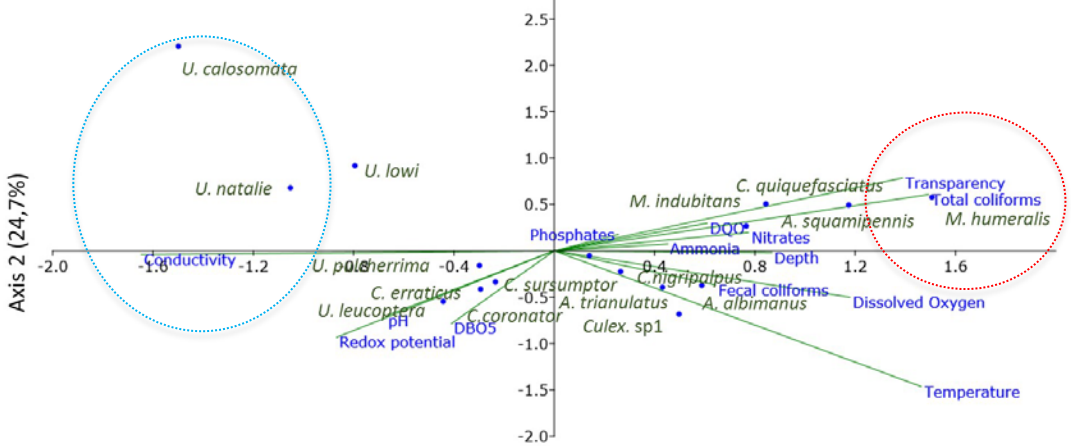


Familys	18
Genus	25
Species	27



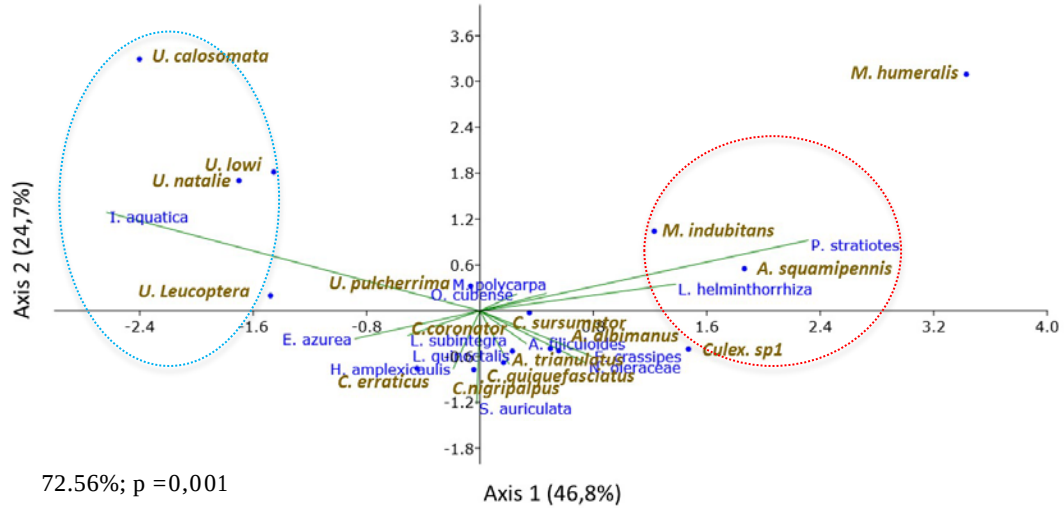
Eichhornia azurea

ACC. Physicochemical variables versus abundances of culicide larvae



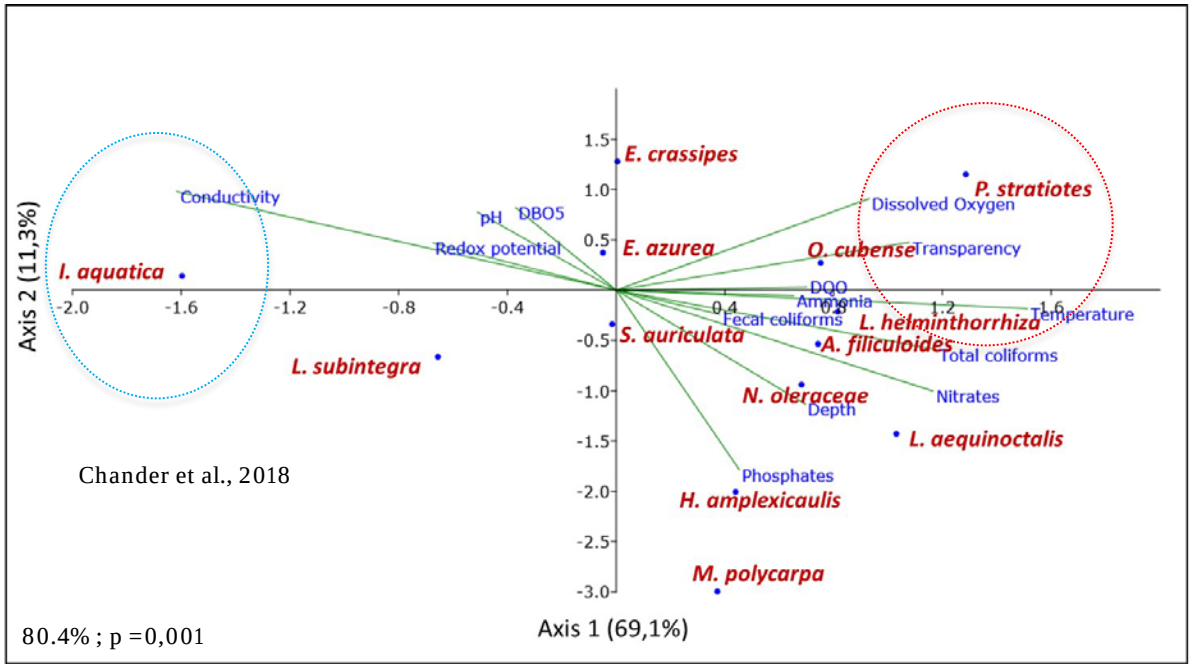
71.6% ; p = 0,003

ACC. Coverage versus abundance of Culicid larvae



72.56%; p =0,001

ACC. Physicochemical variables Vs coverage of aquatic macrophytes



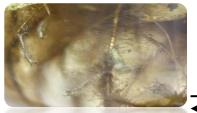
Chander et al., 2018

80.4% ; p =0,001

M. indubitans

R=0,46
P=0,001

(Muleri et al., 2005)
R=0,65
P=0,0001



Transparencia

R=0,45
P=0,003

P. stratiotes

(Tran y Hisashi, 2012)

Conclusions

- Aquatic macrophytes composition (invasive and non-invasive) included *P. statriotes*, was represented by species with heterogeneous coverage in space and time. *P. striatotes* was associated with transparence water principally.

- Santo Tomas lagoon presented larval habitats for Culícidos populations development in tropical lowland regions. Important mosquitoes involved in malaria and filiariasis transmission were present, such as *Anopheles* and *Mansonia*, respectively.

- Positive association between cover plants (P. striatotes) and *Ma. Indubitans*, *Aed. squamipennis*, and *U. lowi* shows the biological importance of macrophytes in the mosquitoes larval habitat. The plants may create a positive or negative influence on water quality and Culicidae species.

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