OVITRAP DEPLOYMENT IN BETTER- HOPE, EAST COAST DEMERARA

MINISTRY OF HEALTH

MEDICAL ENTOMOLOGY UNIT

Medical Entomology unit
Vector Control Services
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Date of Submission:

OVITRAP DEPLOYMENT IN BETTER- HOPE, EAST COAST DEMERARA	
Introduction	The risk of contracting vector-borne disease has increased over the years, owing to a plethora of variables including poor vector management practices among inhabitants and a lack of public knowledge. Insecticide resistance, on the other hand, is becoming more of a hazard in many vector-borne diseases (Hemingway &Ranson, 2000). As efforts to control vector-borne diseases have intensified, so has the emergence of resistance to insecticides. Despite the fact that Guyana has used pyrethroids and organophosphates as their primary vector control interventions for decades, the distribution of insecticide resistance has not been thoroughly investigated and documented. Furthermore, the use of synthetic organic insecticides in agriculture not only impacts the environment, but it also contributes to the emergence of resistance in a number of agricultural and medically important insect species. To combat insecticide-induced challenges, greater dosages and more frequent applications of insecticides have been required on occasions, primarily when control chemicals were employed indiscriminately (Becker et al., 2010). This jeopardizes public health measures because resistance influences behavioral changes and reduces insecticide sensitivity. As such, this prompts investigation to evaluate the effectiveness of Renerzyme, a biolarvide used to control Mosquito eggs and larvae, which has limited mobility and feeding mechanism. According to Souza et. al. (2019), mosquito larvae feed on dead organic matter. Therefore, food competition, such as the addition of renerzyme, a mixture of microbial inoculums infused with natural enzymes and bio-chemicals, inhibits egg hatchability and ultimately breeding.
Objectives	Main objective: To determine the effectiveness of renerzyme biolarvicide on control of mosquito population in Vryheid's Lust, Region 4
	Specific Objective 1. To conduct a pre and post evaluations using ovitraps to determine the effectiveness of renerzyme biolarvicide in Vryheid's Lust, Region 4
	2. To implement renerzyme biolarvicide in Vryheid's Lust, Region 4
Significance of study	Pre-evaluations are necessary to determine the density of mosquito in the area identified, Better-Hope, South. The results will be used guide vector control interventions and further boost awareness activity in the village.

Methodology	Selection of area: Vryheid's Lust was selected based on the number of Dengue cases in the area. A block was located along with the houses for ovitrap placement (Refer to Map in APPENDIX). **Ovitrapping in Vryheid's Lust, Region 4- Pre-Evaluation for implementation of Renerzyme** Ovitraps were lined with germination paper and filled with ¾ container of yeast solution which acted as an attractant agent. Each trap was labeled accordingly and deployed approximately 200m- 400m apart. Ovitraps were monitored every 3-4 days, once the traps were reviewed paper strips containing eggs were folded with the eggs facing inward and placed into labeled biohazard bags.The samples were safely transported to the lab in Styrofoam cooler, where the drying process occurred. The eggs were air dried for 24hrs and the number of eggs collected per trap was record on a log sheet. **Application of Renerzyme in Vryheid's Lust, Region 4** Renerzyme was sprayed according to manufacturer's guidelines, as follows below: 1St month (September): Twice per week 2nd Month (October): Once per month 3rd Month (November): Once per month **Ovitrapping in Vryheid's Lust, Region 4- Post-Evaluation for implementation of Renerzyme** Procedures for ovitrapping were redone for the post evaluations.
Materials use:	Black containers Germination paper Markers Pencils Pens Biohazard bags Labels/plain sheet paper Paper tape Paper clips Yeast Water Stereo microscope Clipboard Gloves Manual/digital counter Air tight containers

Results and analysis

25th May, 2021- PRE-EVALUATIONS

Trap Number	Number of viable eggs	Number of null/ damaged eggs	Total Number of eggs
Trap 1	124	41	165
Trap 2	14	51	65
Trap 3	48	21	69
Trap 4	74	13	87
Trap 5	378	94	472
Trap 6	61	14	75
Trap 7	21	7	28
Trap 8	21	0	21
Trap 9	54	7	61
Trap 10	39	11	50
Trap 11	34	9	43
Trap 12	24	64	88
TOTAL Eggs			**1224**

- **Average egg per trap**
  Total eggs/ Number of positive traps
  1224/12 = 102 Eggs

- **Percentage of positive traps**
  (Positive traps/ Reviewed traps) *100
  12/12* 100 = 100%

- *Refer to appendix for Graphical Representation of data*

NOVEMBER- POST EVALUATIONS

Trap Number	Number of viable eggs	Number of null/ damaged eggs	Total Number of eggs
Trap 1	559	29	588
Trap 2	110	2	112
Trap 3	62	40	102
Trap 4	20	5	25
Trap 5	0	3	3
Trap 6	117	95	212
Trap 7	150	87	237
Trap 8	179	81	246
Trap 9	56	12	68
Trap 10	68	27	95
Trap 11	46	22	68
Trap 12	259	55	315
TOTAL Eggs			**2071**

- **Average egg per trap**
  Total eggs/ Number of positive traps
  2071/12 = 172.6 Eggs

- **Percentage of positive traps**
  (Positive traps/ Reviewed traps) *100
  12/12* 100 = 100%

- *Refer to appendix for Graphical Representation of data*

Discussion

The control of Mosquito eggs and larvae is of significant importance in the reduction of vector borne diseases. Renerzyme biolarvicide was implemented in Vryheid's Lust, Region 4 over a six months' period from May to November, 2021. For this evaluation, mosquito eggs were isolated using ovitrap in a pre-evaluation and post-evaluation survey to monitor the effectiveness of the biolarvicide. Samples were obtained from locations near water bodies, soil and at the base of some plants where tree holes may accumulate water which serves as a breeding ground for mosquitoes (Smithsonian Science for Global Goals, 2018). Mosquito breeding sites were predominantly man-made habitats where modifications in the natural environment facilitated breeding grounds for mosquito eggs and aquatic stages. The distribution of the number of eggs for both Pre and Post-

	evaluation corresponded to 100% signifying that the distribution of *Aedes* mosquito is more associated with the presence of the vegetation in urban and rural areas (Hasnana et. al., 2016). Moreover, a total of 1224 mosquito eggs were obtained during the pre-evaluation survey, including both viable and null/damaged eggs. After the biolarvicide was applied to the breeding sites, a post-evaluation was conducted. A total of 2071 mosquito eggs were retrieved during this study, including both viable and null/damaged eggs. As such, the post evaluation recorded a difference of 847 eggs. Further, the effectiveness is ambiguous due to limiting factors such as unfavorable weather patterns, which prohibited the team from servicing the ovitraps on scheduled dates. According to Bovolo et. al (2009), Guyana records two rainy season from April to Mid- August and November to January. Hasnana et. al., (2016) stated that environmental factors, such as rainfall, temperature, and relative humidity plays a pivotal role in influencing population density of the Aedes mosquitoes. However, while these constraints had a significant impact on the study, there is evidently a need for more in-depth research with a larger study area to thoroughly assess the effectiveness of renerzyme. Additionally, Insecticide resistance testing should also be conducted to evaluate the efficacy of the existing vector management interventions (temephos, aquatain, fendona and malathion).
Conclusion	In concluding, this research obtained baseline data for future research, the findings will be utilized to manage the vector population and to prevent the emergence of vector-borne diseases along the coast of Guyana. Furthermore, considering the large number of mosquito eggs gathered in this study, it is essential to maximize surveillance and source reduction within the study area to prevent vector-borne disease from spreading along the coast. Moreover, sufficient public awareness campaigns should be implemented in the area to inform residents about mosquito breeding sites and the detrimental consequences of vector-borne diseases.
Recommendation	The following recommendation are needed to prevent outbreak in Better-Hope East Coast Demerara: 1. The implementation of vector control intervention in the community 2. Active surveillance to ensure the population is eradicating breeding sites. 3. Public awareness to a larger group in the study areas to educate the public about arboviral diseases and how we can reduce transmission. 4. To conduct the study in a larger study area.
Challenges and Limitation	The following were challenges and limitations from the study: 1. Limited research is done along the coastline area. 2. Limited baseline data is available. 3. Poor temperature during drying process - Limited temperature can result in the egg hatching into larval stage. As moisture remains on the paper, this is conducive for larval growth.

	-Excessive temperature (heat) can result cause the eggs to crack thus resulting in damaged eggs 4. Small sample size which is insufficient to give an overview of the entire community 5. Unfavorable weather patterns which hindered ovi collection 6. Lack of transportation
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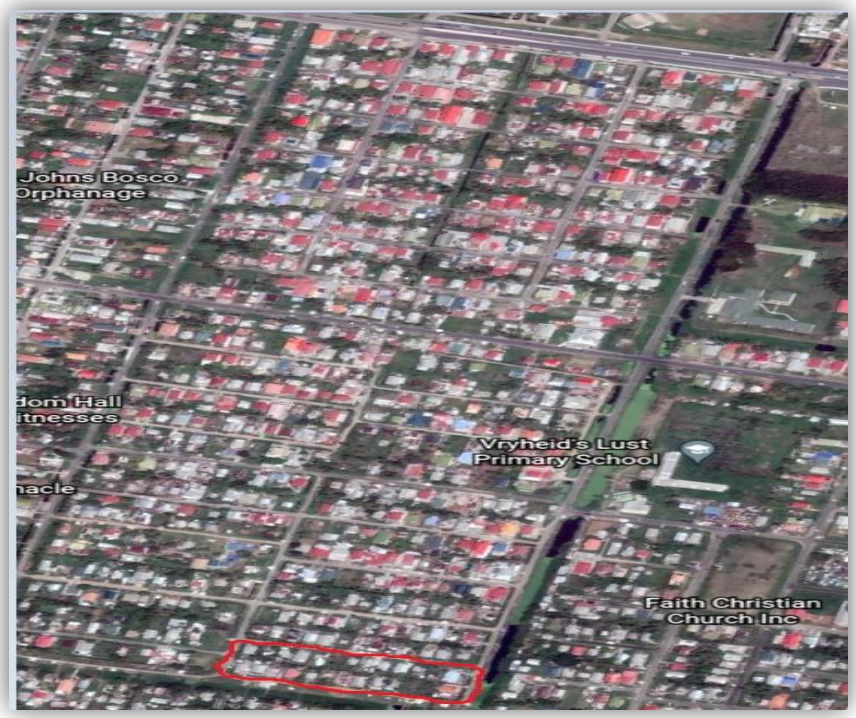
Reviewed by	Dr. Cassindra Alonzo-Ash
Submitted to	Dr. Horace Cox

Appendix

Figure 1: Showing study area in Vryheid's Lust, Region 4



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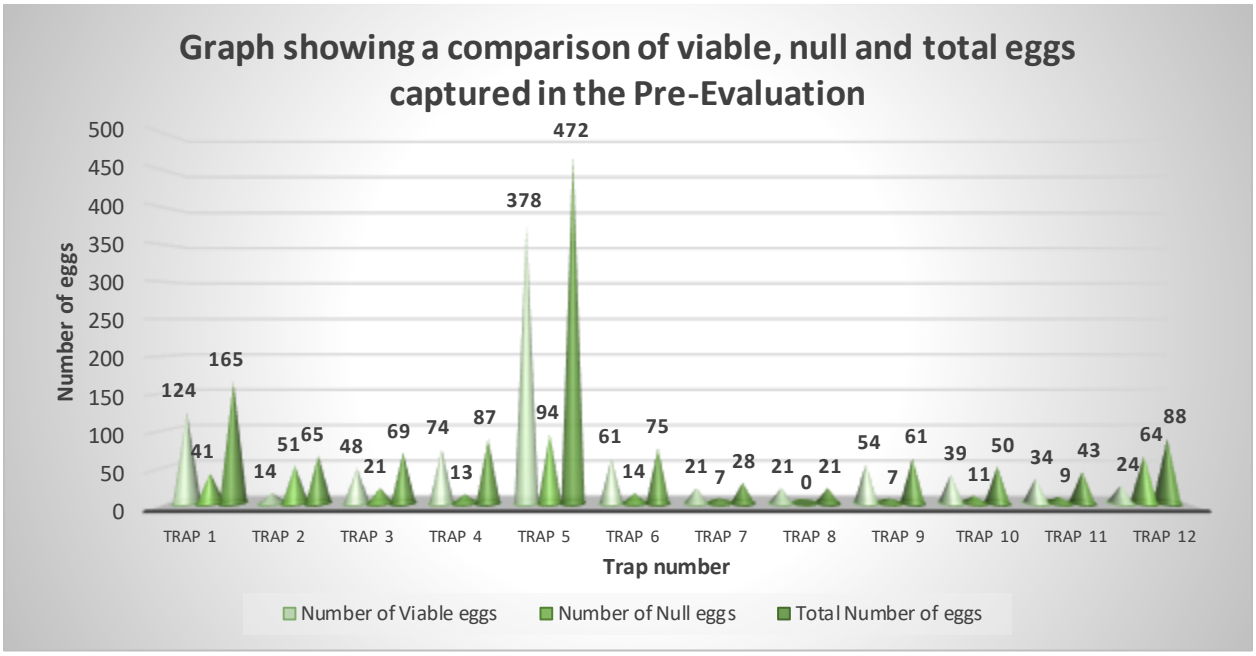

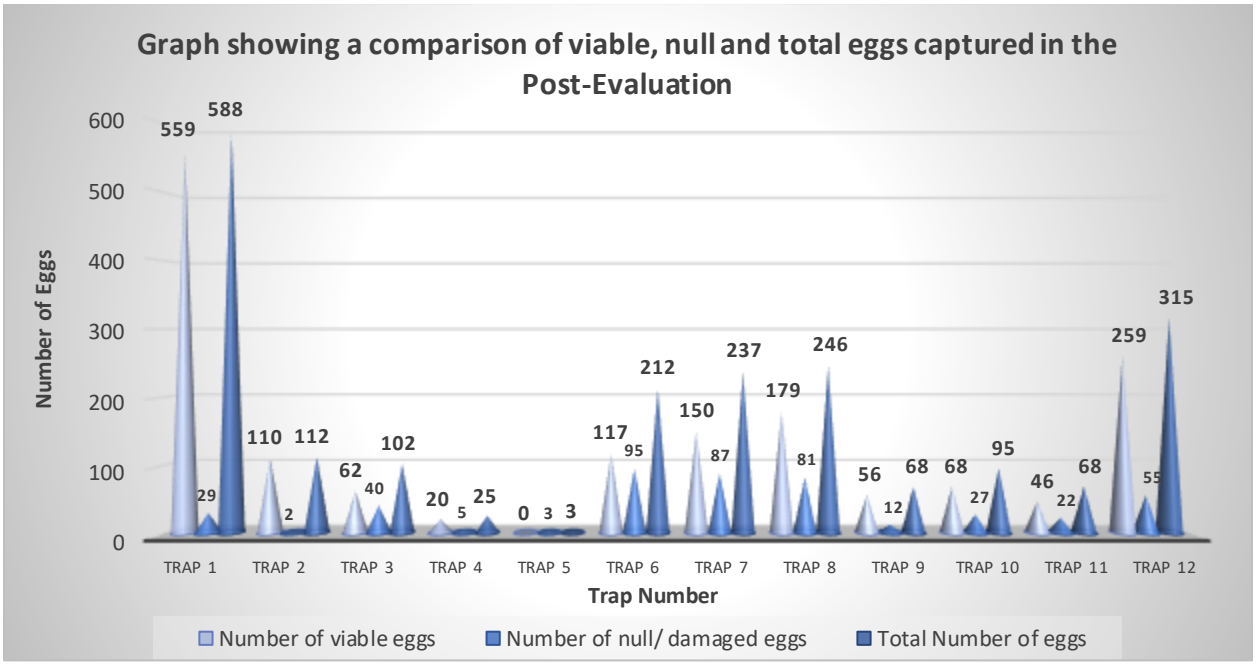

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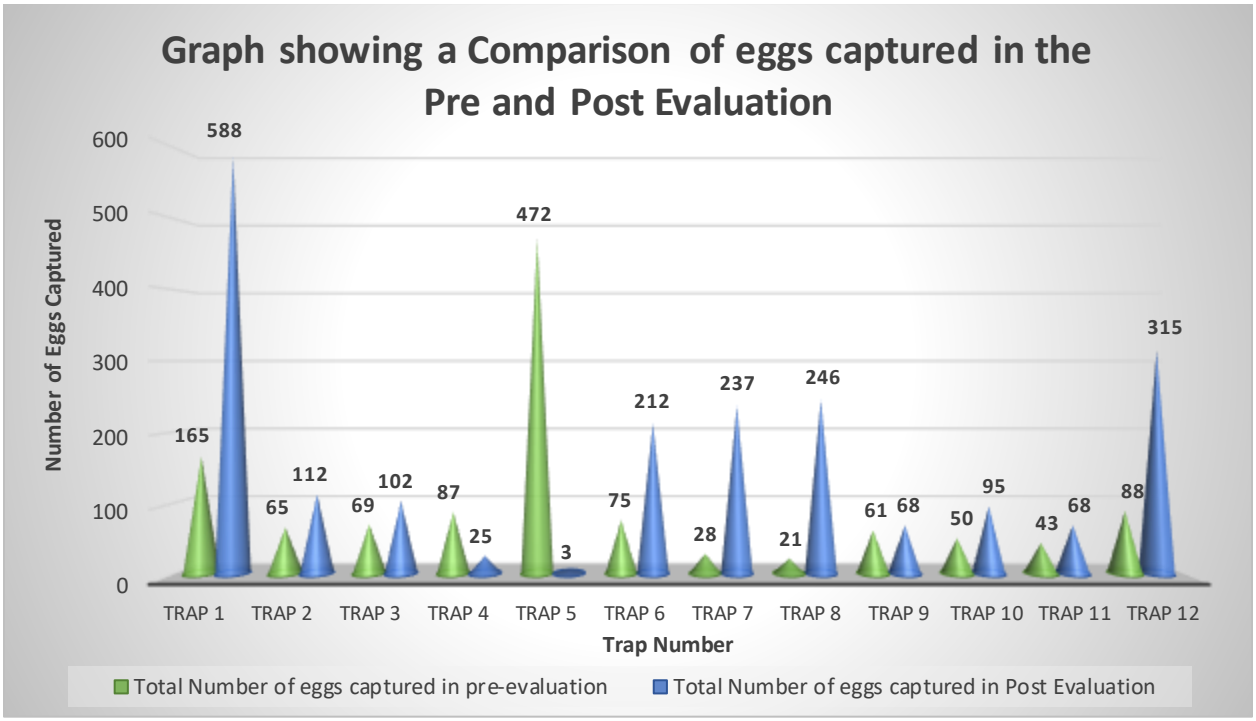

Image one showing the ovitrap after the first monitoring visit

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Image two showing the ovitrap placement