ASSESSING THE POTENTIAL OF AUTODISSEMINATION APPROACHFOR THE CONROL OF VECTOR MOSQUITOES

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INTRODUCTION

- Dengue is a mosquito-borne disease, widely spread all over the world. Primary vector of dengue is Aedes aegypti, while Ae. albopictus are secondary. Both species also transmit yellow fever, zika and chikungunya.

- Currently, there are no commercial vaccines and specific treatment for dengue infection. Dengue transmission is mainly controlled by prevention through vector control programme.

- Pyriproxyfen (PPF) is a juvenile hormone analogue (JHA) and effectively used in vector control programme. Moreover, no resistance has been reported in any mosquitoes. The novel strategy of using mosquitoes to deliver pyriproxyfen to other breeding sites has become more attractive nowadays.

OBJECTIVE

To assess the potential of autodissemination approach using pyriproxyfen which may transfer the insecticides to ovitrap by local mosquitoes,

METHODOLOGY

- Study was conducted in Dataran Automobil Shah Alam, Selangor, which consists of two months prior to PPF dissemination, six months of PPF dissemination and one-month post-PPF dissemination. Initially ovitrap were deployed for the trials (Unlu et al. 2017).

- The ovitrap and autodissemination device was observed at weekly intervals and all the larvae were identified to species levels.

- A larval bioassays was conducted to assess the impact of pyriproxyfen dissemination on the field according to WHO guidelines. All the water samples were tested with three different point of time-before-ongoing and after treatment

Local mosquito successfully transferred PPF to other sites

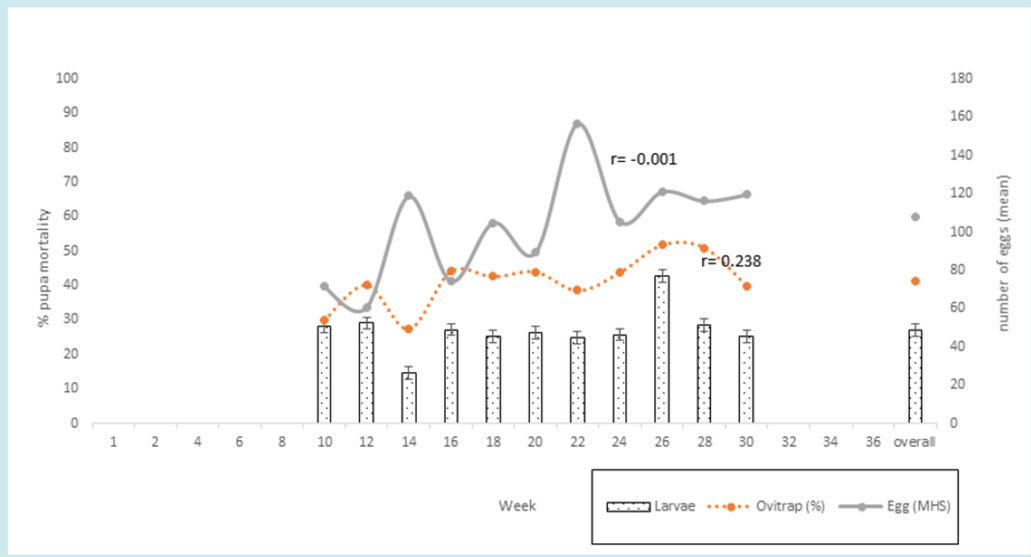

Figure 1. Larval mortality in WHO bioassays from the pre-treatment and relationship between ovitrap and eggs from autodissemination device.

Positive association between mosquito mortalities with number of eggs and positive cup of PPF (Figure 1)

Reduction of larvae population was observed in the early period of autodissemination deployment, with variation of other factors (Figure 2)

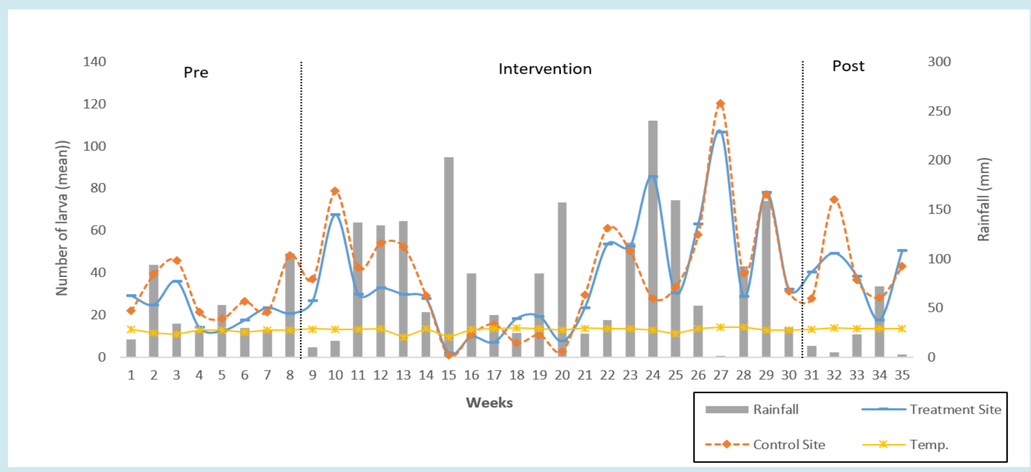

Figure 2. Mean number of larval Aedes sp., rainfall and temperature collected per week.

DISCUSSION

- This approach has shown promising potential in reducing Aedes sp. population and thus improving vector control management during outbreaks, particularly in urban settings.

- A significant impact on Aedes sp. larvae and egg populations from before and after treatment period. The fluctuated trends of ovitrap index, larval, and egg populations were observed at both treated and untreated sites.

- The trial is located in the middle of the city with a high range of mosquito populations. High frequencies of mosquitoes from adjacent and other areas may freely migrate to the treated areas. These mosquitoes may potentially replace the local mosquito population, thus laying their eggs inside the ovitrap as their first choice before they reach any autodissemination station.

CONCLUSION

This suggest that intervention based on autodissemination may affect depending on the site selections in reducing Aedes sp. population and inhibit the dengue transmission. However, further studies are needed to improve the efficacy, especially formula development, including mark-release-recapture (MRRR) trials to understand the dispersal and migration pattern.

Acknowledgement

We thank the Director General of Health Malaysia for his permission to publish this article. We thank One Team Networks Sdn Bhd, Malaysia, for providing the pyriproxyfen and Mosquito Home System used in this study. We also extend our gratitude to Ms. Siti Rahayu, and Ms. Hafizah for field sampling

References

Unlu, I., Suman, D.S., Wang, Y., Klinger, K., Faraji, A., Gaugler, R. 2017. Effectiveness of autodissemination station containing pyriproxyfen reducing immature Aedes albopictus populations. Parasites & Vectors, 10: 39. WHO. 2005.

Guidelines for laboratory and field evaluation of mosquito larvicides. WHO Communicable Disease Control Prevention and Eradication. WHO Pestidice Evaluation Scheme, Geneva. Switzerland.