Mathematical modelling for practical application of Sterile Insect Technique

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Vector control, like sterile insect technique (SIT), is essential to reduce the risk of vector-borne diseases [3]. SIT control generally consists of massive releases of sterile insects in the targeted area in order to reach elimination or to lower the pest population under a certain threshold.

The model presented here is minimalistic with respect to the number of parameters and variables. However, it yields the same qualitative behavior of the insect population with SIT control, as more complicated models like in [1, 2, 3]. More precisely, as in mentioned models, our minimalistic SIT model has two stable equilibria.

Practically, massive releases of sterile males are only possible for a short period of time. That is why, using the bistability property, we develop a new strategy to maintain the wild population under a certain threshold, for a sustainable low level of SIT control.

We illustrate our theoretical results with numerical simulations, in the case of SIT mosquito control.

References

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