On strategies to control vectors or pests by the sterile insect technique: some perspectives from mathematical modeling.

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All around the world, pests and diseases' vectors have become major issues in terms of Health and Food security. Since standard methods have showed serious limitations (resistance to adulticides, etc), new control tools have been developed or are under development. The Sterile Insect Technique is one of them. It consists of releasing sterile males, that have been sterilized either by irradiation (SIT) or using incompatible strains of Wolbachia (IIT). These sterile males will mate with wild females, driving the population either to elimination or under a certain threshold.

In this talk, we present new results based partly on recent works [1, 2]. We build and study a temporal model and its spatio-temporal counterpart, to propose and study different SIT/IIT control strategies. We discuss the results in terms of practical applications. The main application of our study is to highlight important parameters and to help in the design of new releases protocols and experiments.

References

[1] M. Strugarek, H. Bossin, Y. Dumont. On the use of the sterile insect technique to reduce or eliminate mosquito populations. Applied Math. Modelling 68: 443-470. 2019.

[2] P.A. Bliman, D. Cardona-Salgado, Y. Dumont, O. Vasilieva. Implementation of Control Strategies for Sterile Insect Techniques. 2018. Submitted. arXiv preprint arXiv:1812.01277

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