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Sterile Insect Technique (SIT) for crop protection: accounting for Residual Fertility (RF)

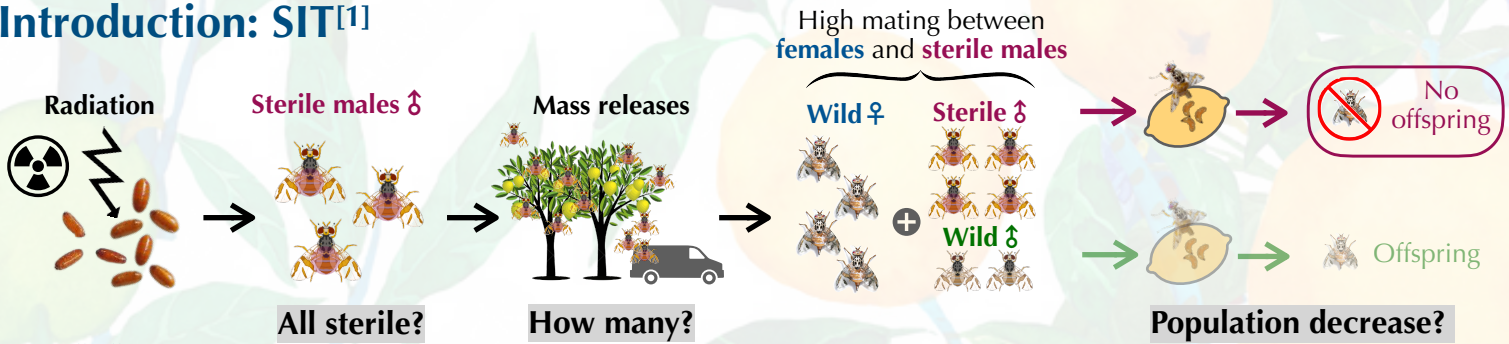
Marine Courtois¹, Kévan Rastello¹, Frédéric Grogard², Ludovic Mailleret^{1,2}, Suzanne Touzeau^{1,2}, Louise van Oudenhove¹



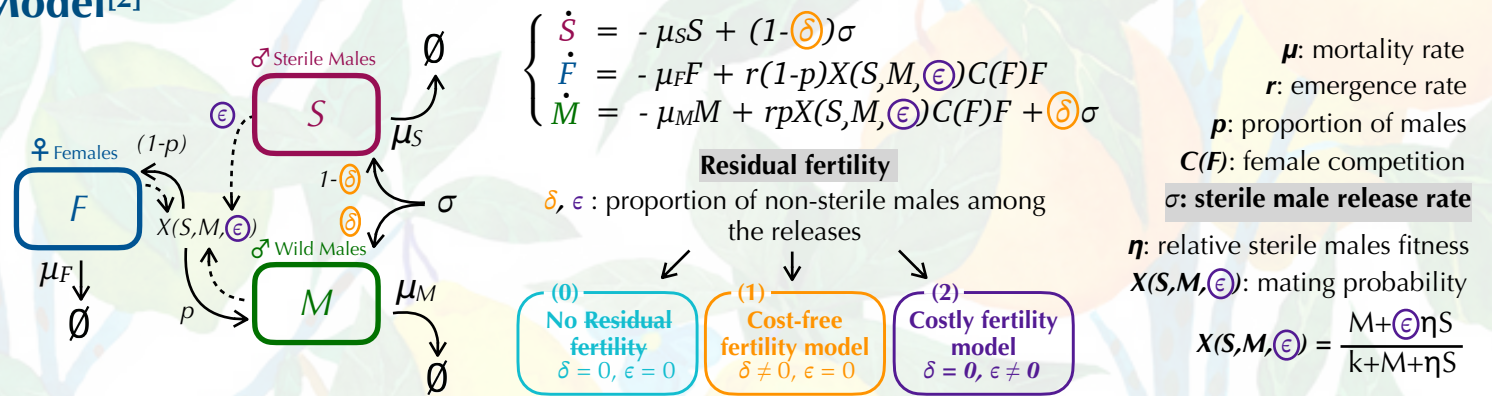
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Introduction: SIT^[1]

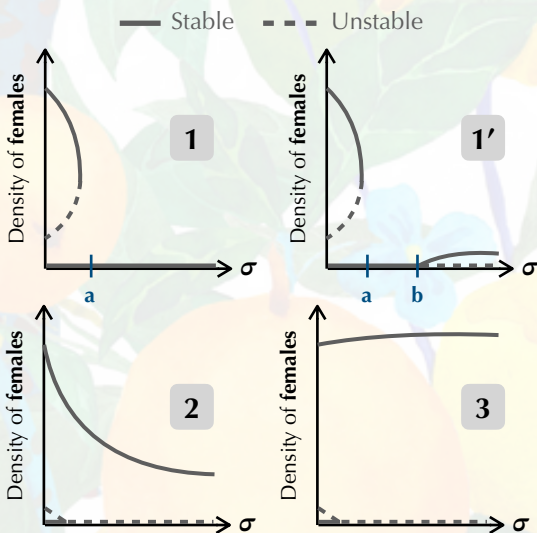


Model^[2]



Results - Discussion

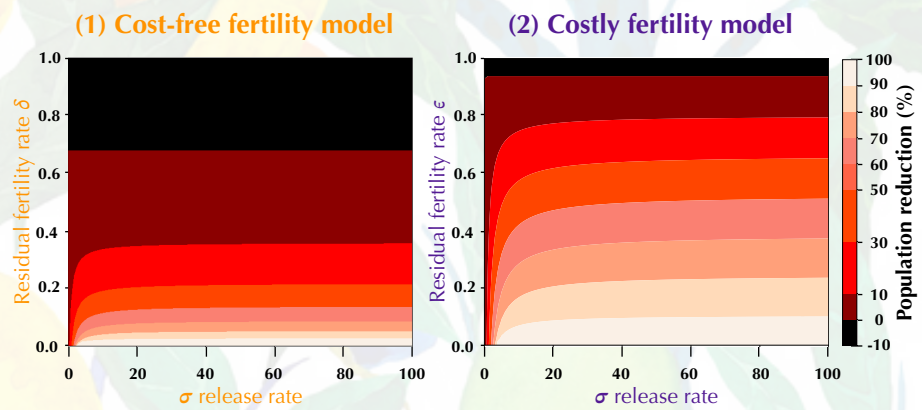
General shapes of σ bifurcation diagrams



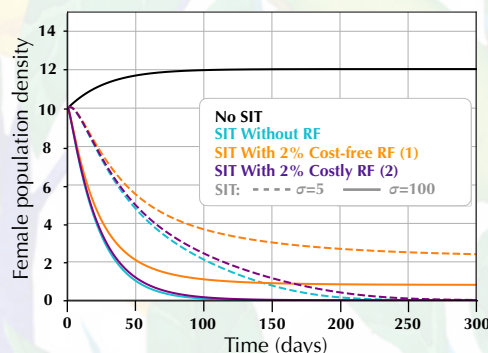
• Bifurcation diagram shapes as function of RF rate



Pest population control capacities at equilibrium



Temporal dynamics



- Strong impact of RF on SIT efficiency
- For costly RF, SIT is effective at higher release rates
- For SIT effectiveness with 2% of RF: releases of at least 500 sterile males per day per ha ($\sigma = 5$)

Conclusion

References

[1] V.A. Dyck, J. Hendrichs, A.S. Robinson, Sterile insect technique: principles and practice in area-wide integrated pest management, Springer, 2005.
 [2] M.S. Aronna and Y. Dumont, On Nonlinear Pest/Vector Control via the Sterile Insect Technique: Impact of Residual Fertility, Bull Math Biol, 82(110), 2020.