

1023-92-1788

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Generalized Trojan Gene Hypothesis.

A Trojan gene is a genetic variation that can lead to local extinction when it is artificially introduced into a population. This approach is especially useful to deal with invasive animal species, a growing problem which threatens agriculture and ecosystems worldwide. However, predicting the stocking rates of Trojan individuals, the feasibility of the strategy, and the time to extinction for a given species is not easy. It requires careful modeling using coupled systems of advection-diffusion-reaction PDE's and the use of parameters that are difficult to measure in practice. Mathematical modeling of an ecosystem following the introduction of Trojan individuals at a constant rate reveals that female population of the target species declines in number over time due to the production of a disproportionate number of males in subsequent generations, leading to an eventual local extinction. The generalization of this model allows designing strategies for eradication of disparate invasive species. (Received September 26, 2006)