Predators As A Possible Strategy For Controlling A Xylella Fastidiosa Epidemic - Part I

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"In Southern Italy there has been an ongoing Olive Quick Decline Syndrome (OQDS) outbreak, due to the bacterium Xylella fastidiosa, which has caused a dramatic impact from both socio-economic and environmental points of view.
Current agronomic practices are mainly based on uprooting the sick olive trees and their surrounding ones, with later installment of olive cultivars more
resistant to the bacterium infection. Unfortunately, both of these practices are having an undesirable impact on the environment and on the economy.

In recent papers Zelus renardii (Hemiptera, Reduviiidae) has been identfied as a predator of P. spumarius for a possible control of a Xylella epidemic.

Here, by generalizing previous models of ours, a spatially structured mathematical model has been proposed to include the predator Zelus renardii in the dynamics of a Xylella epidemic.

The fact that Z. renardii has been reported to be a generalist predator implies the choice of an Holling type III functional response of predation in the mathematical model. As a consequence, it has been shown that the introduction of Z. renardii as a predator of P. spumarius is not an efficient control strategy to eradicate a Xylella epidemic. Instead, a specialist predator or of a parasitoid, whenever identified, would lead to the eventual eradication of a Xylella epidemic; as a matter of fact, in this case the appropriate choice for the predation functional response would be an Holling type II.

In either cases it has been confirmed , as from our previous results, that a significant reduction of the weed biomass can lead to the eradication of the vector population, hence of a Xylella epidemic, independently of the presence of predators.

A relevant contribution of our approach consists of a suitable restriction of measures of intervention (control) only to a subregion of the whole habitat of interest (""Think globally, act locally"").

All of the above has been illustrated by a set of computational experiments, within a variety of different possible parameter scenarios."

Author: CAPASSO, Vincenzo

Presenter: CAPASSO, Vincenzo