A model for the biological control of an olive tree (*Olea europaea* L.) pest.

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ABSTRACT

The olive tree (*Olea europaea* L.) is among the oldest and most widespread crops in the Mediterranean basin, [2]. Portugal is one important olive producer country in particular in the Trás-os-Montes region, in the northeastern Portugal.

The olive moth, *Prays oleae* (Bernard) (Lepidoptera: Praydidae) is the most damaging pest in this region, [1]. Larvae of several generalist and specialist parasitoids attack the olive moth. The most abundant specialist parasitoid is *Ageniaspis fuscicollis* (Dalman) (Hymenoptera: Encyrtidae), [3]. In Trás-os-Montes region, the second most abundant parasitoid was *Elasmus flabellatus* (Fonscolombe) (Hymenoptera: Eulophidae) that behaves as a facultative hyperparasitoid, parasitizing some larvae of hymenopteran and larvae and pupae of lepidopteran species, [5].

Spiders are generalist predators with important predatory action in agroecosystems and ability to reduce the populations of various insect pests, [4].

We construct a mathematical model considering the population of the olive moth M, juvenile (larvae) P_i and adult populations A_i of the two parasitoids, $i = 1, 2$ and the spiders population S as the variables in our system. We assess the ecosystem steady states for feasibility and stability. In addition, we include also the possible pesticide effects, that represent essentially extra mortality rates for each one of the insect populations.

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