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Targeting the life cycle stages of the Diamond Back Moth (Plutella Xylostella) with three different parasitoid wasps

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Abstract : A continuous time model of the interaction between crop insect pests and naturally beneficial pest enemies is created using a set of simultaneous, non-linear, ordinary differential equations incorporating natural death rates based on the Weibull distribution. The crop pest is present in all its life-cycle stages of: egg, larva, pupa and adult. The beneficial insects, parasitoid wasps, may be present in either or all parasitized: eggs, larva and pupa. Population modelling is used to estimate the quantity of the natural pest enemies that should be introduced into the pest infested environment to suppress the pest population density to an economically acceptable level within a prescribed number of days. The results obtained illustrate the effect of different combinations of parasitoid wasps, using the Pascal distribution to estimate their success in parasitizing different pest developmental stages, to deliver pest control to a sustainable level. Effective control, within a prescribed number of days, is established by the deployment of two or all three species of wasps, which partially destroy pest: egg, larvae and pupae stages. The selected scenarios demonstrate effective sustainable control of the pest in less than thirty days.

Keywords : Biological control, Diamondback moth, Parasitoid wasps, Population modelling
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