عنوان مقاله:

Mathematical model on the transmission dynamics of varroosis in honeybee colony with treatment and biocontrol agent

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خلاصه مقاله:

Honeybee colony is invariably invaded by vectors which negatively affect their survival and reproduction. The compartmental model approach was adopted and partitioned honeybee population into three (۳), population of vectors into two (۲) and a single compartment for the population of biocontrol agent. The model is aimed at expending treatment and biocontrol agent as combined control strategy for curbing Varroosis in honeybee colony. Disease-free and infestation-free steady state was obtained and its global stability established. Also, the basic reproduction number R_0 of the model was computed. Furthermore, the numerical simulation performed indicated that, Varroa-mite infestation in honeybee colony has a greater negative impact; if control measure is not taken, honeybee colony extinction is certain. Hence, with the treatment using Thymol powder as a control strategy; the numerical results indicated a sharply decline in the population of honeybee infested by Varroa-mite. In the same vein, biocontrol mechanism was employed by introducing ۱,۵۰۰ biocontrol agents into the population of Varroa-mite in honeybee colony. With this effort, it swiftly triggered the mode of extinction of the Varroa-mite population within ۵-۶ months. As such, the findings indicated that, treatment and biocontrol strategies are the most efficient methods of curbing Varroosis in honeybee colony. Thus, it is recommended that higher initial value of biocontrol agents should be employed prudently to achieve the control of Varroosis via biological and treatment as combined control strategy.

کلمات کلیدی:

Biocontrol, Treatment, Varroosis, Global Stability and Steady State

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