Analysis, control of EFSB pest population using graph theoretic approach and pattern formation in the pest model

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Prevention of crops from pests has always been a serious cause of concern throughout the world. Eggplant crop is among the top crops in asian countries that are seriously damaged by the pests. Eggplant Fruit and Shoot Borer (EFSB), Leucinodes orbonalis, is the most damaging pest of eggplant. Larvae of the EFSB feed inside eggplant fruit, making the fruit unmarketable and unfit for human consumption.Trathala flavoorbitalis, a tiny wasp that is harmless to humans is the most notable parasitoid of the EFSB as it attacks the EFSB at its larval stage. Here, we have formulated a model of Eggplant fruit and shoot borer through biological control. The dynamical analysis of the system has been discussed which includes the boundedness, local stability of the steady state solution and the global stability analysis of non-trivial by graph theoretic approach by constructing a lyapunov function. In addition, the optimization of the biological control strategy has also been discussed using linear feedback control. The analysis of spatio-temporal model is also investigated to observe the evolution of diffusive patterns in a biological pest control model. Finally, the numerical simulation has been discussed to validate the analytical results obtained. Further, we have also obtained the global sensitivity analysis using the LHS method.