1145-37-2753   **Komi S Messan**, **Marisabel Rodriguez Messan***
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The role of Varroa on the honeybee population dynamics: a modeling approach and the effect of brood-mite interaction.

The rapid decline of honeybee population have sparked a great concern worldwide. Many field and theoretical studies have shown that the collapsing of colonies may be due to the infestation by the parasitic Varroa mite. This study investigates the population dynamics of honeybee colonies under infestation by Varroa mite. We propose a single patch brood-adult bee-mite interaction model in which the time lag from brood to adult bee is taken into account. Model parameters are estimated under constant and fluctuating seasonality. The analytical and numerical studies reveal the following: (a) Large mite mortality could drive the mite population extinct leaving the colony with healthy brood and adult bees; (b) Small brood's infestation rate could stabilize all populations at the unique interior equilibrium under constant seasonality while driving the mite population to die out when changes in seasonality is considered; (c) Large brood's infestation rate can destabilize the dynamics leading to extinction of all populations dependent on initial conditions under constant and non-constant seasonal model; (d) Sensitivity analysis indicate that the queen's egg-laying rate may have the greatest effect on colony's population size. (Received September 25, 2018)