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AN EVALUATION ON THE PERFORMANCE SUITABILITY AND ADAPTABILITY OF BEES IN PROTECTED AND NON-PROTECTED BEEHIVES AT OIL PALM SMALLHOLDERS

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ABSTRACT

Nowadays, the oil palm is the largest plantated crop in Malaysia, most noteworthy yielding oil crop, and positioning first on the world in oil production. However, there were some challenges in every action and situation for the plantation industry especially the pest attack in oil palm contribute to human and elephant conflict (HEC). Several outbreaks have been reported around Malaysia including Kampung Gol, Jerantut, Pahang and problem has never been solved even though there have been all the types of controls that been introduced. The main issue in human-elephants conflict was the crop-raiding of oil palm. Following this, the effectiveness of selected bee (*Apis cerana)* will be studied in Malaysia as the first attempt in mitigating or controlling wild elephant attacks in smallholder's oil palm plantation. The purpose of the study was to evaluate the population abundance of *Apis cerana* over a year sampling in the beehives, to quantify the best practice for a successful mass rearing of *Apis cerana* in the selected testing area, to determine the relationship between the population of *Apis cerana* in different method practice and climatic factors and to measure the relationship between *Apis cerana* in different method practice and its predator. This study was conducted on 10 beehives from April 2018 until March 2019 in Kampung Gol, Jerantut, Pahang. *Apis cerana* colonies were being labeled and the data collection was done by counting bees. Every single comb or brood of the beehives was photographed, insert to the computer, marked by the grid area (cm^2), and calculated by using empirical measures techniques. The bee population density per cm^2 was determined by counting the number of bees directly in square equaling one cm^2. The data bee's population were recorded and analyzed. However, protected beehive equipped with lathing mesh or net, bee excluder and water or grease oil as protection and non-protected beehive was origin beehive. The population of bees, *Apis cerana* was found significant different ($P<0.05$) in mean number of bees among of sampling periods. In addition, R-squared (R^2) showed overall the total populations of bees was (93.83%), non-protection method was (80.21%) and protection method was (99.10%) of A*pis cerana* which were influenced by the whole sampling period. Besides, in protection method (22443.8±353.84) have higher bee's population compared to the non-protection method (20045.7±338.03). Paired sample t-test revealed that there was significance different ($P<0.05$) in mean number of *Apis cerana* among both methods that implies protection method had high ability to protect bee's population and helped for increasing the *Apis cerana* population in research area. There was no significant relationship ($P>0.05$) between the population of *Apis cerana* with abiotic factor whether in both methods except rainfall in protection beehives *Apis cerana* prefered to stay outside the beehives that equipped with has a zinc roof. The findings also showed that *Apis cerana* had significant relationship ($P<0.05$) with the hornet, ants, lizard and wax moth in non-protection method but not significant relationship ($P>0.05$) in protection beehive. As a recommendation for future research, beekeepers must consider the ventilation of beehives by making more aeration hole at beehives box to fulfil increment of abundance of bee population. The beehive must be arranged with optimum distance and using protection methods such as double lathing mesh to inhibit natural enemies attacked. Lastly, place the beehives at the place that reduce light intensity and avoid from extreme weather to avoid bee's absond from their beehive and to be more successful of the mass rearing of *Apis cerana* in mitigating human and elephant conflict the researcher must transfer the wild of *Apis cerana* colonies straight to the bee-fencing prototype at the field.

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TABLE OF CONTENTS