

**King Saud University**  
**College of Food and Agriculture Sciences**  
**Department of Plant Protection**

**Evaluation of performance, queen quality, and some specifications of imported package bees.**

**Thesis Submitted**

**By**

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**Title of research:**

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**Abstract:**

This study was conducted in the apiary at education farm and in the Melittology Research Lab, College of Food and Agriculture Sciences - King Saud University - Riyadh - Saudi Arabia during March to December 2021. The main objective of the study was to evaluate and compare the activities of sealed brood area, solidness, honey area and pollen stored in colonies of the native honey bee, *Apis mellifera jemenitica* and the imported honey bee, *Apis mellifera*. The study also evaluated various specifications of imported bee packages (weight of packages, homogeneity of bees, infestation of Varroa and Nosema), and queens (queen weight, diameter and volume of spermatheca, and sperm viability) during the spring and summer season of 2021.

The native bees showed significantly ( $P \leq 0.05$ ) greater mean sealed brood area ( $192.6 \pm 92.66$  inches<sup>2</sup>/ colony), stored honey ( $344.4 \pm 196.21$  inches<sup>2</sup>/ colony) and stored pollen area ( $43.4 \pm 34.29$  inches<sup>2</sup> / colony) compared to those of imported honey bee ( $95.7 \pm 64.12$  inches/ colony,  $137.6 \pm 75.75$  inches<sup>2</sup>/ colony and  $24.0 \pm 37.43$  inches<sup>2</sup>/ colony, respectively). The native bee showed significantly better brood solidness ( $13.8 \pm 6.33\%$ ) than imported honey bee ( $28.51 \pm 17.85\%$ ). The native bees were significantly least infested with Varroa mite ( $0.73\%$ ) than imported bees ( $2.29\%$ ).

The evaluation of imported bee packages revealed the significant difference ( $P \leq 0.05$ ) between the weight of the imported bee packages during spring and summer seasons ( $922.01 \pm 13,66$  and  $1157 \pm 56,93$ g respectively). The percentage of dead bees in the imported bee packages was  $6.37\% \pm 1.57$  during the spring season. Whereas, no dead bees were recorded in imported bee packages during summer season. No significant differences were found in the mean length of the third ventral (Targa 3) in the imported honey bee worker during spring and summer season ( $2.418 \pm 0.009$ ,  $2.416 \pm 0.011$  mm, respectively). The

homogeneity of imported bee packages were non-significant during spring and summer season with values 69% and 73%, respectively. The percentage infestation of Varroa mites was significantly ( $P \leq 0.05$ ) higher in the imported bee packages during spring ( $1.02\% \pm 0.12$ ) compared to summer season ( $0.40\% \pm 0.04$ ). The percentage of Nosema infestation was very high ( $23.75\% \pm 1.63$ ) in the imported bee packages during spring season. Whereas, no Nosema infection were recorded during summer season in the imported bee packages.

The weight of queens accompanying the imported bee packages during the spring ( $0.1996 \pm 0.01$ g) and summer seasons ( $2001.0 \pm 0.005$  mg) showed no significant difference ( $P \geq 0.05$ ) between two seasons. The morphometric and anatomical characteristics of the queens accompanying the imported bee packages were measured. The data showed the general means of queen's head width ( $3.66 \pm 0.036$  mm), thorax width ( $4.44 \pm 0.07$ ) and thorax length ( $4.45 \pm 0.062$  mm). The mean diameter of the queen's spermatheca during the spring and summer seasons was  $1.12 \pm 0.045$  mm,  $1.12 \pm 0.028$  mm, respectively, and showed no significant difference between them ( $P \geq 0.05$ ). The volume of spermatheca of imported queens showed no significant difference ( $P \geq 0.05$ ) during two season (spring and summer) with values  $0.77 \pm 0.089$  mm<sup>3</sup>,  $0.74 \pm 0.056$  mm<sup>3</sup>, respectively. Likewise, the percentage viability of sperms stored in the spermatheca of queens revealed no significant differences ( $P \geq 0.05$ ) during spring ( $80.93\% \pm 3.67$ ) and summer season ( $78.96\% \pm 3.67$ ).