

DETERMINING TEMPORAL AND SPATIAL AVAILABILITY OF BEE FRAGES: GROUND INVENTORY, SUPPORTED WITH GIS AND COPUTER AIDED SATELLITE IMAGE PROCESSING

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Abstract

In arid zone regions, seasonal shortage of bee forage is very critical and beekeepers have to move their colonies from time to time in search of better forage to maintain and build their colonies and to produce honey. In Saudi Arabia, beekeepers commonly move their bees averagely five times/year. Careful determination of the spatial and temporal availability of bee forage species would guide beekeepers to move and manage their bees synchronizing with forage availability. To identify, characterize and map the spatial and temporal distribution of the bee forages of the area ground inventory work supported with geographical information system was conducted. Moreover, computer aided satellite image processing techniques were applied to determine the distribution and seasonal pattern of the bee forages. Along with, their blooming periods were monitored and their flowering calendar was prepared. For some major honey source bee forages, their nectar secretion dynamics and amount were estimated per flower and per tree. Accordingly, 159 bee forage species belonging to 49 plant families were identified as pollen and nectar sources and their flowering calendar was established. From these, *Ziziphus spina-christi*, *A. tortilis*, *A. ehernbergiana*, *A. asak*, *A. origina*, *Lavendula* species, *Blepharis ciliaris* were identified as major sources of pollen and nectar. The nectar source plants like *Ziziphus spina-christi*, *Acacia ehrenbergiana* and *Acacia tortilis*, estimated to secret 3.6, 0.791 and 0.336kg of nectar sugar/tree respectively. Based on the eco-climatological factors and their flowering periods variations, these major bee forages species were found to distribute temporally and spatially in to eight distinct categories. The computer aided satellite image segmentation process also confirmed the spatial and temporal distribution of the bee forage resource that have been determined through ground inventory work. Integrated approaches, following ground inventory work supported with, the application of geographical information system and satellite image processing techniques would be important to characterize and map the available bee forage resources for their efficient and sustainable utilization.