Anatomical and biological studies on the queens and drones of honeybee at incidence of varroa mites in colonies

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In general diseases and parasites of honey bee colonies are considered as one of the most important factors which affect the qualitative and quantitative characteristics of bee race in any region. Varroa infestation is generally considered lethal for European races of Apis mellifera (Ruffner 1983). Colony losses due to the mite normally take some 2-7 years after the first detection of the parasite (De Jong et al 1982; Martin 1997a), but once established Varroa has been responsible for 60% colony losses of commercial honeybee colonies and 95% losses of feral honeybee colonies. Honeybee colonies infested with different degrees of infestation results weaken of individuals (workers, drones and queens) which are unable to conduct their responsibility in or outside the colony, and this may be led to the death of such colonies or resulted a marked decrease in their production of brood rearing (larvae of workers, drones and queens), ripening honey, royal jelly, wax, venom, drones andqueens.Therefore the present work concerned mainly to studying effects of different levels of natural infestation by Varroa destructor on the reproductive organs and biological characters of queen bees and drones of Carniolian honeybees (Apis mellifera) during spring seasons. In addition, an experiment was carried out on pure Carniolian, F1 Carniolian and F1 Italian for determination of seasonal activity of drone and worker also an experiment was carried out on F I Caniolian for determination the seasonal changes in the mites population (Varroa destructor)Summary128in relation to the size of sealed brood area workers and drones in infested and non-infested honeybee colonies. This work was extended from 2004 to 2007 seasons.The points were considered as follow:1.The Carniolian hybrid race recorded the highest sealed drone brood area (39.5 inch2) followed by the pure Carniolian race (23.4 inch2) and the Italian hybrid race (7.6 inch2), respectively while, the Carniolian hybrid race produced the highest significant increase in the sealed workers brood area (788.0 inch2) followed by the races pure Carniolian and Italian hybrid (760.4 inch2 for each).2.Regardless honeybee races, the highest significant increase in the sealed drone brood area (91.3 inch2) and sealed workers brood area (1138.4 inch2) was produced on 8April while the lowest drone brood (0.2 inch2) and workers brood (473.4)area was produced on 24 Sep.3.Regarding the estimation dates, the Italian hybrid, Carniolian hybrid and pure Carniolian honeybee races produced the highest drone brood area on 21 April (32.7 inch2), 8April (218.7 inch2) and 25 June (133.3 inch2) while the highest workers brood area was produced on 8 April (1437.7 inch2), 8April (1302.7 inch) and 30 May (1180.7 inch2) for the three races, respectively.4.Infestation by Varroa mites on the adult honeybee workers and the sealed workers brood was gradually increased from Jan 2005 until Oct 2006. The Varroa infestation recorded 1.5 & 46.17% on the adult workers and 3.5 & 70.83% on the sealed workers brood on Nov129 Summary2005 and Oct 2006, respectively. High infestations were detected in the drone brood cells during January (84.67%), decreased gradually to reach the lowest level during May (47.33%) then increased gradually recording 68.33% (June), 71.0% (July) and 83% (August).5. The mite load was relatively low in worker brood cells compared to drone brood. It was slightly increased from July 2006 to Oct 2006 Generally, the sealed drone brood cells showed the highest average infestation (46.06%) followed by the sealed workers brood cells (25.63%) andthe adult workers (15.92%),

respectively.6. The lowest Varroa infestations were detected in Nov and Dec (1.5-2.67%) then, gradually increased to 4.5% (Jan), 6.33% (Feb), 6.17% (March), 11.5% (April), 17.5% (May), 22.33% (June) and 26.67% (July). The highest mite infestations were recorded during Sep (37.5%) and Oct (46.17%). Similar trend was observed concerningpopulation dynamic of the Varroa mites.7. The sealed worker and drone brood area was relatively low in colonies infested with Varroa mite comparing with, healthy, colonies treated with essential oils. The infested colonies recorded 314.78 and 11.63 inch2 meanwhile essential oils treated colonies recorded 584.74 and 20.17 inch2 for the sealed workers and drones brood areas, respectively. Average reduction due to Varroa mites recorded 46.17 and 42.34% for the sealed workers and drones brood areas, respectively. Reduction % in the sealed brood area was greatly varied according to type ofSummary130the sealed brood and the estimation date. It was ranged between 27.71 to 60.0% for sealed workers brood area and 30.8 to 100% for the sealed drone brood area. The highest reduction was recorded on 5 February 2006 for the sealed workers brood area (60.0%) and on 14 September 2006 for the sealed drones brood area (100.0%).8. Number of accepted grafted larvae (AGL), capped queen cells (CQC) and emerged virgin queens (EVQ) produced under conditions of different levels of infestation with Varroa mites was significantly decreased. According infestation level, percentage decrease in number was ranging between 26.19-66.89% for AGL; 30.73-73.58% for CQC and 34.28-81.42% for EVQ. Highly significant negative correlation was found between infestation with Varroa and number of AGL (-0.828), CQC (-0.864) and EVQ (-0.912).9.Under infestation by Varroa at 2-5%, 7-10% and >30%, respectively, the body weight of emerged virgin queens (EVQ) was decreased by 6.75, 10.26 and 20.16% copmaring to the control treatment. A highly significant negative correlation coefficient was found between infestation with Varroa and weight of the EVQ (-0.855).10.Mean length, width and volume of the ovary (two ovaries) and diameter and volume of spermathecae of the EVQ were significantly decreased as infestation level with Varroa increased. Length of ovary was decreased by 14.99, 29.88 and 33.67%; width was decreased by 12.85.