

## ABSTRACT

### **Behavior and management of domesticated and wild honeybees (*Apis* spp.) in Chitwan, Nepal. PhD Dissertation Submitted to IAAS, Rampur, Chitwan, Nepal. 240p.**

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Series of studies were carried out to investigate the behavior and management of honeybees, *Apis cerana* F., *A. mellifera* L. and *A. dorsata* F. in Chitwan, Nepal during 2003-2005. Twelve colonies of five-framed *A. cerana* F. with about equal brood, hive storage and colony strength were prepared in November 2004 and the colony development parameters recorded. One-third of the colonies absconded in summer and about one-sixth in rainy season, while non-absconded colonies also slowed comb building, brood rearing, colony strength and hive storage in summer and rainy seasons. Feeding sugar candy and pollen substitute prevented absconding in May and July. Three weeks feeding in May resulted higher comb building (15.0%), higher brood rearing (158.8%), stronger colony strength (15.0%) and higher hive storage (171.2% honey, 270.9% pollen) in June. Those colonies having higher brood mite (*Varroa jacobsoni* Oud.) in winter absconded earlier. Five-framed fifty *A. mellifera* colonies with daughter queen prepared in August 2003 and 25 of them fed with sugar syrup @ 166g sugar/day for 6 days with 4 days interval. Twelve percent of the colonies superseded in October-November, were separated and studied. They reared higher broods, stored more honey and pollen, built more combs and showed higher foraging rate in the post-superseding period in January. Sugar fed supersedure colonies gave significantly higher honey yield and net profit (19.20 kg and Rs 4711.32) followed by sugar-fed non-supersedure colonies (14.87 kg and Rs 3545.00) and non-fed supersedure colonies (9.20 kg and Rs 2640.0) and the least from non-fed non-supersedure colonies (5.87 kg and Rs 774.00 /colony/season), respectively. The primary immigration of *A. dorsata* small colonies occurred during November (591.8 cm<sup>2</sup>)-December (549.8 cm<sup>2</sup>) and secondary type mainly from site shifting of the large colonies towards north in January (2302.8 cm<sup>2</sup>)-February (1188.6 cm<sup>2</sup>) and through swarming in March (713.0 cm<sup>2</sup>)-April (225.0 cm<sup>2</sup>), respectively. Long distance migration started from April and almost all colonies disappeared by July. It preferred non-disturbed previous nesting sites, slightly changed comb alignment on tall water towers, *Bombax* trees and residential buildings. All the colonies performed rapid comb building during November-December and March-April and by the larger immigrants even during January-February and it completely stopped in May-June. The maximum comb size was up to 7200 cm<sup>2</sup> (60 x 120cm). Nesting period ranged from a week to eight months. Maximum colonies aggregated in March, emptying in October in 2003 and in July in 2004. Colonies immigration declined by 54%, 50% and 100% in May, June and July as compared to previous years. A general survey accomplished in 2004 revealed *A. mellifera* kept in Langstroth hive in terai and *A. cerana* in 3 different hives: 41.1% in improved, 31.2% in traditional log and 27.6% in wall hives in hills, for honey production purpose. The honey productivity in the hills was very low (8.1 kg/yr/hive) and marketed by home visits and it was higher (28.7 kg/yr/hive) in terai. More than half (58.6%) of the beekeepers in terai trained and adopted necessary management practices, and had assured services, honey market and well developed beekeeper's groups, cooperatives and association. However, there were several limitations: ecological problems (declining bee crops, deforestation, poisoning, parasitic and predatory pressure), behavioral problems (swarming), socio-economic limitation (lack of money), poor management (feeding/pasture, queen, pest) with these species and, absconding, robbing, low productivity and

stinging with *A. cerana* (hills) and excessive colony division, conflict on pasture, colony selection, queen management, bee clinic, honey market and transportation with *A. mellifera* (terai) were other associated problems. The status of *A. cerana* and *A. mellifera* colonies in September-October 2004 was very poor (brood 3.5:2.0 combs, honey 0.5:0.4 combs, combs covered 6.0:6.0, pollen storage trace to nil and the in-coming and out-going flight < 100 bees/5min./hive). Colonies of *A. cerana* (8.3%) were infested with *V. jacobsoni* and *A. mellifera* (55.2%) with *Tropilaelaps clareae* Delfinado and Baker. There existed more than 225 bee flora (hills 170 and terai 150), of which 179 nectars, 194 pollen and majority both sources but they were in shortage during the rainy and autumn seasons. Maize, *Zea mays* L.; buckwheat *Fagopyrum esculentum* Moench; mandarin orange, *Citrus reticulata* Balanco; mustard, *Brassica campestris* L.; sesame, *Sesamum orientale* L.; litchi, *Litchi chinensis* Sonner; Nizer, *Guizotia abyssinica* (L.) Cass.; sunflower, *Helianthus annuus* L. and cucurbits (bottle gourd, *Lagenaria siceraria* (Molina) Standl.; sponge gourd, *Luffa cylindrica* (L.) Roem.; bitter gourd, *Momordica charantia* L.) are the cultivated bee crops and mustard, *B. campestris*; gumpate, *Leucas lanata* Benth.; rudilo, *Pogostemon glaber* Benth.; litchi, *L. chinensis*; Chiuri, *Bassia butyracea* Roxb. and buckwheat, *F. esculentum* kept high potentiality for uni-floral honey production in Chitwan. Conservation of *A. dorsata*, program for the promotion of *A. cerana* and selection, propagation and commercialization of supersedure *A. mellifera* honeybees in Chitwan is suggested, for which a beekeeping policy/guideline should be developed and implemented.

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