

Evaluation and Selection of *Apis cerana* Populations for Brood-rearing Efficiency

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Introduction

The Asian honeybee, *Apis cerana*, is distributed throughout India. Owing to the vast physiographic diversity of the region different populations of *A. cerana* have evolved naturally. Although these geographic populations or ecotypes show morphological uniformity and can be crossed with each other, they often exhibit considerable variation with respect to biological and behavioural characteristics (Ruttner, 1987). These differences are important to the beekeeper because they relate to a variety of honeybee products and crop productivity. Correlations have been found in differences in brood cycles, amount of brood and brood-nest arrangement, swarming tendency and swarm emission, wax production, nectar storage and temperament (Ruttner, 1971).

Information available on brood-rearing by different populations of *A. cerana* is meagre. Earlier studies have been conducted in different agro-climatic regions but as such the figures available are variable (Bisht, 1966; Kapil, 1957; Saraf and Wali, 1972; Shah and Shah, 1981; Verma *et al.*, 1988). The present study was therefore

designed and conducted with populations of *A. cerana* from three different regions established at a common location so that other factors being similar, the brood-rearing efficiency of the populations could be compared.

Materials and Method

The study was conducted at the University's *A. cerana* research and demonstration apiary. This is located at 1,256 m and lies between 31°50' N, 76°59' E. Colonies of *A. cerana* were brought from an altitude of about 2,700 m in Himachal Pradesh, Kashmir and Garhwal. Ten colonies each from Himachal Pradesh and Kashmir and five from Garhwal were established at the apiary. They were brought to equivalent status with respect to bee strength, brood and stores. Each colony was queen-right and had a newly mated queen. Brood-rearing efficiency was studied in terms of area under brood (comprising eggs, larvae and sealed brood) and prolificacy of the queen. Observations were recorded at intervals of 21 days during spring, summer, autumn and winter.

Research work on oriental honeybee, *Apis cerana*, in Pakistan

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The earliest record of *Apis cerana* breeding in Langstroth hives in the Punjab dates back to 1882–84. Sketchy research done on *A. cerana* bee farming is available in the form of 47 abstracts in proceedings of science conferences. Few detailed papers were published until 1987. In 1988, Muzaffar produced a Ph.D. thesis on management of *A. cerana* in Pakistan so as to encourage farmers and other people to adapt improved rearing technology for honey production and pollination of crops. The comprehensive research work included studies on competition with other *Apis* spp., supplemental feeding before and after nectar flow and its impact on honey yield, queen production, swarm prevention, clustering of bees, comb formation on *A. dorsata* wax, yield of migrated (8.1–16.9 kg/colony) and non-migrated colonies (4.7–5.7 kg/colony), honey production potential of Swat strain (14.4 kg/colony) and Marghalla strain (10.9 kg/colony), honey yield of feral colonies (1–5 kg/colony), and incidence and control of pests and diseases. Some 379 additional nectar and pollen source were recorded, floral calendar of Marghalla area and low-cost transitional hives were prepared. The insect and plant sources of honeydew honey, effects of honeybee pollination on ten crops and fruit trees, comparative performance of *A. cerana* and *A. mellifera*, and honeybee pollination and pest management in *Brassica* spp. crops were also investigated.

Results and Discussion

Table 1 indicates the total area under brood for the three *A. cerana* populations. It was observed that all three populations had maximum area covered with brood during spring followed by autumn and then summer. Brood-rearing continued through winter at a low rate. Prolificacy of the queen fell from 256–588 during spring to 45–216 in winter.

Analysis of the data revealed that there was significant difference ($p < 0.05$) in the performance of Himachal Pradesh, Kashmir and Garhwal

bees. The Kashmir bee was the best performer followed by the Himachal Pradesh population. A similar trend has been suggested by the morphometric studies of Mattu and Verma (1984) and Singh and Verma (1993). The three ecotypes showed significant difference in size in the order northwest Himalayan > central Himalayan > northeast Himalayan (Singh and Verma, 1993). Verma *et al.* (1988) also recorded a similar pattern of brood-rearing and egg-laying by *A. cerana* queens in Himachal Pradesh. Shah and Shah (1981) however, reported very high brood area (9032 cm²) for the Kashmir bee. This difference can be attributed to the change in habitat and associated bee flora in the present study. Differential availability of nectar and pollen resources and climatic conditions have previously been reported to influence colony performance (Verma *et al.*, 1988).

References

- Bisht, D.S. 1966. *Studies on the behaviour of Apis indica F. under Delhi conditions with special reference to brood rearing and pollen gathering activities*. M. Sc. thesis: Indian Agr. Res. Inst. Delhi, India.
- Kapil, R.P. 1957. The length of life and brood rearing cycle of the Indian bee. *Bee Wld.* **38**: 258–263.
- Mattu, V.K. and Verma, L.R. 1984. Comparative morphometric studies on the Indian honeybee of the north-west Himalaya. *J. Apic. Res.* **23**: 117–122.
- Ruttner, F. 1971. *Morphological and biological characterization of economically interesting bee species and races*. 23rd Int'l Apic. Congress, Apimondia. Publ. House, Bucharest, Romania, pp. 383–386.
- Ruttner, F. 1987. *Biogeography and Taxonomy of Honeybee*. Berlin, Springer Verlag.
- Saraf, S.K. and Wali, J.L. 1972. Preliminary studies on the egg laying capacity of the queen bee of *Apis indica* F. Hill Strain in Kashmir. *Indian Bee.* **1** **34**: 27–31.
- Shah, F.A. and Shah, T.A. 1981. Egg laying capacity of Kashmir *Apis cerana*. *Bee Wld.* **62**: 114–115.
- Singh, M.P. and Verma, L.R. Morphometric comparison of three geographic populations of the north east Himalayan *Apis cerana*. In: *Asian Apiculture* (L. J. Connor, T. Rinderer, H.A. Sylvester & S. Wongsiri eds) Wicwas Press USA. pp. 67–73.
- Verma, L.R., Rana, B.S., and Mattu, V.K. 1988. Economic and biological characters of the Indian honeybee, *Apis cerana* Fabr. Effect of seasonal variations. *Indian Bee J.* **50**: 35–37.

Table 1. Comparative performance of *A. cerana* ecotypes

Season	Brood area (cm ²)			Queen prolificacy (egg-laying rate/day)		
	Himachal Pradesh	Kashmir	Garhwal	Himachal Pradesh	Kashmir	Garhwal
Spring	1820.25 (121.5)	2415.5 (199.27)	1507.55 (203.45)	409.65 (32.53)	515.45 (29.38)	302.25 (32.15)
Summer	1561.22 (132.59)	1718.27 (176.29)	1142.86 (159.25)	166.66 (22.58)	205.71 (19.57)	106.67 (21.43)
Autumn	1741.27 (222.35)	2276.54 (231.51)	1358.33 (171.65)	307.44 (23.58)	419.81 (29.85)	198.25 (28.25)
Winter	710.48 (79.25)	949.14 (54.27)	563.25 (74.82)	98.65 (27.53)	109.83 (32.43)	70.03 (15.27)
Average	1458.30 (191.50)	1839.90 (202.50)	1142.80 (179.20)	245.60 (33.20)	312.7 (38.60)	169.30 (22.70)

Note: Values in parentheses are standard deviations.