

## Effects of Modernised Wall Hives on Performance of *Apis cerana*

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Mountain communities in the Hindu Kush-Himalayan region have a rich tradition of having the Asian honeybee, *Apis cerana*, in indigenous structures known as wall hives (Kumar and Kumar, 1996; Verma *et al.*, 1999). Beekeeping in traditional wall hives has certain disadvantages and is adding to the problem of conserving the genetic diversity of *A. cerana* (Kumar, 1997). A bee colony in a wall hive cannot be inspected or managed. Also honey harvesting by cutting and squeezing the comb causes heavy bee mortality, loss of brood and comb, and the honey is unripe and unhygienic.

In order to exploit the full potential of this important natural resource efficiently and economically and to help in the conservation of the species, traditional practice was modified by incorporating scientific concepts to produce the modernised wall hive (Verma *et al.* 1999). Performance of *A. cerana* in traditional and modernised wall hives was monitored to test the success of the new technology.

### Material and Methods

Studies were carried out in the mid-hills of Himachal Pradesh at 1500 m. This area is

characterised as humid sub-temperate with stone and nut fruits, and off-season vegetable cultivation and seed production. *Plectranthus* spp., *Berberis* spp., tun (*Tuna ciliata*), paja (*Prunus padum*), clover (*Trifolium* spp.), rose (*Rosa* spp.) are important additional bee forage.

In order to evaluate comparative performance of *A. cerana* bees in wall hives modernised by inserting movable comb-frames, experiments were conducted on five traditional and five modernised hives of approximately equal size located in farmhouses. Initially each of the ten hives was at 6-7 comb-frame bee strength (8000-10,000 bees). The hives were selected on the basis of biological activity having an average of 60 pollen and 130 nectar foragers incoming every 5 min at 1100 hrs in early September. Data on the number of combs covered with bees, brood area (cm<sup>2</sup>) and honey stores (kg) were recorded from the beginning of September 1995 to the end of November 1997 at intervals of 15 days. Floor sweepings of hives were scanned for determining mite and wax moth infestation, and intrusion by robbers such as pseudoscorpions, beetles, ants, etc. Observations were made on the frequency of absconding, swarm emission, artificial sugar-

Table 1. Comparative performance of *Apis cerana* during 1995-97

| Parameter                     | Traditional hive* |        |        |        | Modernised hive^ |        |        |        | Remarks                         |
|-------------------------------|-------------------|--------|--------|--------|------------------|--------|--------|--------|---------------------------------|
|                               | Autumn            | Winter | Spring | Summer | Autumn           | Winter | Spring | Summer |                                 |
| Number of combs               | 8                 | 1      | 3      | 5      | 8                | 5      | 6      | 8      |                                 |
| Strength (no. of bee frames)  | 6.5               | 1      | 2.5    | 4      | 5                | 3.5    | 5      | 7      |                                 |
| Brood area (cm <sup>2</sup> ) | -                 | -      | -      | -      | 800              | 200    | 1200   | 2100   | *Could not be evaluated         |
| Honey stores (kg)             | -                 | -      | -      | -      | 1.5              | 0.75   | 4.5    | 6      | *Could not be assessed          |
| Incidence of wax moth         | low               | low    | medium | low    | nil              | low    | nil    | nil    | -                               |
| Robbers and scavengers        | high              | high   | high   | high   | nil              | low    | nil    | low    | ^treated after detection        |
| Mite infestation              | low               | low    | medium | medium | nil              | low    | low    | nil    | ^managed                        |
| Absconding frequency          | nil               | high   | nil    | high   | nil              | nil    | nil    | nil    | ^averted by management          |
| Swarm emission                | 0.5               | nil    | nil    | 1.5    | nil              | nil    | nil    | nil    | ^colony divided                 |
| Artificial feeding            | -                 | -      | -      | -      | 1                | 1      | nil    | nil    | *not practised                  |
| No. of honey harvests         | 1                 | nil    | nil    | 0.6    | 0.25             | nil    | nil    | 1.4    | ^during modernisation           |
| Honey harvested (kg)          | 3                 | nil    | nil    | 2.5    | 2.5              | nil    | nil    | 3.8    | ^subsequent increase in harvest |

feeding, number of honey harvests and amount of honey harvested.

### Results and Discussion

Results of biological and economic performance parameters are presented in Table 1. The data reveal that initially during autumn bee strength in traditional hives was on an average 6.5 comb-frames whereas it was five comb-frames in the modernised hives. This can be explained by the fact that hives were modernised at the beginning of the first autumn. During this operation the combs were cut from the point of their attachment in the wall cavity, surplus honey was extracted, and combs with brood were mounted on to movable frames. The moveable frames were then introduced into the wall cavity and the bees allowed to settle on them. Numerous young and forager bees were lost and brood suffered chilling. The bees took some time to recover from the shock and to adapt to their overhauled habitat. Subsequently it was observed that bees in modernised hives gradually built up in strength to reached 7 comb-frames by summer.

The traditional method of harvesting honey by cutting and squeezing combs towards the end

of autumn reduced bee strength in traditional wall hives to a single comb. There was loss of comb, brood and bees. Surviving bees in a queen-right situation rebuilt their hive. Build-up in strength was slow and rose to only four combs at the end of summer. Furthermore, after the autumn honey harvest and during the winter dearth, bees demonstrated a high tendency to abscond and desert traditional hives. This was probably because no sugar-feeding was provided to help bees during this period. In contrast to this, the regular monitoring and management of bees that is possible in modernised wall hives averted or controlled absconding. There was also faster spring build-up, swarming was averted and two out of five colonies were divided. This management was not possible in traditional wall hives where an average of 1.5 swarms were emitted.

The modernised wall hives allowed checking of the colony for disease (sac brood, nosema), pests (wax moth), parasites and robbers (pseudoscorpions, beetles, ants). Appropriate remedial measures could be provided. No such cleanliness and medication was possible in traditional wall hives triggering the tendency of bees to abscond. Economics improved as there was a higher number of honey harvests in

summer from a modernised hive (1.4) compared to a traditional hive (0.6). The lower number of honey harvests during autumn for modernised hives (0.25) was because honey had been extracted during the operation of modernisation. It was observed that subsequently not only did the number of honey harvests increase in modernised hives but also the honey yield (3.8 kg compared to 2.5 kg for traditional hives). This was because modernised hives provided facilities for efficient and hygienic honey extraction without causing any loss to the bee colony.

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### References

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