

Indigenous Knowledge of Beekeeping in Jumla, Western Nepal

Naomi M. Saville and S.N. Upadhaya
ICIMOD, Kathmandu, Nepal

Apis cerana, the Asian hive bee, and its various sub-species, is threatened in Nepal and throughout Asia. Recent research (Verma, 1998) suggests that the western Nepal high-hill strain (subspecies *cerana*) found in the remote area of Jumla, is not only larger but also higher honey-yielding than other Himalayan strains. Conservation of this genetic resource is being tackled by promotion of beekeeping with it. The aim of this study has been to access indigenous knowledge from Jumla farmers in order to develop improvements to traditional beekeeping methods.

Methods

Data have been compiled with a participant-observation method by the first author, a questionnaire survey (May–July 1997) and by participatory rural appraisal (PRA) exercises.

Results

Traditional log hives and their characteristics
In Jumla, cylindrical and square cross-section hives are made of hollowed-out logs. The wall thickness is usually 5–6 cm. Preferred timber

species are *Ilex dipyrrena* (kharso), *Juglans regia* (okher) and *Pinus wallichii* (sallo). A good-quality hive will last for at least 25 years, so hive-making is not such a threat to the forest as it might at first seem, especially as greenwood is traditionally viewed as unsuitable.

The month of Magh (mid-January–mid-February) is an auspicious time for making hives, particularly Tuesdays in the 'Maga Jog' (a special time in astrological charts, as explained by local astrologers). The tree must be hollow or rotten on the inside with dead tops, but not fallen, since it may then be rotten on one side. The hive-maker taps a tree at the bottom with the blunt side of an axe and if a hollow sound is made it is felled. After felling, the tree is cut into hive-sized logs and the 'male' and 'female' sides of the tree are determined. These are important to traditional beekeepers because bees prefer to make their combs on 'male' wood. 'Male' wood, used for the top half of the hive, tends to be reddish and rich in resin, and is found on the side of the tree facing the sun (east/south). 'Female' wood is whiter and is found on the shady side (west/north). The rotten middle part of the tree is scraped out using an axe and 'basso', a local cutting/scraping tool. The bottom 'female' part

is made thicker than the top part to form a strong, well-balanced base that will not rot quickly. A hole is positioned at the mid-point between the 'male' and 'female' wood. Once the log has been hollowed out completely, the hive body is finished. The two openings of the log are closed with circles of the right size cut out of thick hand-cut planks. These circles are plastered into the ends of the hive using cow dung or a cow dung/mud mixture.

When building square cross-section hives/wall hives, fallen trees are preferred to dead standing ones. The method of making is similar to that of the log hive, except that the log is cut into a square cross-section and then the hive is hollowed out from one side, making a box closed on three sides. The wall hive is placed in a wall when a house is being built with the open side inside the house. This (long) side is closed with a thick plank, plastered in as above.

Traditional methods of baiting hives to capture swarms

Of 302 farmers questioned, 256 farmers had a total of 2221 baited hives in the forest and in pastures on cliffs. Many had placed none, whereas the most active beekeepers had as many as 80. The mean number of baited hives per beekeeper was 8.7 hives (SE of mean 0.8), the mode zero and the median 4. When asked what they do before placing their hives in the forest, 259 farmers said that they rubbed their hives with 'gosard' (a hive-baiting substance), 20 said they used raw honey only, and 169 said that they cleaned their hives by scrubbing them inside with fresh walnut leaves screwed into a ball. Prior to rubbing the hive with walnut leaves, about 33% of farmers scorch their hives. Five farmers said that they only scorched their hives when they were new (to dry out the wood and remove rough edges) and a few said they only scorched when the hive was damp, mouldy or bad-smelling. Some claimed that scorching the hive discouraged bees from returning by spoiling the comb imprint.

The composition of 'gosard' varies from area to area: 291 farmers used honeycomb and 264 mixed it with old combs. Added ingredients to the basic mixture were mentioned as follows: 8 farmers added walnut leaves; 42 cow ghee (clarified butter); 10 wild rose flowers (*Rosa moschata*); 4 dhoopi (*Juniperus* spp.); 11 (roasted) de-husked rice; 4 (roasted) barley; 12 mustard oil; 4 cloves; and one or two farmers mentioned cumin. Old combs are often first dry-fried in a pan over a fire. Then the ingredients are ground in a large wooden mortar and mixed with honey. It is important to use entirely dry ingredients in order to avoid the 'gosard' going mouldy. It is best kept in 'booss-paa' (*Betula alnoides* bark), which is excellent as a preservative.

Traditionally, 'Magh ko Maga' and 'Shri Panchami' are auspicious days in January/February that are good for 'gosard'-making. Other good days are determined by consulting a Brahmin or local Dharmi ('shaman'). Much is made in April/May and applied to empty hives throughout the swarming season (May-July). Some continue applying it up to the second short (post-monsoon) swarming season in September. Some farmers store 'gosard' for a few years. If the smell deteriorates, it is re-made by adding fresh ingredients. If a beekeeper knows or suspects that a menstruating woman has touched the hives, a 'puja' (ritual worship) will be performed by sprinkling the hive with cow urine and reciting mantras (religious chants). It is believed that the mere touch of a menstruating woman can cause bees to abscond or not reoccupy a hive.

Swarm management methods

Once drone activity is high, traditional beekeepers prepare themselves for swarm catching. Swarms are transferred to log hives by hand or using any container that is convenient for scooping up bees (e.g., small basket). If bees need to be moved from a place that is tricky for handling a local *Artemisia* species known as 'gwiepatti' or sometimes 'titepatti' (*Artemisia*

vulgaris) is placed near the bees and rubbed to give off a strong scent. These aromatic plants are also used by some farmers to make a kind of bee veil when handling colonies that become defensive. When a colony has swarmed two or three times, the beekeeper may look for queen cells and destroy them to prevent further swarming that would weaken the colony too much.

Honey harvesting and processing methods

A smoker locally called 'kangreto' is made out of old cotton cloth tied into a roll. Some farmers use specific herbs to produce a good smoke that encourages bees to leave the combs without inducing too much disturbance. Once the bees abandon the combs, the combs are cut from the top using either a 'panyau' (rice-serving flat spoon) or a 'khukuri' (sharp knife). Bees are brushed off the combs using a small broom made of dried grasses usually dampened with water. Any bees stuck to the combs are brushed off with the small broom and cleaned on to a plate with a little water. Bees saturated with honey are cleaned in this water and are quickly washed on to a cloth and put into the sun to dry; very few bees die in the process.

Most beekeepers only cut honeycombs from one side of the hive. Some change sides every few years, whilst others believe that the queen always resides on one side and so never cut there. Some farmers separate out the best sealed honey as raw honey ('kaacho maha') for use as medicine and to sell at a high price. The remaining unsealed honey (sometimes brood combs) and older black combs are mashed up and cooked to reduce water content and preserve. The honey is cooked directly over a fire to a high temperature. Melted wax is skimmed from the surface and kept for trading with metal workers. Cooked honey ('pakkeko maha') is sold more cheaply than raw honey and is not valued as a medicine. Some believe that it angers the local gods to sell raw honey and so only sell cooked honey. 'Chiauche maha' is made from boiling down honey water that results from handling

honey during extraction until it is thick and honey-like. An important guest will be fed pure raw honey, a less important guest cooked honey and an unwanted guest 'chiauche' honey.

Winter colony management

Of 269 farmers who answered questions, 229 (86%) claimed to feed their bees. The farmers' definition of feeding ranged from leaving some combs of honey back for the bees, to applying a sweet solution around the mouth of the hive in the early spring (March–April). Sugar is not produced in Jumla and is expensive since it is flown into the area. Hence natural sugar alternatives are often used for feeding bees. Foodstuffs mentioned by farmers were as follows: 157 used (usually raw) honey; 59 either cooked or raw sweet pumpkin; 50 raw sugar cane ('gude'); 31 buckwheat flour and honey 'roti' or cake (usually par-cooked); 24 sugar; 15 sugar solution; 8 apples; and 6 a decoction of a sweet turnip (locally known as 'koira ko butun') boiled down into a thick solution. Most feed in the winter between December and April. Feeding during the dearth period in the monsoon is not practised. Other food mentioned are: 'mehel ko butun' (concentrate of a sweet forest fruit) and 'chamel ko dhuto' (inner husk of rice). The latter is extracted if rice is beaten for a long time and is sweet tasting. Beekeepers sprinkle this flour on a plank leading to the hive entrance; bees collect it and presumably consume it.

The 'buckwheat-honey rotis', or 'desu' as they are locally called, form a kind of edible 'dummy board' that probably significantly increases the insulation of bees in winter. The bees chew up the candy-like substance and obtain nutrition usually leaving just the hard dark cooked surface by the end of the winter. The buckwheat itself may be medicinal to bees, especially because of its bitter properties. 'Koira ko butun' is considered medicinal to bees. It is applied around the mouth of beehives during spring (February–April) and is believed to serve as a snack for bees on their way out for the first foraging trips of the year and a medicine against 'disease' that affects

bees at this time. Bees appear to cluster upon this substance and feed from it. It does not seem to induce robbing.

'Bhuko' is a high-altitude herb (*Gnaphalium* sp.) collected in autumn (September/October) and placed in hives as insulation. The bees chew up the flower heads and fluffy leaves, and farmers believe that the bees can obtain crystallised nectar and pollen from the flower-heads. Some beekeepers hide raw honey inside bunches of 'bhuko' so that bees do not stick to it while feeding. 'Pirul' (pine needles) are packed inside hives, outside the inner layer of 'bhuko', and also around the outside of hives as insulation. They do not encourage mice in the same way as straw. In some areas 'pire gass', a high-altitude grass that is hot and spicy in flavour, is also used. Some farmers enclose this insulation with flat stones or slates and at high altitudes will even build a wall enclosing the hives. This helps protect against pine martens.

Traditional methods of disease control

Jumla farmers recognise diseased bees in various ways, e.g., black and/or angry bees, absconding, bees not working, and bees inactive, hanging together by the feet. Brood disease is recognised when bees are seen throwing out dead larvae ('that look like grains of cooked rice'), by a sour smell and black combs.

The traditional method of treating disease, other than feeding with honey or 'koira ko butun' is to apply a herbal smoke, especially on Tuesdays. The constituents of this vary. Of 16 farmers interviewed who applied smoke, most used 'dhoopi' (*Juniperus* spp.). Botanical identification of other ingredients used to smoke bees is yet to be completed. Some believe that 'puja', sprinkling a teaspoonful of cow urine together with 'chuna jurro' (local herb), is effective. Hive condensation, when bees are in

occupancy, is solved by wiping the wetness off and sprinkling barley flour inside the hive.

Discussion

Although the concept of fixed-comb beekeeping may seem primitive to a modern frame-hive beekeeper, there are many aspects of traditional beekeeping knowledge that may have application in modern beekeeping or in beekeeping with appropriate technology in other countries. The following points drawn from the above results warrant further investigation and testing in other areas with *A. cerana*: (i) use of 'male' wood for top-bars and 'female' wood for bee boxes; (ii) medicinal effect of buckwheat-honey cake; (ii) effect on *A. cerana* of subsisting on natural fruit sugars in dearth periods; (iii) bee-repellent properties of *Artemisia* spp.; (iv) anti-microbial properties of *Juglans regia* leaves; (v) anti-microbial and acaricidal properties of herbal smokes; and (vi) the attractiveness of 'gosard' and its various components.

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