

Small-scale Beeswax Processing in Remote Western Nepal

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Jumla is a remote high-hill district of western Nepal (28–29 °N, 81–82 °E, 254,364 ha). It is isolated from motor roads by a 3–5-day walk. The district centre, Jumla (Kalanga) bazaar, lies at an altitude of 2500 m and has an air-strip. It is the administrative centre for the Karnali zone (the area of Nepal with the lowest Human Development Index) and is developing as a centre of trade and services. The population of the district approximates 75,964 (1991 statistics), comprising mainly Brahmin, Thakuri, Chettri, Kami, and Tibetan (Bhote) castes that form a strongly traditional society. Much of the district lies above the local rice-growing threshold of 2600 m; potatoes and barley form the staple diet. Here, wild flowers are abundant on the uncultivated slopes and forest, thus honey and beeswax have traditionally been an important source of income, especially for those at high altitudes.

Beeswax is an important product of beekeeping (Brown, 1981; Krell, 1996) that is often neglected as a source of added income or as a resource to be utilised within the household. In Jumla, the International Centre for Integrated Mountain Development (ICIMOD) in collaboration with a local non-governmental organisation (NGO) called Surya Social Service Society (or 4S Jumla) have been promoting the

use of beeswax. Manufacture of beeswax candles and herbal salves/creams can be a source of income-generation and livelihood improvement for local people. The isolation of Jumla and other remote mountain areas means that high-value, low-weight-to-volume products are most suitable for export. Honey and beeswax fit well into this category. With rapidly rising air cargo costs, value-added products need to be produced in the remote area itself in order to make sufficient profits.

Traditional Markets and Uses for Beeswax

Traditional uses of beeswax in Jumla are: lost-wax casting for making 'kaso' (high-quality brass) cooking pots, bells, religious statues, and silver bracelets; mending water vessels; shoe-making and mending (waxing thread and polishing or reconditioning leather shoes); waxing kite threads; and to a much lesser extent, making candles and skin creams.

Of 302 farmers questioned in 1997, most did not sell or use their beeswax, but at least 126 of them traded it in a barter system with low-caste (Kami and Sunar) people who use it for lost-wax casting of iron and gold respectively. The usual 'price' is 1:1 weight for weight with metal items, often pots and pans. The metal varies: 89 farmers

said that they exchanged it for unspecified metal pots; six exchanged for kaso; two for copper; and 20 for iron. Many farmers appear to keep the wax at home and trade it with visiting Kami, but some farmers (16 of those interviewed) carried it with them on trading trips to lower altitudes (for example, Nepalgunj and Surkhet) where they deal with metal-workers. Only five farmers claimed to use the wax themselves and only eight quoted a wax price in rupees. This varied from 40 to 200 Rs/kg with an average of Rs 118 (SE of mean 20.9) (US\$ 1 = Rs 62.5).

When the Jumla Beekeeping Project started, a few traditional beekeepers were already making candles using the high-altitude bamboo (locally called nigalo) as a mould, and others were making (mustard) oil and wax ointments for the hands and face. Seeing these indigenous methods and realising the value of them the project has worked to promote the use of beeswax in these two ways.

Importance of Beeswax when Honey Crops Fail

As Thai Sac Brood Virus (TSBV) and European Foul Brood (EFB) has decimated the population of *Apis cerana* in Jumla since 1994, promotion of the use of beeswax has been particularly important as a means of encouraging beekeepers not to give up. It is hoped that such efforts may contribute to the preservation of the now relatively rare *Apis cerana cerana* local to the area (Verma, 1998). When colonies abscond or die, they leave combs behind that need to be removed for disease-control purposes. Processing of these combs to make pure beeswax not only sanitises the wax and removes a source of re-infection, but also provides at least a small income from the lost colony. With the failure of honey harvests, exploration of a market for beeswax products is an attempt to improve the economic value of beekeeping until the local bee population evolves adequate resistance to these diseases and honey harvests can increase again.

Beekeeping for Beeswax Instead of Honey Alone

In tests of appropriate technology in beekeeping in Jumla, farmers favour top-bar hives that are adapted from traditional log hives. When extracting honey from these hives, combs are usually cut and squeezed rather than honey being extracted by centrifugal action and the combs being re-used. Hence, beeswax becomes an important product of beekeeping rather than a by-product. Value-added products are potential sources of extra income.

Development of a Beeswax Collection and Processing Centre

In December 1996 a beeswax collection and processing centre was established in Jumla for the promotion of beeswax processing and marketing. This centre buys raw and dirty beeswax from local farmers at a locally negotiated rate of 150 Rs/kg for relatively clean, processed beeswax and Rs 80-90 Rs/kg for dirty wax. This wax is collected during field visits by farmer-trainers of the Jumla Himalayan Beekeepers' Association (HIBA) and by the two staff employed by 4S Jumla to run the beeswax centre. Wax is also collected from the neighbouring districts of Mugu and Kalikot.

Before the wax can be made into value-added products, it has to be repeatedly cleaned and filtered to remove dirt and soot particles. Solar wax-extractors (Tomlinson, 1991) can be used in Jumla to extract wax from old combs during the warmest months of the year (May and June). Black soot is a major problem in quality control. Pine firewood, which is high in resin and produces copious soot, is the normal means of cooking and lighting in Jumla. Soot-contaminated candles, although perhaps darker in colour than pure beeswax, are not significantly different from candles made with cleaner wax, but soot-contaminated creams have a smoky smell that is disliked by most potential customers

outside Jumla. Hence the centre has been seeking means of heating wax without fire.

Kerosene, the common alternative to firewood for cooking in the plains of Nepal, is only available in Jumla bazaar (not in rural areas) and is expensive owing to being carried rather than flown in. Electricity supplies however, although unavailable in most villages, are generated by a small hydro-electric power plant that serves Jumla bazaar for much (at least half) of the time. This electricity, although much slower at generating heat to melt beeswax, is a more forest-friendly means of doing so. Despite low and severely fluctuating voltages, an electrically powered wax-melting / candle-dipping tank has been constructed and is under test. It was made as follows. A black polythene water tank was cut open to make a large (c. 175 l) water bath. It was fitted with a thermostatically-controlled heating rod. Two aluminium rectangular boxes for holding wax are then placed in the water bath, close to but not touching the heating rod. The temperature of the rod is adjusted to about 80°C, so that the wax melts. The water bath is insulated with wood shavings enclosed in a wooden box.

An alternative to the use of electricity is the use of solar panels. To date this is effective for small volumes of wax using a 12-V solar panel that charges a small 12-V gel battery. This is connected to a ceramic resistor that heats up slowly and is put in direct contact with the beeswax in a plastic Thermos flask with a secure (insulated) lid. Wax will melt in about 30 min when battery charge is high, but no more than a litre of wax can be melted at one time. Such technology allows wax processing activities to be done regularly even when there is no electricity or firewood, but the equipment is too expensive for village-level production and is not yet developed for large quantities.

Beeswax Products using Local Resources

In addition to candles, medicinal beeswax preparations are also manufactured. Although the beeswax centre has bought in coconut,

mustard and essential oils from the plains for making creams in large quantities, Jumla has comparative advantage in the production of certain unusual natural oils. These include hemp-seed (*Cannabis sativa*), dhatelo (*Prinsepia utilis*), tilkuro (*Perilla occimoides*), walnut (*Juglans regia*), apricot kemal (*Prunus persica* and *Prunus* spp.), 'devdar' (*Cedrus deodara*), and jatamansi (*Valeriana jatamansi*). The latter two are 'essential oils' with medicinal application and the others have excellent skin-conditioning properties. Hemp-seed oil is traditionally used as a massage oil for painful joints and muscles. It is now being made into a massage ointment for application like 'deep-heat', and is found to be highly effective. Others are made into various skin creams. Means of increasing the production and helping to remove the drudgery in producing these oils are needed. Currently they are produced by labour-intensive and time-consuming hand-pressing. Research into the many medicinal healing herbs of the area is also underway to discover which are suitable for formulation into creams and in what quantity. To date turmeric (*Curcuma longa*) is being used in antiseptic creams to good effect. *Paris polyphylla* and *Picrorhiza kurrooa* will also be used in the future.

Beeswax Products as a Means to Improving Livelihoods

Aside from its value in income-generation, beeswax can also help improve the livelihood of Jumla people. Beeswax candles give off a bright light and non-toxic sweet-smelling fumes. Lighting for most Jumla families comprises 'jharro', sticks of resin-rich pinewood that give off a thick black sooty smoke. Jharro is harvested at great cost to the forest since it is usually cut from living trees. Candles can contribute both to improved family health and lower levels of forest destruction. School children can read and write by their light, which is not possible with jharro.

The climate of Jumla is harsh with cold, drying winds that chap the lips and skin. Women's

hands in particular suffer from manual work with the soil, cutting firewood, scrubbing pots with ash, mud and ice-cold water, plastering floor and walls of their houses with mud and cow-dung, and so on. Many people work in the fields and forests without shoes, often incurring minor wounds to the feet and suffering from cracked heels and soles. Medicinal skin preparations made from oils that villagers make themselves or buy for cooking, combined with beeswax and sometimes local healing herbs help to relieve the suffering of chapped skin, lips and feet. They can also heal wounds that might otherwise go untreated. In remote areas with minimal health services such applications of local resources are very valuable.

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