

What is Beekeeping ?



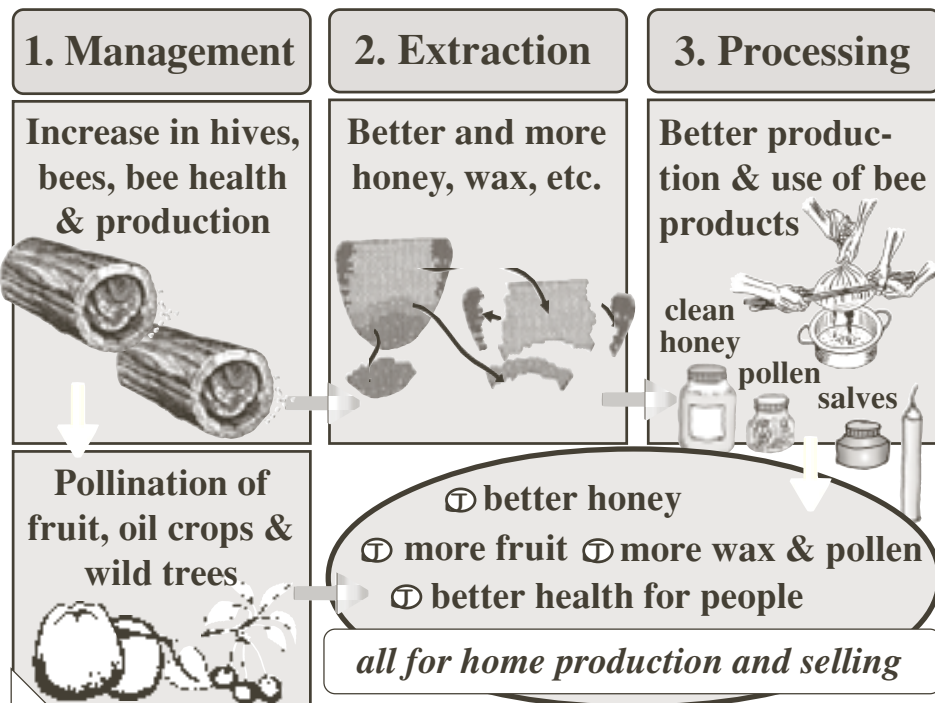
A woman trainer examines the Jumla Top Bar Hive

Bees live naturally in hollow tree trunks, under branches and on rocky outcrops in the jungle. By copying the natural needs of bees, people have kept bees in hives at home for centuries. There are direct and indirect benefits from beekeeping. Honey, wax, pollen, medicine, etc. are direct benefits. By pollinating crops bees also help increase farm production. In the jungle, bees help to maintain biodiversity by pollinating many wild tree species. These are all indirect benefits.

With small improvements to traditional beekeeping, production can be increased and diversified. This chapter provides information about how these low cost improvements can be made to traditional beekeeping.

Why improve Beekeeping ?

In this chapter improvements are described in 3 areas of traditional beekeeping :- 1. bee management, 2. honey extraction, and 3. processing of bee products (honey, wax, etc.). With better bee management, bee populations increase, and bees are more healthy and productive. Improvements to honey extraction mean better quality and quantity of honey & other products. Improvements to processing also means increasing the quantity and quality of bee products. Pure honey, wax and pollen have natural nutritional and medicinal qualities. Having more, healthier bees also improves pollination and so helps the environment. The 3 diagrams below illustrate the 3 areas of improvement.



How to improve Beekeeping ?

Anyone can easily keep bees. For this you don't need lots of land or big investment. To improve the quality and quantity of bee products it's important to pay attention to bees' protection, health, hygiene and diet. Just small improvements to management can give many benefits.



Important things to consider in Beekeeping

1. Choice of beehive
2. Caring for bees
3. Problems with bees
4. Product management

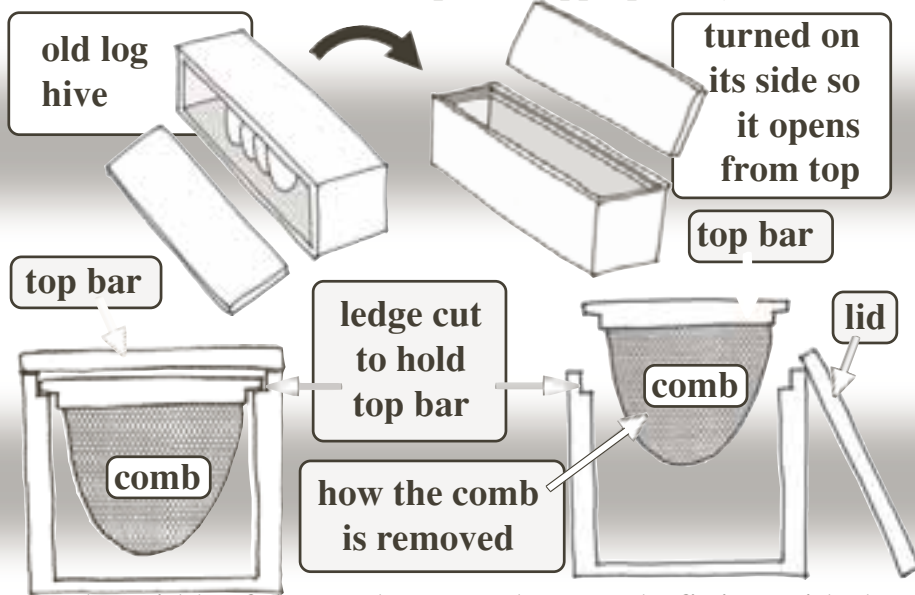




1. Choice of Beehive

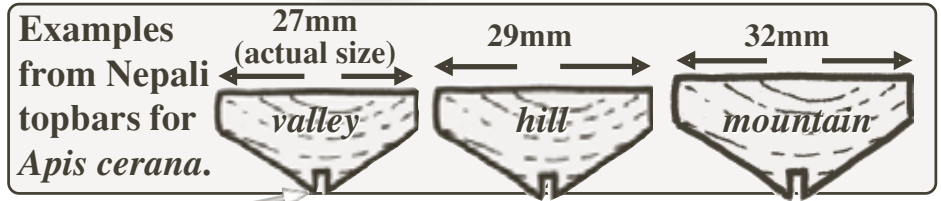
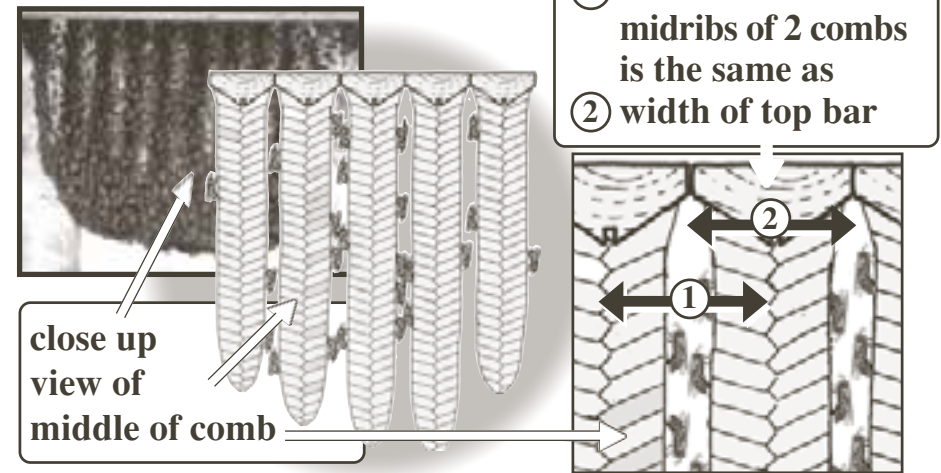


When choosing a hive, the timber liked by bees, a cheap and easy method of making the hive, and its durability are all important. There are 2 main types of hive: traditional, and improved. In the traditional hive the combs can't be taken out to look at, while in the improved hive the combs can be removed and replaced without damage. In Jumla district of Nepal, farmers have improved their traditional hives by making top bars to which combs are attached. These can be removed for inspecting combs and replaced again. This is a good example of local hives which are improved appropriately.



The width of the top bar must be exactly fitting with the width of the comb, and there must be room between combs for 2 bees to move up and down. The size of bees may change according to altitude (the higher, the larger), bee species and variety, so the width of the top bar should also change accordingly. Examples of different sizes of top-bars in Nepal are given in the following diagram. In nature, the distance

from the centre of one comb to the centre of the next is equal to the width of the top bar.



The base of the top bar is pointed. This helps the bees to build straight combs.



2. Caring for Bees

Swarming

Swarming is the natural way for bees to reproduce. It happens when the number of bees in the hive becomes large and a new queen is made. When the new queen hatches, half the colony will leave along with a queen. The old queen goes with the first swarm. When bees are about to swarm you will see more males flying outside the hive. A cluster of bees may be seen hanging near the entrance to the hive. Inside the hive the combs contain many male bees and queen cells. If the tips of the queen cells are a brown colour then bees may swarm within 2-3 days.

① A hive of bees and their young

② A worker bee and its developing cell

④

③

④ A queen and queen cells shown. If the tip is brown a queen will emerge soon

③ Male bees. Their cells are slightly raised like a hat

④

③

Worker bees

Putting a swarm of bees in the hive

It is traditional knowledge to spray swarming bees with water or ash. Improvements to traditional practices are suggested below.

- Use walnut, citrus or lemon grass leaves to clean the old hive. Wipe with honey and wax.
- plaster any holes or cracks in the hive
- Put the queen in a box if she can be found. When the bees are all in the hive, place a queen gate over the entrance and let the queen mix with the other bees in the hive.
- Be careful not to damage the queen.
- Put the swarm into the hive in the evening.
- Feed in the evening only.
- If the queen is new, don't add the queen gate because she must fly outside to mate. Watch the hive from 10am to 2pm for about 5 days to check that they don't fly away. If bees are seen bringing pollen this means they are settled, and it is safe to take the queen gate off, or to stop watching the bees in the daytime.
- There may be a tradition of clipping the wings of a new queen, but this should **not** be done because the queen may not have mated. The queen mates with the male bees outside the hive while flying. If she can't fly, she can't mate or lay eggs, and the colony may slowly die out.



A swarm bag or veil can be used to capture a swarm



queen box



queen gate

🐝 **Uniting bee colonies** 🐝

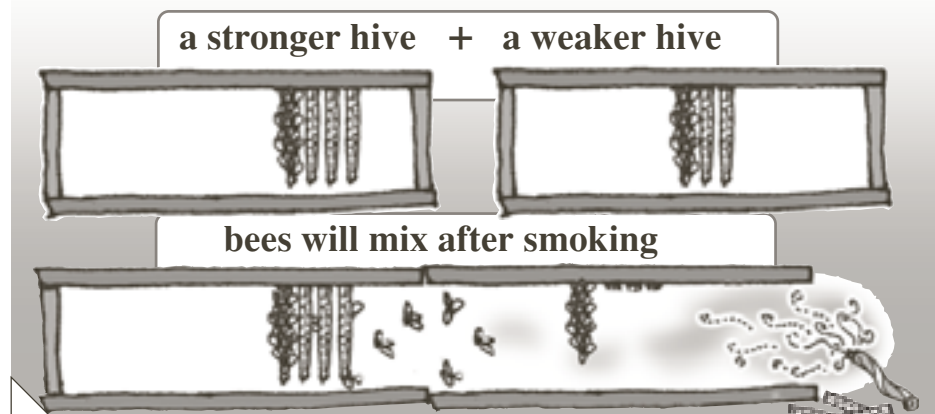
Beekeepers like as many hives as they can keep. But it's not just the number of hives that's important, there must be plenty of bees inside also. It is better to unite 2 weak colonies to make one big one, because :-

- by uniting 2 weak colonies neither die
- uniting increases honey production
- it takes less to feed a united hive
- a stronger colony is less susceptible to disease
- a bigger colony has a more balanced temperature
- if one colony has no queen, it can be saved.



How to unite colonies

To unite 2 small or weak colonies place the 2 hives close to each other. Put the frames of the weaker hive in the stronger hive and smoke the weaker hive to remove all the bees and drive them into the stronger hive. By doing this, the stronger queen will kill the weaker queen - you don't need to do it. It's best to unite colonies at the start of winter, or the start of the monsoon, or when there is no queen in the colony. If bees start to fight, give more smoke.



🐝 **Robbing** 🐝

One problem is that bees from different colonies sometimes fight each other. Why ?

- food is spilt outside or given outside
- honey is spilt during harvesting
- there is no food and bees are hungry
- food is given in the daytime, and the hive is mishandled
- the colony is weak



how to stop a swarm

Preventing robbing

- spray water on the hive
- never feed outside the hive
- take steps to strengthen the hive (feeding, uniting with a stronger hive, etc.)



Absconding



Signs that bees are ready to abscond

- bees stop bringing pollen
- bee traffic at the hive entrance slows down greatly
- bees may form a ball hanging at the entrance
- the queen stops laying
- there are no or very few eggs or larvae - only adult bees are found in the hive
- bees usually abscond between 10am and 2pm

Reasons for absconding

- lack of food
- too hot or too cold
- too much disturbance
- smoke, bad smells or water getting into the hive
- opening, moving or disturbing the hive too much
- robbing (bee fighting)
- attack by predators or disease



Feeding Bees



Why Feed Bees ?

It's very important to feed bees. To get good benefits from bees, it's necessary to feed them according to their needs. Although it costs to feed bees, the honey production payback makes it worthwhile. As a result of feeding, the bees can increase in number and be strong to resist diseases. Bees must be fed when flowers are unavailable, or if the colony becomes too weak to collect enough food.

What can Bees be fed ?

The best foods for bees are honey, sugar water or candy (sugar, honey and water solid food). However if these are not available in your area other sweet substances can be used. Sweet pumpkin or buckwheat pancake can be mixed with honey, or pear or apple jam can be given. Food should always be given inside the hive in the evening, and taken out in the morning. Sugar water is made by mixing one part boiled water to 1-2 parts sugar. Don't give food if older than 2 days. Photo 17 on p.14 shows feeding technique.



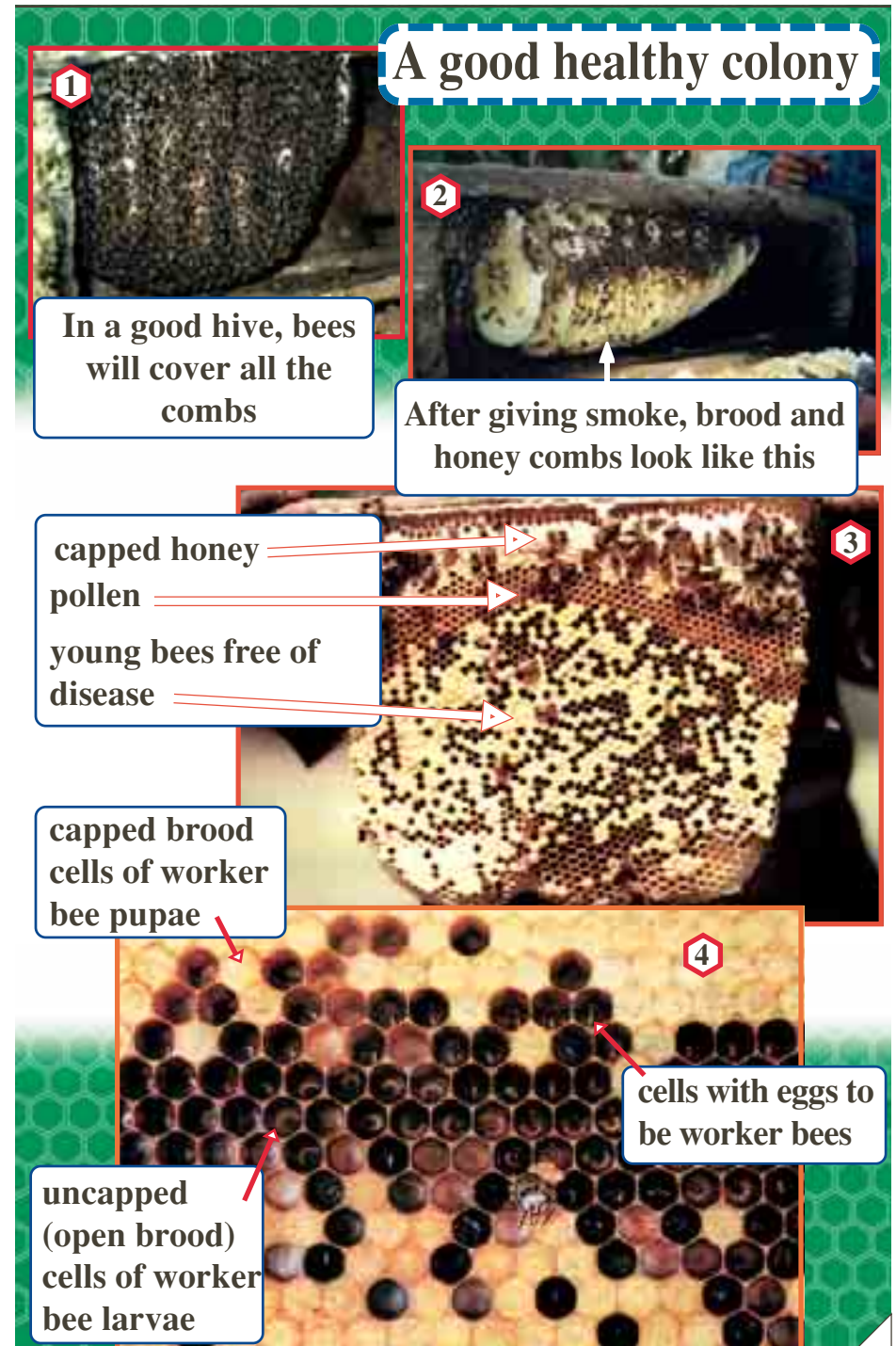
To judge the colony's condition and see what management is needed, check the hive regularly.



Signs of a Healthy Colony



- Seeing single eggs in comb cells is a sign that the queen is active. If open brood (larvae) and capped brood (pupae) are both visible, the colony is in a good condition (page 11, photo ④).
- Bees flying in and out & moving quickly is a good sign.
- Bees bringing plenty of pollen means they are busy raising young - this is a good sign.
- Bees being light in colour is a sign of good health.
- Lots of male bees is a sign of potential swarming



A good healthy colony

①

In a good hive, bees will cover all the combs

②

After giving smoke, brood and honey combs look like this

capped honey

pollen

young bees free of disease

③

capped brood cells of worker bee pupae

④

cells with eggs to be worker bees

uncapped (open brood) cells of worker bee larvae

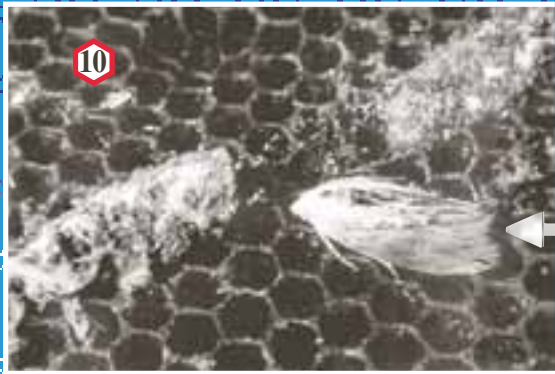
A diseased, unhealthy colony



5 In an unhealthy colony bees cannot cover all the combs



6 On a diseased comb there are few capped brood cells. Un-capped cells with dead larvae are seen. Combs may have a sour smell and bees are angry.

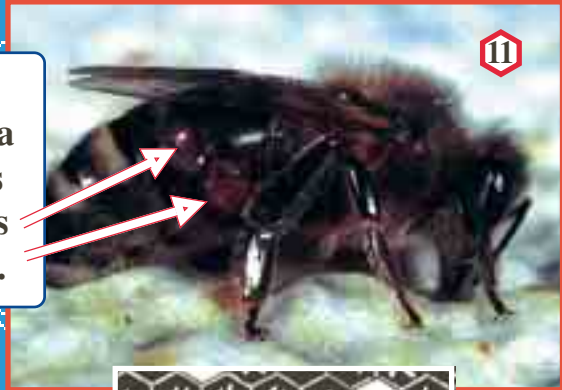


10 Wax moths occupy combs not covered by bees, and eat holes in them, leaving silky threads as they go. Later, the comb looks like a spiders' web. Wax moth's larvae look like maggots.



7 Combs with *European Foul Brood* disease seen close up show dead larvae. These dry up and stick to the base of the cell.

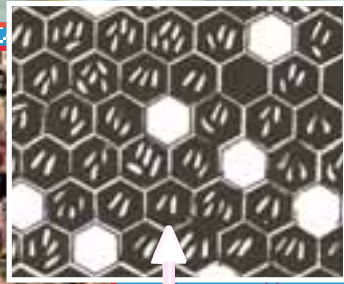
11 This tiny red insect on the bee's body is called a *Varroa mite*. This sticks to larvae and adult bees and is harmful to them.



8 When seen close up, bee pupae with *Thai Sac Brood* disease look like a sharp tipped bag



8 Compare the diseased combs (6&7) with this healthy one, where many capped pupae are seen and healthy larvae are white and fat.



12 In a colony without a queen, several eggs are seen laid by the workers bees in each cell. The colony should be mixed with another, or a new queen added

Herbs for bees

13

half a handful of Horsetail

7 Jasmine flowers

a handful of worm-wood

raw, ground tumeric

a handful of persian lilac or neem leaves

water to mix

14

seive the cooked mixture

15

2 parts sugar and one part cooked medicine

16

dissolve the sugar in the medicine

17

place straw, grass etc. in the liquid to prevent bees drowning and place **INSIDE** the hive



3. Problems with Bees



Symptoms of bee problems are also shown on colour pages 12 and 13

Symptoms that bees are in bad health (photos 5 to 12)

- Bees leave combs uncovered
- Bees are angry
- Bees move slowly
- If bees are dark and shiny they may be diseased or queenless
- Because of lack of food, combs are dry and empty of honey. If starved, bees are seen dead with their heads buried in the comb cells.

"Brood" Diseases of young bees

Like people, bees suffer from a variety of diseases. In Nepal there are 2 main diseases. These are called *European Foul Brood* and *Thai Sac Brood*. These effect young bees while still in their cells. Nowadays these are common diseases.

Symptoms of *European Foul Brood* : (photos 6 and 9)

- Tiny white lines (the tracheal beathing tubes of the bees) can be seen on uncapped larvae
- Too much water is seen around the larvae
- Twisted, dead larvae are seen
- Very few capped cells are seen
- Dead larvae form scales which are brown and stuck to the base of the cells

Symptoms of *Thai Sac Brood* : (photo 7)

- This disease effects the pupae stage and young uncapped larvae are less affected
- Capped brood cells may have jagged holes
- In the capped brood cells pupae look pointed and sometimes discoloured
- The head of these pointed pupae turns black and dries out

- When taken out, these pointed pupae look like a tiny plastic bag filled with water
- Worker bees are seen throwing the diseased larvae out of the hive. It may look like they carry grains of cooked rice.



This is a bees' friend. It eats lice found on bees' bodies, but doesn't harm them.

Diseases of Adult Bees

Worker, male and queen bees suffer from various diseases such as acarine, nosema, amoeba and paralysis. These are caused mainly by lack of hygiene, old sugar water, lack of food and being too hot or cold. Prevention of these diseases is the same as for preventing disease in young bees. If the disease spreads, infected combs should be removed.

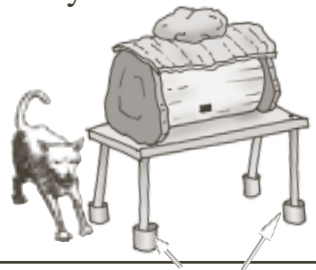
Preventing Disease

- Keep combs strong and prevent too much swarming
- Unite weak colonies with stronger ones
- If hives are hot, make small holes to allow air flow
- If the weather is cold, cover the hive with pine needles, moss, sacking, or other insulation
- Clean out dirt from the hives every month
- Take out old, black combs
- Dispose of these carefully (use for wax extraction)
- Take out combs not covered by bees
- Process the cut combs and keep covered away from wax moths
- Provide food if not available



Curing disease after it has struck

- Take out uncovered combs
- Give food and herbal medicine continuously for at least a week



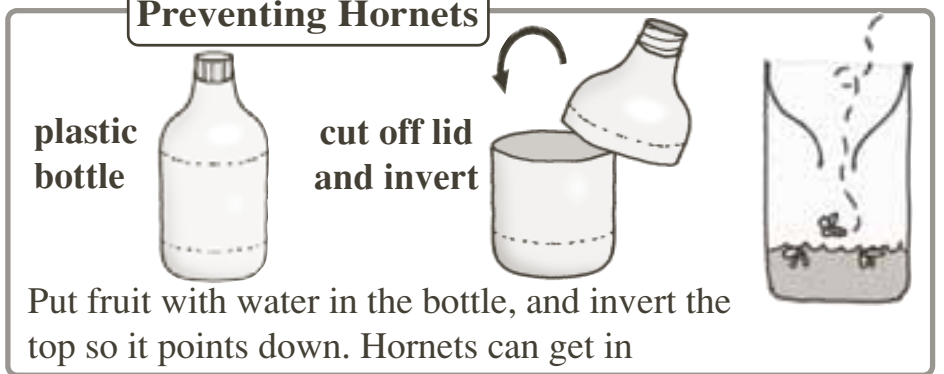
Preventing ants with bowls filled with water

- Transfer the diseased colony to a location where there are no other beehives to avoid spread of the disease
- Take out combs with diseased young, and burn them to prevent the disease spreading
- As cutting out diseased brood comb can cause the colony to abscond, put a queen gate on the entrance
- Mix and cook chopped Persian Lilac or Neem, horsetail, Jasmine flowers and raw tumeric with water, strain and mix with 2 parts sugar until dissolved. Feed in the evening of every other day for at least 10 days (5 doses). This is shown on page 14.

Preventing Wax Moth

Keep the inside of the hive clean. Take out uncovered, old combs. Dispose of them carefully and never throw them around the apiary. Process the wax quickly. Store re-usable combs and processed wax well, in sealed containers. Maintain strong colonies by feeding, uniting etc.

Preventing Hornets



How to tell if bees have been poisoned

- Many bees die in a short time
- Bees can be seen dead around the hive
- Bees die with their tongues sticking out
- Poisoned live bees walk around in circles
- Fewer bees arrive at the hive



How to prevent poisoning ?

- Use local herbs for pest control instead of toxic chemicals
- Don't use poisons when plants are flowering
- If it is essential to use chemicals, first inform beekeepers and only use in the evenings or at night.

If signs of poisoning are seen, close the hive immediately and keep the bees in the hive for at least 24 hours, providing air flow and feeding regularly.



4. Processing Bee Products



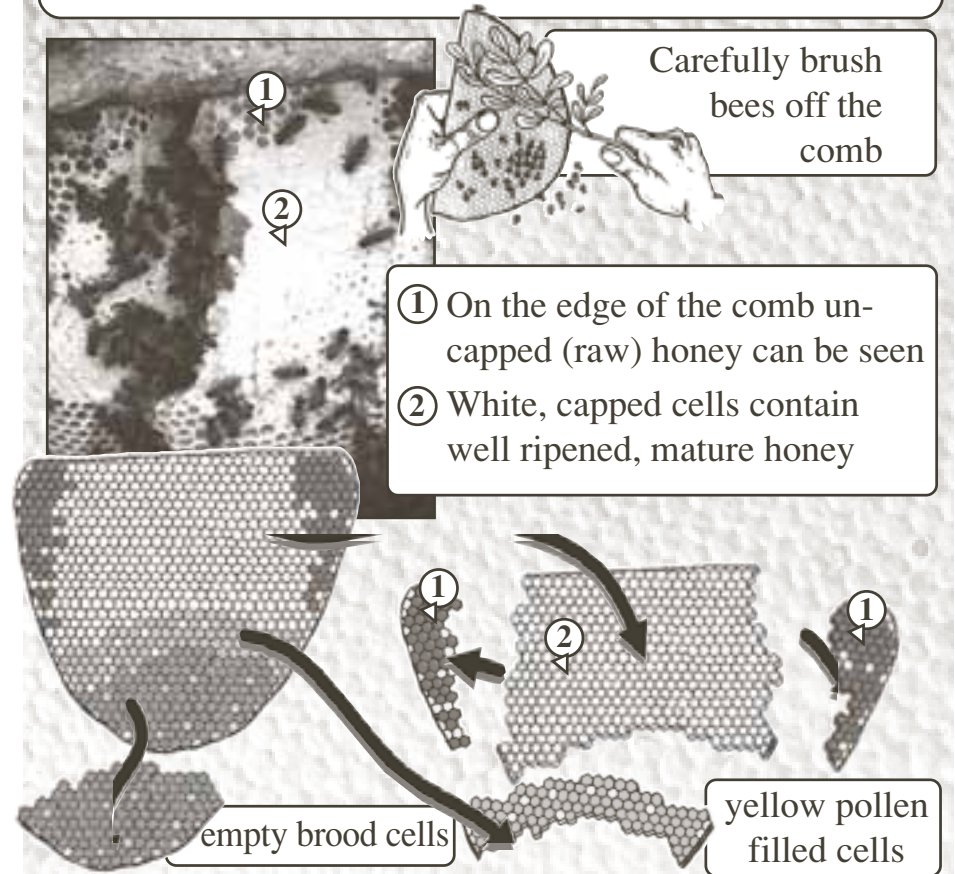
Things to consider when extracting honey

- Never allow honey or cut combs to touch water (not even small drops) as this will increase the water in the honey and make it spoil.
- Wash any utensils (buckets, knife, etc.) with hot water and soap or ash, and make sure washed utensils are well dried.
- Extract honey in the evenings but before dark
- Slowly give smoke from the edge of the colony
- Once bees have moved away from the smoke, gently cut the combs from the edge
- Look closely and only cut combs with honey, don't cut combs with brood
- Gently brush any bees off the cut combs, but don't use water on the brush
- Put the cut comb in a clean, dry bowl or bucket, and cover well to prevent bees getting into it

Combs, or parts of combs containing capped ("ripe") and uncapped ("raw") honey should be separated because uncapped honey will ferment quickly.

Use uncapped honey first.

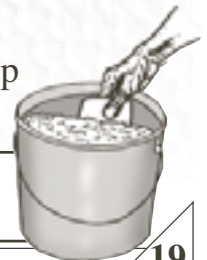
Separate capped, uncapped, pollen and empty comb



What to do after extracting the honey

- Because uncapped honey has a higher moisture content, it shouldn't be mixed with capped honey. This means they shouldn't be processed together, and uncapped honey should be used quickly because it soon ferments due to the water content.
- Cut the capped combs into small pieces and keep in a deep, air tight container for up to a week.

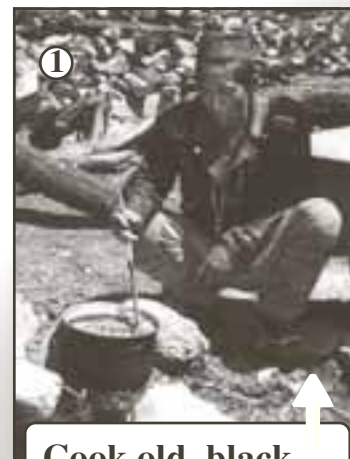
skim off wax pieces & debris that rise to the surface



- After 7 days the honey has sunk and the wax rises to the top. Skim the wax off the surface. Seive the honey through a fine, clean cloth. Only use clean, dry hands to squeeze through the seive. The wax mixed with honey that is skimmed from the surface can also be squeezed for home use, or fed to the bees.
- Put the seived honey into clean and dry containers as needed. These can be glass, clay, wood or good plastic containers that are airtight. If airtight containers are not available, seal the lids with wax.
- Honey should **not** be cooked because this destroys its nutritious and medicinal qualities. There is **no** value in cooked honey.
- Remaining comb with pollen should be cut into small pieces, covered with liquid honey and stored in the same way as honey in an airtight jar. This is very nutritious. Feed one piece once a day as needed to pregnant or suckling mothers, babies over 6 months, old or sick people. It may be difficult to digest at first so feed small pieces until used to it.
- Pure honey can also be used as a medicine. It is useful for burns, cuts, sores, ulcers (including gastric), indigestion, stomach ache, urinary tract infections, tonsilitis, infected eyes and ears (for eyes and ears dissolve honey in a drop of boiled, warm water and seive well before using).



Extracted honey seived into a clean, dry bowl



Cook old, black combs and wax left after honey extraction over a low fire



Squeeze the cooked wax in a bag between two sticks. The molten wax looks like oil.



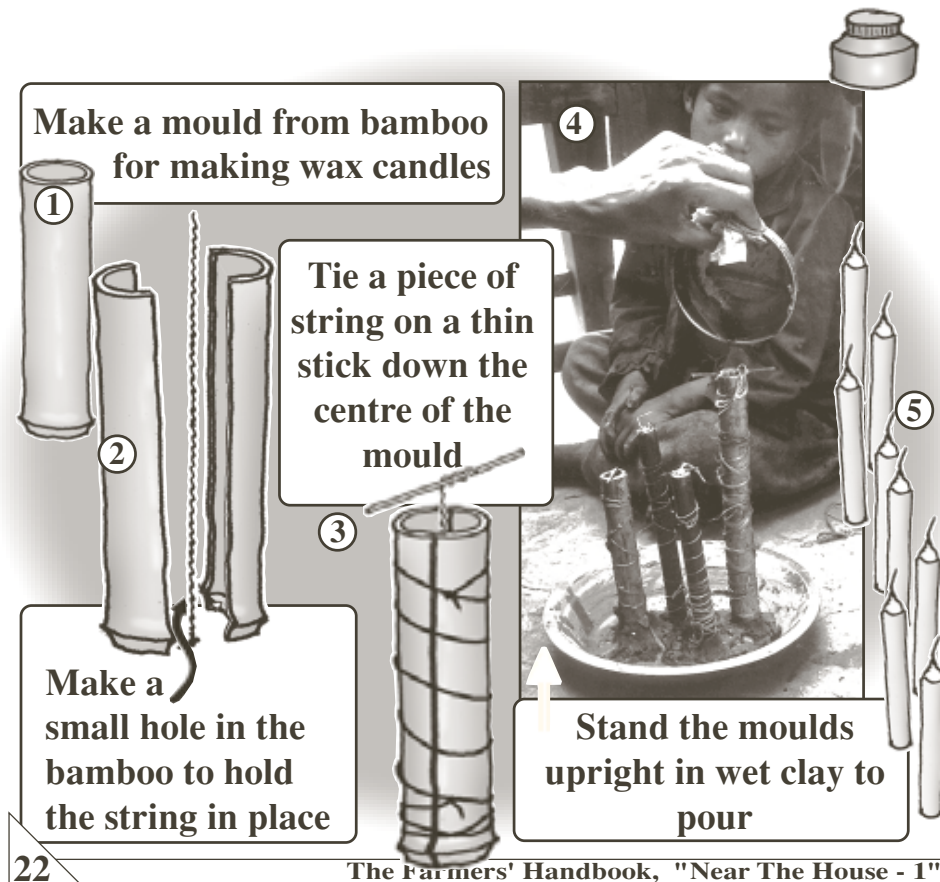
Allow to cool slowly and remove the hardened wax from the liquid. Scrape off any dirt that is attached underneath the wax cake.

Beeswax

Wax is produced from glands on the underside of 12-18 day old worker bees. Bees use it to build their combs. Some Nepali beekeepers believe that a tiny scorpion-like red insect makes wax, but this is untrue (but this is a useful insect, see p.16) as bees make it themselves. Many beekeepers also carelessly discard old combs. This wastes the wax and attracts the wax moth. Better to process the wax to make ointments, candles or polish.

Processing Wax

Soak old, dark combs or wax from honey processing in water for a day. Then, put the old combs or wax in fresh water and heat slowly. When wax melts and becomes like oil on the water surface, pour the wax and debris mixture into a cloth bag and squeeze it between 2 sticks to seive it into another container. Let it cool and harden without disturbing. Take the clean wax, break into small pieces and put in a steel or aluminium pot. Boil water in another pot and place the pot of wax in this to melt. When melted, seive through a clean cloth. This wax can be used to make cream, candles, polish, etc. To make cream, add one part wax to 3-4 part vegetable oil. The method to make candles is shown in the diagram below.



Farmers' Experience

Mr Karnabir Sunar

From Nepal, Jumla district, Chandanath - 4, Dandakot village, Mr Karnabir Sunar keeps bees in his improved Jumla Top Bar Hive. Now let's hear about his experience.



Karnabir Sunar


“ I've been keeping bees since 1995. In our culture, lower castes like me aren't supposed to keep bees, so the custom goes, but I've been keeping them successfully. There are good benefits in bee-keeping, especially with the Top Bar hive. To make the hive I upturned the old log hive and put top bars on without any cost at all. With this hive I can inspect the bees easily, watch for diseases, feed the bees, and extract honey without harming the bees. I can sell the honey and wax because it's good quality. Before I kept bees I hadn't been able to have children. After keeping bees and eating honey and pollen my strength increased and my wife had a son, and I fed him with honey from when he was only 8 months old ! Now, I have 9 hives. The work's easy and low cost, and so I plan to have more in the future. ”




Read On !

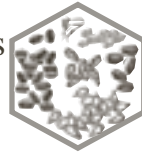



Subjects Related to Beekeeping

 **Chapters related to Fruit :-** how to create, grow and manage improved fruit trees with practical information on fruit nurseries, grafting, budding, stone grafting, top grafting, air layering, planting fruit trees and orchard management.




 **Seed Saving chapter :-** information on methods to produce and store various quality seeds at home.



 **Nutrition chapter :-** information about needs and sources of a healthy diet for all the family.



 **Agroforestry chapter :-** information about how to plant and manage trees on farmland without decreasing farm yield.



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