









Holeta Bee Research Center

African Smallholder Beekeeper Essential Hive Management By Kibebew Wakjira (Ethiopia), and Dr Guy Stubbs (South Africa)

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Introduction

Dear Fellow Beekeeper

This is an uncomplicated guide for beehive management to keep, protect as well as benefit from the African honeybee.

The suggestions in these manuals have been developed from research done by the Holeta Bee Research Centre, the SAMS project and African Honey Bee. We have tried to offer acceptable solutions that will enable anyone to start beekeeping using the resources available to them.

By keeping bees you are much more than a Beekeeper. You are a honeybee guardian, preserving honeybees in a sustainable way to ensure biodiversity.

Biodiversity is the natural balance in nature that enables nature to survive and sustain us. Honeybees are very important in ensuring this balance because they pollinate plants. In other words honeybees by taking pollen from one plant to another on a mass scale ensures genetic diversity of plants that strengthens environmental resilience.

By keeping bees and caring for them you are protecting them and practicing nature conservation for generations to come. So, well done.

We hope that you benefit from these manuals.

Good beekeeping and Guv Oromia Agricultural Research Institu Holeta Bee Research Center

* The SAMS project – <u>https://sams-project.eu</u>

What is a beehive? A beehive is a cavity where bees make their home. When a swarm of bees is looking for a new home they will send out scout bees that measure and inspect cavities and then select a suitable one for them to move into. That's why beekeeping can be done in traditional, transitional and modern hives because they are all bee friendly cavities. Traditional hives **Note:** Sizes of a transitional hive can be the same as a modern hive. Transitional Modern hive hive

V

The bee space

If you know how to keep bees in the traditional way or you know someone who knows how to do traditional beekeeping, you will see that the management of modern beekeeping is almost exactly the same. The only difference is that with modern beekeeping you make use of the bee space.

The bee space is the precise gap within a hive or natural nest that bees won't fill with wax or propolis. It enables the bees to crawl around in their home. **The ideal space is between 4mm and 9mm.**

| Gap size | Impact on bees | | |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| <4mm | This gap is too small for worker bees to pass through. Any spaces, cracks or crevices of this or smaller dimension will be filled with propolis. | | |
| 4.3mm | This is the standard African spacing for queen excluders. | | |
| 9mm | This is the usual space the bees will leave between adjacent areas of capped brood. This allows two layers of bees to work back-to-back. | | |
| >9mm | A gap larger than 9mm will be filled with wax comb. | | |

If you don't use the bee space in modern beekeeping, you might as well use a traditional system.

Bees will build excess comb in spaces larger than 9mm and propolis spaces smaller than 4mm. So a bee space is the space between 4mm and 9mm.



The natural spacing of combs in a wild bee nest is 32mm apart.



The natural spacing of 32mm between comb has not been observed. The result is burr comb.

Note: Propolis - bee glue made from the resin of plants

Traditional beekeeping and modern beekeeping that doesn't consider the bee space share one thing in common – fixed combs that must be physically cut or broken out of the hive.

Modern beekeeping, if it uses the bee spaces enables the beekeeper to work with individual combs without breaking them or damaging them. Modern beekeeping is a way of incentivising bees to build in frames that can be removed and inserted back into the hive. This enables the beekeeper to inspect and attend to the bees and collect honey without breaking combs.

In all the spaces 1–6 illustrated below the bee space, i.e. greater than 4mm and less than 9mm, is taken into consideration.

| 1 | <i>honeycomb</i> | 2 |
|---|------------------|---|
| 4 | honeycomb | 5 |



Modern beekeeping = Moveable frames

Advantages of the modern hive presented in this manual:

Like the traditional hives:

- 1. The construction of the hive is very simple because it only requires a table saw.
- 2. The hive can also be constructed from locally available materials.
- 3. It does not require skilled work force to construct the beehives and run the beekeeping.
- 4. The modern hive can be used to easily catch swarms.

Better than the traditional hives because:

- **1.** Convenient to inspect and care for the bee colonies.
- 2. Expandable so can manage swarming.
- 3. Can add extra supers for honey production.
- 4. Can partition brood and honey.
- 5. Expandable so greater harvest.
- 6. Moveable frames result in less bees killed and less disturbance of the colony.
- 7. Modern hives enable better management of brood because it can be inspected and worked with comb by comb.



Why this manual focus on modern hives

Traditional hives are not as effective as modern hives because you need to cut comb out and thereby can produce much less honey.

Transitional hives are better than traditional hives because you use the bee space. With transitional hives you place top bars spaced exactly 32mm along the top of the cavity with waxed starter strips that the bees build on.

Transitional hives should be built to the same sizes as modern hives so that they are interchangeable with modern hives.

Note: Bees consume the honey which causes the special wax-producing glands to convert the sugar into wax which is extruded through small pores. It takes 2.7 kg - 3.6 kg of consumed honey to produce 450 grams of wax. Wax appear as small flakes on the bee's abdomen. Bee producing wax



Modern hive equipment

The hive



Protective Clothing



Hive tool

A hive tool is used for prying open frames and hive parts stuck with propolis.



Inside is a bit of mesh or scrunched up wire to let the air move more easily.

How to light the smoker

Collect some dry horse / donkey dung / blue gum leaves / pine needles or even dry moss. Light it and puff air into the smoker. When it is lit, add some extra fuel and you should get a white, cool smoke.



Modern hive inspection Steps for colony inspection

Beehive or colony inspection is necessary for effective colony management.

It enables a beekeeper to monitor honeybees' activity and ensure that the maximum strength of the colony coincides with the maximum nectar flow in order to obtain an optimum honey yield.

There are two methods of colony inspection: external and internal colony inspection.

Smoke – Puff smoke into the entrance and wait a bit before opening the hive.
Frames – Always keep frames in the same order that you take them out. Return frames in the same order that you took them out.
Temperature – Avoid opening the hive when it is cold or you

Tips: *The entrance* – Don't stand in front of the entrance.

the hive when it is cold or you could kill the larvae which needs to be kept at 36°C.

External colony inspection

During external hive inspection, the beekeeper should observe the following important points:

- The normal flying in / out of the colony which can be categorised as high, medium or low foraging activity.
- Type of food source being brought to the hive by the honeybees by observing pollen on the bees' legs.
- Whether the bees accumulated on the hive entrance, which can be due to swarm preparation, heat, ants or other enemies attack, and ripening of honey.
- 4. Whether dead bees (extra ordinary dead bees) found on the entrance of the hive due to starvation or being poisoned.



Internal hive inspection

- **1.** Wear good protective clothing.
- 2. Have a good quality smoke source at hand.
- **3.** Keep working materials clean and protective clothes free of any odour that attract or irritate bees.
- 4. Keep your body clean (wash your body). But do not use any perfumed soap or cosmetics.
- 5. Adjust working time it is very important to carry out internal hive inspection either late in the afternoon or evening if there are people or animals about.
- **6.** Select a clear and calm day for inspection. Do not open hive in bad weather (rainy, cold and windy days).
- **7.** Prepare all the necessary hive operation tools such as smoker, hive tool, bee brush, etc, and clean protective clothing for your safety.



Steps for an internal hive inspection:

- Fill and light your smoker with fire so that you have good quality smoke source at least 10 minutes in advance before you start hive inspection. This is because you may face serious problem if the fire has gone out after you open the hive for inspection.
- 2. Dress comfortably and carefully in your light coloured and pre-cleaned protective clothes.
- 3. Then keep all your working tools within your reach.
- **4.** Take your smoker and approach the hive to be inspected with gentle movements either from sides or from the back.
- 5. When approaching an established hive of bees with intent to open, do not move into the line of flight of the worker bees leaving to and retuning from the field.
- Approaching the hive directly in front of the entrance will cause the guard bees to be on alert and result in a defensive colony.
- 7. After you reach the hive from the back or side, send at least five quality slow puffs of smoke into the entrance of the hive. A few good puffs of smoke create communication barriers among the guard bees and this in turn disorganises the defence system of the hive. Using smoke also prompt the bees to gorge themselves with honey and in this satiated condition they are less likely to sting. Wait a minute for the smoke to penetrate to the corners of the hive to ensure that the disorder of the colony is complete, before opening the hive.
- **8.** Then open the hive lid (the outer cover) by using the hive tool.
- **9.** To open the hive, place the hive tool into the tight spaces between the boxes and lid and slowly press downward to break the propolis seal.
- 10. Next, lift (do not remove) the outer lid of the hive and puff several puffs of smoke slowly and replace the lid. Wait a minute and puff some more smoke into the hive entrance. This can complete the disorganisation of the colony.

- **11.** Do not over smoke the hive because over smoking can harm the bees and larvae and hot smoke can burn them.
- **12.** After the disorganisation of the colony is completed, remove the outer lid and place it upside down near the hive for your easy reach and to makes a convenient resting platform for hive bodies during hive operation.
- **13.** Now you will be looking into the top bars of the frames in the top super. A puff or two of smoke blown across the top of the frames will induce the bees to go further down into the hive body.
- **14.** Then start inspecting the frames from one end of the hive.
- **15.** Use cool smoke and keep it to a minimum during inspection.
- **16.** Over smoking may contaminate the honey.
- 17. Take an end frame out of the hive and look at it thoroughly to see what it has. After checking, put the frame on the floorlid placed upside down near the hive with the upper end against the hive to create free space for easy operation. This frees up room to slide the remaining frames and break the wax and propolis that binds them together.
- **18.** Pull frames out one by one until all frames are examined.
- 19. During inspection pay lots of attention and make several mental notes.
- **20.** Later you need to transcribe your observation to your records as recommended on page 41.
- **21.** During inspection prevent:
 - a. The queen falling or getting damaged.
 - **b.** Frames getting mixed up. Ensure that frame order is maintained 100%.
 - **c.** Crushing bees during the operations will not only reduce the work force but causes alarm that results in uncontrolled aggression of bees.



A safe way to carry a super



Important observations to be made during internal colony inspection:

- The presence of the queen: the queen is mostly found around the warm brood nearer to newly laid eggs and hatched out larvae.
- General pattern of the brood on each comb on both sides.
 - In the healthy colony with a prolific queen you will see perfect oval from top to bottom and side to side with a good combination of sealed pupa, larvae of all ages and cells filled with eggs.
 - If a spotty brood or poor pattern is observed with many drones cells, the queen is possibly non-vigorous or damaged.
- Swarm preparation: when bees form several peanut shaped wax cells, which contain immature queen, and the hive is quite populous, it indicates swarm preparation. These should be broken off to prevent swarming.
- Health condition: it is important to observe the signs or presence of any pests and diseases of bees in the hive (such as wax moth, sugar ants, etc. and disease symptoms).
- Availability of space during inspection, if the beehive is full of bees and brood combs, at the beginning of the flow and space is reduced, the colonies might swarm so a super should be added to create space.
- Checking for the ripening of honey is also identified by inspecting the beehive internally. *Sealed qu*

After you complete the inspection of the super replace the removed frames in the same order that you found them and take the whole super and place it on the outer lid near the hive. Inspect all the supers in similar way. After all your observations have been written in the report on page 41 and the beehive components arranged, in their original places, close the hive carefully. By using occasional puff of smoke to control the bees, carefully replace the covers in their respective places to finish the hive inspection. Make sure that during this operation, the queen is not injured and the bees are not crushed. Tip: If there are freshly laid eggs then it can be deduced that there is a queen.



Things to look out for during hive inspection

Note: The flow is when there are a lot of flowers that produce nectar and / or pollen in bloom and the bees have access to lots of food.

Seasonal Cycles of Activities in Colonies

A colony of honey bees comprises a cluster of several to 60,000 **workers** (sexually immature females), a **queen** (a sexually developed female), and, depending on the colony population and season of year, a few to several hundred **drones** (sexually developed males). A colony normally has only one queen, whose sole function is egg laying. The bees cluster loosely over several wax combs, the cells of which are used to store honey (carbohydrate food) and pollen (protein food) and to rear young bees to replace old adults.

In the dearth a reduction in the amounts of nectar and pollen coming into the hive causes reduced egg laying and brood rearing and diminishing population. Depending on the age and egg-laying condition of the queen, the proportion of old bees in the colony decreases. The young bees survive the dearth period, while the old ones gradually die. Propolis collected from the buds of trees is used to seal all cracks in the hive and reduce the size of the entrance to keep out cold air.

When nectar in the field becomes scarce, the workers drag the drones out of the hive and do not let them return, causing them to starve to death. Eliminating drones reduces the consumption of dearth honey stores. When the temperature gets cold, the bees begin to form a tight cluster. Within this cluster the brood (consisting of eggs, larvae, and pupae) is kept warm – about 36°C – with heat generated by the bees. The egg laying of the queen bee tapers off during the dearth, even if pollen is stored in the combs.

Metamorphosis period for bees

| | A | | | |
|-----------------------|-----------------------|-----------------------|--------|-----------------|
| Queen 1 2 3 | Worker 1 2 3 | Drone 1 2 3 | | Period |
| 4 5 6 7 8 | 4 5 6 7 8 | 4 5 6 7 8 | | eriod as larvae |
| 9 10 11 | 9 10 11 | 9 10 11 | | rms |
| 12 | 12 | 12 | days — | transfo |
| 14 | 13 | 13 | | n anc |
| 15 | 15 | 15 | | 000 |
| 16 | 16 | 16 | | ns co |
| | 17 | 17 | | e spi |
| | 18 | 18 | | arva |
| | 19 | 19 | | |
| | 20 | 20 | | |
| | 21 | 21 | | bee |
| | | 22 | | dult |
| | | 23 | | Ĭ |
| | | 24 | ↓ | |

as egg

feeding

under a closed cap

emerges



| | Days | Worker Bee Tasks | |
|------|--------------------|--------------------------------------------|--------------|
| | 1 | Cleaning cells and | |
| | 2 | keeping brood warm | A |
| | 3 | | |
| | 4 | Feeding older | B |
| | 5 | iuivue | |
| | 6 | | |
| | 7 | | |
| | 8 | Feeding younger | ന |
| | 9 | larvae | S |
| зее | 10 | | |
| ve E | 11 | | |
| H | 12 | | |
| | 13 | Producing wax | |
| | 14 | Transporting food | ര് |
| | 15 | within the hive | S |
| | 16 | Builaing combs | |
| | 17 | | |
| | 18 | | |
| | 19 | Guarding hive | (E) |
| | 20 | entrance | |
| | 21 | | |
| | 22 | | |
| | 23 | | |
| | 24 | | |
| | 25 | Visiting flowers, | |
| зее | 26 | pollinating them, | \mathbf{r} |
| ng E | 2/ | ana collecting pollen, nectar, propolis | L |
| agi | 28 | and water | |
| For | 29 | | |
| | 21 | | |
| | 22 | | |
| | 22 | | |
| | 34-35 | End of life | |
| | J 4 -JJ | <u> </u> | |
| | | | |
| | | | |

Bee making wax

Colonies that are well supplied with honey and pollen in the dearth will begin to simulatively feed the queen, and she begins egg laying during late dearth and the beginning of the new nectar flow. This new brood aids in replacing the bees that have died during the dearth. The extent of early brood rearing is determined by pollen stores gathered during the previous flow. In colonies with a lack of pollen, brood rearing is delayed until fresh pollen is collected from flowers, and these colonies usually emerge from the dearth with reduced populations.



Queen surrounded and supported by nurse bees

The beginning of the nectar flow

During early stages of the nectar flow, new sources of pollen and nectar stimulate egg laying and brood rearing. The bees also gather water to regulate temperature and to liquefy thick or granulated honey in the preparation of brood food.

Later in the flow season, the population of the colony expands rapidly and the proportion of young bees increases. As the population increases, the field-worker force also increases. Field bees may collect nectar and pollen in greater amounts than are needed to maintain brood rearing, and surpluses of honey or pollen may accumulate.

With an increase in brood rearing and the accompanying increase in adult bees, the nest area of the colony becomes crowded. More bees are evident at the entrance of the nest. A tell-tale sign of overcrowding is to see the bees crawl out and hang in a cluster around the entrance on a warm afternoon.

Combined with crowded conditions, the queen also increases drone egg laying in preparing for the natural division of the colony by swarming. In addition to rearing workers and drones, the bees also prepare to rear new queens. A few larvae that would normally develop into worker bees are fed a special gland food called royal jelly, their cells are reconstructed to accommodate the larger queen, and her rate of development is speeded up. The number of queen cells produced varies with races and strains of bees as well as individual colonies.

Regardless of its crowded condition, the colony will try to expand by building new combs if food and room are available. These new combs are generally used for the storage of honey, whereas the older combs are used for pollen storage and brood rearing.



Swarming

When the virgin queens emerge, and before the main nectar flow, the colony will swarm during the warmer hours of the day. Sometimes the old queen and at other times the virgin queens and a whole lot of the worker bees that have gorged themselves with honey will rush en masse out the entrance. After flying around in the air for several minutes, they will cluster on the limb of a tree or similar object. This cluster usually remains for an hour or so, depending on the time taken to find a new home by scouting bees. When a suitable location is found, the cluster breaks up and flies to it. On reaching the new location, combs are quickly constructed, egg laying, brood rearing starts, and nectar and pollen are gathered.



A swarm of bees entering a modern hive catch box.

When the virgin queens are about a week old, they fly out to mate with one or more drones in the air. The drones die after mating, but the mated queen returns to the nest as the queen mother. Worker bees care for her. Within 3 or 4 days the mated queen begins egg laying.

Before the nectar flow reaches its peak, the colony reaches its greatest population and concentrates on the collection of nectar and pollen and the storage of honey for the coming dearth. After reproduction (swarming), all colony activity is geared toward dearth survival. The nectar flow peak is the time for storage of surplus food supplies. Rain or drought may reduce

flight and the supply of nectar and pollen available in flowers. It is during the flow that stores are accumulated for the dearth. If enough honey is stored, then the beekeeper can remove a portion and still leave ample for colony survival.

Basic honeybee colony management guidelines



Beekeeping follows these seasonal cycles. This is important for beekeepers to understand. In Ethiopia like South Africa (tropical region), it is more difficult to note the seasonal cycles since there is no period when the colony is totally inactive. The yearly colony cycle can be broken into three periods:

- 1. Honeybee Colony Management during build-up period.
- 2. Management of colonies during honey flow period.
- **3.** Management of colonies during dearth period.

The periods vary from place to place and more than one of each can occur in a yearly colony cycle. It is also not possible to use fixed rules or routines as no two season are ever alike. Flowering of plants, and, more importantly, nectar flows, are influenced by seasonal weather patterns. The honeybee colonies respond to these changes. Therefore, beekeepers have to understand the habits and activities of the bees in reaction to the changes of their environment to be successful.

A beekeeper has to establish seasonal management plan based on her / his knowledge of the dates when the major honey flows occur, hive and bee observations, and the extent to which these days may vary from one year to year.

This plan tells the beekeeper when changes occur within the hive or in the environment. It allows her / him to manipulate her / his colonies efficiently ahead of the time. **Tip:** Consult the Holeta Bee Research Centre or / and read their book: "HONEYBEE FORAGES OF ETHIOPIA".

Tip: Speak to traditional beekeepers in your area to find out their ideas of when the seasons are.

Honeybee Colony Management during build-up period

Timing of management operations is critical in enabling the building up colony populations in preparation for the main nectar flow.

The period is called the build-up period because the queen starts laying many eggs to produce many worker bees.

Specific management points, which call for careful attention during this period, are:

- 1. Control of diseases and pests
- **2.** Queen rightness (the presence of a healthy queen). This determines the performance of the colony
- **3.** Sufficient food reserve for the colonies
- 4. Provision of adequate space in the hive
- 5. Swarm prevention



Read: "Honeybee forages of Ethiopia".

Providing space for build-up of the colony (supering)

Colonies in all types of beehives need extra space to expand the brood nest during the build-up period.

The colony needs to rear brood and build the population. If enough space is provided at proper time, colony build-up will be maximised, and production of honey increased. Good beekeeping maintains colonies in potential swarming condition, yet controlling swarming by providing sufficient space to accommodate the growing population.

Therefore, to achieve maximum honey yield, colonies should build-up before the main nectar flow, not during it. Colonies that continue their build up on the main nectar flow usually produce little surplus honey for the beekeeper.

Therefore, generally successful population build-up in beekeeping is dependent upon:

- 1. Availability of nectar and pollen sources during the late dearth / early build-up period,
- 2. Queen's capacity to lay eggs,
- **3.** Size and age structure of the supporting worker population's ability to maintain favourable conditions in the brood nest and to feed the brood, and
- 4. Proper space in the proper time for expansion of the brood nest and storage of honey.

Feeding of bees during the build-up period

Instead of feeding bees with artificial food during the build-up period, it is cheaper, more sustainable and healthier for the bees to manage hives well by leaving at least ¹/₃r^d of the honey when harvesting and only harvesting once during the year.

Management of colonies during honey flow period

There are three basic management activities need to be performed during honey flow period:

- 1. Determining when the main nectar flow occurs:
 - a. Identify the major nectar and pollen plants of the area.
 - **b.** Recording the flowering periods.
 - c. Keeping records of the weight gains and losses of colonies.
 - d. Speaking with other beekeepers, especially traditional beekeepers.
 - e. Speaking to your local honeybee research centre.
 - f. Reading books about bee plants in your area and when they flower.
- **2.** Preparing the populous colony for the main nectar flow:
 - **a.** Timing in colony management during build-up period is critical in preparing the colony for the main nectar flow.
 - **b.** Providing additional space for colonies:
 - **i.** The following indicative conditions can be helpful to know when to provide extra space for the bee colonies:
 - 1. When the colonies are observed externally, it is possible to see clustered bees at the entrances of their hives.
 - 2. When the hive is open the whole comb could be covered with bees.
 - **3.** Whitening of the tops of frames in the brood chamber or food chamber with freshly secreted beeswax.
 - ii. Methods of providing space to a colony:
 - **1.** Adding supers to the hive when the super on the hive is $\frac{2}{3}$ rd full.
 - **2.** Harvesting, extracting and storing the honey
 - **a.** The honey is ripe when the bees cap the cells with honey with a thin layer of beeswax.
 - **b.** When 90% of a comb contains capped honey, it is ready for harvesting.
 - **c.** If uncapped honey is harvested, it will ferment.
 - **d.** For harvesting the ripe honeycombs, bees are best removed from the comb by brushing them off.
 - e. A little smoke can be used to get them started, but using too much smoke to clear the comb of bees will give a smoky taste to the honey.

In summary

Maximum quantity and quality honey production requires:

- **1.** Prolific young queens.
- 2. Stimulating early colony growth.
- 3. Ensuring an ample supply of food (not overcrowding an apiary site).
- 4. Effective seasonally based management.
- 5. Optimum weather conditions.
- 6. Prevention of swarming.
- 7. Protecting from enemies and diseases.

Reducing hive volume

Reducing hive volume during the dearth period is one of the important activities to get colonies in good condition for the next active honey follow season.

Reducing hive volume helps the bee colony to maintain the internal heat temperature easily so that the bee colony will easily cover the entire combs.

In addition to this, reducing volume helps to protect the colony from various pests' infestation like wax moth.

The hive volume can be reduced by removing the honey super. However, instead of removing all frames from the top with the super, it is very good to select only the empty combs (without nectar, pollen), old dark combs and broken frames from all the chambers and use the good ones from the reduced super in place of them. Please see page 40.

After reducing the super, clean the frames by removing combs and hang them in aerated areas for next season use.

Always make sure that you have left at least ¹/₃r^d of the honey from the harvest for the bees.

Task 1: Trapping swarms

Traditional beekeepers make their hives smell like bees were living in them with old wax and propolis.

You can do exactly the same.

Ask a beekeeper to give you the black wax and propolis that they don't use. Rub this onto the inside and entrance of your hive. If you burn it with a candle it works even better.

Note: Waxed frames will also attract bees.



Trap hives

Make sure to put your trap hive out at the start of the season.

If you don't know when this is ask a traditional beekeeper when they put their hives out.

Put your trap hive out on top of a roof or in a tree.

Keep checking the trap hive to see if bees have moved in. After 2 weeks open the hive to remove spider webs.

There are other ways to acquire bees. These methods, should not be attempted by anyone without much experience.

Splitting a swarm

This is a method where you stimulate bees to produce an emergency queen. It weakens a colony and it takes a long time to recover but if done at the right time of the year it can be successful.

Transferring a swarm

This can be an effective method if the combs and bees are moved with little damage to the new hive. Once the bees have been transferred they must be moved gradually, i.e. 2m per day or at least 10km for 30 days at night.



Setting up an apiary

An apiary is a site / place where you keep beehives. This manual teaches stationary hive beekeeping. In other words you don't move your hive around.

You might see apiaries of 30 or more hives in an apiary. This only works if you can move your hives to new nectar flow so the bees have food.

Like traditional beekeeping, if you practice stationary hive beekeeping, i.e. you don't move your hive around, you can't have more than 2 or 3 hives in an apiary otherwise you will never produce any honey.

A good apiary site is one that is

- 1. Secluded,
- 2. Exposed to full sunlight, and
- 3. Close to a multitude of flowering plants; it must have
- 4. Good air circulation and
- 5. Water drainage, and
- 6. A reliable source of fresh water.

Apiary site selection for profitable beekeeping

This manual proposes stationary apiary site beekeeping. This means that hives are not moved around like in commercial beekeeping.

Carrying Capacity

The carrying capacity of an environment is the maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.

Very important: In order to manage the hives in a stationary apiary, it is critical to understand carrying capacity!!!



Exceeding the carrying capacity

In the same way that cows will grow thin if there are 20 of them in a camp with enough food for 10, too many hives in a stationary apiary will not enable enough resources for all the hives to produce excess honey.

Therefore, similar to traditional beekeeping, spread apiaries and hives out and start with one hive per apiary increasing the number slowly as you see the production of your first hive. From keeping accurate records, measure the impact of keeping more hives. Rather have too few that produce honey than too many that don't produce any honey.

Fresh water for the bees

Water is needed by bees for individual consumption, brood rearing and hive ventilation. To satisfy the requirement, site selection for be keeping activities should be within a maximum of 0.5 km from water to the apiary site.

Position of apiary

The apiary <u>should be close</u> to a homestead <u>to</u> <u>deter theft</u>, but <u>not too close</u> to the house, children, domestic animals or anyone or thing that can be stung.

It is good to plant around the apiary to make bees fly up.

Bee flight

Moving hives

If you move your hive 2m per day, the field bees will find the queen when they come back looking for their hive / after foraging.



Or if you have transport for your hive, take it at least 10km away <u>at night</u>, leave it there for for 30 days before bringing it back to where you want to put it.

Task 2: Adding supers

At the build-up period of the flow the queen will lay more and more eggs so there will be more and more bees. The extra bees will start bringing in more nectar and build comb and make honey. It is very important to monitor their progress and add supers when necessary. This has two functions:

- To slow down swarming. Swarming is how a bee colony reproduces when they have run out of space in their home, they produce a new baby swarm which flies off looking for a new home.
- **2.** The bees pack honey into these supers which makes harvesting easier.
- **3.** If you have drawn out comb in your frames the bees will fill them with honey much faster and you can produce much more honey.

Preparing a super to add to your hive

If you have a super with drawn out comb this is the best. If you have wax foundation in your frames this is a good option. Otherwise use a waxed starter strip that protrudes 7mm from the top bar.

Make sure that the frames are spaced properly, i.e. 32mm, so that the bee space is perfect when you add the super.

Note: If you have drawn out comb you can space the frames wider, e.g. 35 or 40mm.



Task 3: Harvesting honey

- 1. Check that the combs are 90% capped.
- 2. Leave at least 33% of the honey for the bees.
- 3. Always be aware of keeping everything clean.
- 4. Follow the instructions in the African Smallholder Beekeeper Essential Honeycomb Processing Manual.

i.e. just as the flow ends.

Harvesting

- 1. Plan.
- **2.** Time of the year.
- 3. Smoke hive.
- 4. Remove frames that are 90% capped.
- 5. Leave 33% of honey for the bees.
- 6. Place harvested frames in an empty super.
- 7. Reduce space in hive.



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Transporting the harvest

When you have placed the harvested frames in an empty super, seal the super on the top and bottom and strap the lids closed.

Try not to bump the harvested frames and transport by carrying / horse / motorbike / car to where you will be extracting the honey.

Tip: Try to extract honey from the combs as close to the beehive as possible to reduce changes of breakage.



Have someone hold the super to reduce bumps

Storing drawn out comb

After extracting honey from the combs, put the frames with the last honey on out for bees to clean. For a few days there will be lots of activity. When the combs are dry, store them in empty supers with lots of space and light.

Tip: A super is a box with no lid or floor that can take frames.

Wax moths hate light and air so if you store it correctly you won't have a wax moth problem.



Task 4: Replace old comb

In the dearth period, i.e. the period where the queen is laying very few eggs and so there are very few bees – inspect the brood combs and replace the two darkest combs with frames with no comb so that the bees can make fresh, clean comb.

Tip: If you don't manage your brood, you get weaker and weaker swarms.



Add two new frames in the middle with one old frame between them. Shift all the frames out to the sides.



Record keeping

Each time you visit your hives collect the following information:

| Hive name: | Hive name: |
|------------------------------|------------------------------|
| Apiary site: | Apiary site: |
| Date and time: | Date and time: |
| Health of queen: | Health of queen: |
| Harvest: | Harvest: |
| Super: | Super: |
| | |
| Hive name: | Hive name: |
| Apiary site: | Apiary site: |
| Date and time: | Date and time: |
| | |
| Health of queen: | Health of queen: |
| Health of queen: Harvest: | Health of queen: Harvest: |

Pest management

Ants

The main thing to prevent ants being a pest is to have your hive on a stand with a barrier that stops the ants. Useful things are oil / grease / ash.



Honey badgers

Taller hive stands and strong wire or strapping holding the hive firmly on the stand are the best deterrent of a honey badger.



Baboons

Baboons climb on stands and push the hive off. So strap hive securely on hive stands.



Wax moth

Light and Ventilation: Wax moths prefer small dark places. Storing your frames of drawn comb in well lit areas and providing maximum ventilation creates a hostile environment for wax moths. If you store your drawn comb frames in supers, make sure they are placed in adequate light and there is ample space between supers so air can flow freely.

Phostoxin: Phostoxin is a safe treatment available for use when dealing with wax moths. Stack your supers about five high and place a sheet of newspaper on top. Tape up all cracks between supers to ensure you have created a properly enclosed fumigation chamber. Place the Phostoxin on top of the newspaper in a porcelain saucer and put on a top cover. When the build-up period arrives, make sure to air out Phostoxin treated frames for a couple of days before adding to hives.

Stack hives with drawn out combs with spacers so they receive lots of light and air.









Endnote

As you will have seen in this manual, we have offered some practical and accessible solutions for beehive management. The sizes have been well researched for beekeeping with the African Honey Bee both in Ethiopia and South Africa and the methods have been trialed and tested in both countries.

The method used for problem solving is known as Asset Based Community Development (ABCD). ABCD is a methodology for the sustainable development of communities based on their strengths and potentials. It uses the community's own assets and resources as the basis for development; it empowers the people of the community by encouraging them to use what they already possess.

We have found the adage: "Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime," to only be true if you first teach a man to make the equipment he needs to fish. God has given each one of us the gifts we need to change our lives. We are blessed with relationships; we have families and communities. We are blessed with assets such as natural resources, waste that we can recycle, and the things we own. We are blessed with abilities, talents, the passion to learn, and the capability to work hard. This book suggests ways that we can use these gifts to change our lives, the lives of our families and those of our communities.

There are many books about more advanced beekeeping than what is suggested in these manuals. These will make a lot more sense once you have learnt the basics taught in these manuals. Treat the lessons learnt here as a foundation that you can build on.

Good beekeeping Guy and Oromia Agricultural Research Institut Holeta Bee Research Center

Hive inspection

- 1. Safety clothing
- 2. Smoker
- 3. Smoker fuel and matches
- 4. Hive tool
- 5. Spare super and 11 waxed frames
- 6. Match box to catch queen
- 7. Rubber bands

Supering

Harvesting from a modern hive

| 1. | Safety clothing | | | | | |
|----|---------------------------------------------------------------------|--|--|--|--|--|
| 2. | Smoker | | | | | |
| 3. | Smoker fuel and matches | | | | | |
| 4. | Hive tool | | | | | |
| 5. | Empty super and 11 spare waxed frames or framed with drawn out comb | | | | | |
| 6. | Lids to seal super | | | | | |
| 7. | Strapping to hold lids onto super | | | | | |
| 8. | Bucket with water for cleaning equipment | | | | | |
| 0 | Old brood management | | | | | |

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Developed within project Improved livelihoods of coffee and honey/bee by-product producers within conserved landscapes in Bale, Ethiopia

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