BEE KEEPING

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BEE - KEEPING

Introduction:- There is probably no other occupation about which non-participants know so little as is the case with bee keeping. Often too, the little they know tends to be partly true. For this, folklore and the popular press are largely responsible. The local press has given undue stress on facts about bee keeping which are far from their explanatory context.

There is also the fact that in some countries, particularly in Europe where there is a large number of amateur bee keepers there is a tendency to treat the honey bee with extra admiration rather than treat it as a tool used for the production of honey.

This pamphlet is not designed to tell the complete story of bees and bee keeping. It is intended to explain the pattern of bee keeping in Northern Nigeria and the Ministry of Agriculture’s extension work in that field. In doing this, it is necessary to include the natural history of the honey bee.

HONEY BEES

Varieties:- Although all the economically important bees in the world are of the same species, there are a number of varieties which have evolved as a result of their environment in various areas.

The most productive varieties are found in Europe where their habit of storing large quantities of food have been fixed by natural selection over a long period of time.

The only variety of honey bee in Northern Nigeria is *Apis mellifera*, adonsoni (Latreille).

It has been said that African bees are as productive as other varieties, but this claim has not been justified by empirical research. It is noteworthy that in Brazil, the only country outside Africa in which the indigenous African variety has been introduced is now taking active steps to eradicate it. The variety was introduced there more than eight years ago.

In a colony there are male and female bees. The male honey bee is called the drone. A number of drones are reared and tolerated in colony when their presence may be needed. When there is little or no food coming into the colony, the drones may be destroyed.

The female bees are of two kinds. In each colony there is usually only one queen. She lays all the eggs and is called "mother of all the bees."
The remainder of the bees in the colony are workers. They may occur in large numbers up to several thousands. These workers are female whose ovaries have not developed, but their bodies have become adapted to perform different works in maintaining the colony.

The queen is able to lay either male or female eggs. But she will not lay eggs in an unclean cell. To prepare a cell for egg-laying, it is ‘painted’ with a thin coating of propolis. It has been said that the worker bee is an ‘imperfect’ female. This is true as far as her reproductive organs are concerned. The queen is ‘imperfect’ also, since she is unable to do the work of a worker.

Field Life:-- Longevity of the individual worker bee is of great importance. Once a worker becomes a ‘field bee’, its length of life is determined by the amount of flying which it does. Some may live for three or four weeks only.

This means that sufficient young bees must be reared for a complete replacement over that period. Since the field force may number 30,000, even a few days of extra life greatly reduces the number of young bees needed to replace them and hence the amount of food needed to rear them.

Length of ‘field life’ appears to be connected with length in size and adonsoni is a short winged variety.

Honey Comb:-- The life of the colony is centered on the combs. These are made by the workers from wax which is a secretion from their wax glands on the under side of the abdomen. The honey comb is one of nature’s engineering feats.

The combs are attached to the top of the place in which the colony lives. It is extended downwards according to the prosperity of the colony and the space available. They are spaced from each other so that there is just sufficient space for bees to work on both faces of adjacent combs.

This in practice means that with most varieties, the septa of the brood combs are one-and-three eighths of an inch apart.

The comb is constructed to provide the maximum number of cells with the minimum expenditure of material. It provides the greatest strength possible with what appears to be flimsy construction. This is achieved by the hexagonal shape of the individual cell. These cells are of remarkable accuracy and are consistently correct with regard to size.
The combs are used for brood rearing and the storage of food. This brood is roughly spherical and the area surrounding it can be used for storage. When nectar is available in large quantities it is always stored at the top of the comb, so that as the brood emerges from the cells at the top it is replaced by food and the brood nest moves downwards.

As this process goes on, either the combs must be extended downwards or the area available for brood rearing becomes restricted. These facts are of importance when we consider modern methods of bee keeping.

The colour of the wax from which the combs are made varies according to the floral source of food. However it is always light in colour usually yellow or white.

**Brood Nest:** The queen lays her eggs within the brood nest. The larvae are fed by the workers and adult bees result. The worker egg takes three days to hatch. Its larvae is fully grown after five days and pupation occupies thirteen days. Corresponding figures for the queen are: three, five, and eight days. For the drone it is three, five and sixteen days.

The queen lays a large number of eggs, sometimes as many as 2,000 a day. The bees resulting from these eggs will replace the natural casualties and may also increase the number of bees in the colony. But no matter how long this goes on there is no reproduction in the true sense of the word. Reproduction in honey bees occurs when there are two colonies where there was previously one. This is termed swarming.

**CHARACTERISTICS OF HONEY BEES**

**Swarming:** Swarming occurs during the period when the colony is able to gather a great deal of food. This results in an increase in population and finally some queen cells are prepared.

When the larvae in these queen cells are fully grown and sealed for pupation, about half of the occupants of the colony together with the queen leave as a swarm. They will settle as a cluster in any convenient place. ‘Scouts’ go to look for a suitable place for a new home.

The parent colony is left to be headed by the first young queen to emerge. Frequently several of these young queens will successively leave the hive with smaller swarms. The first swarm with the old mated queen is termed the prime swarm. The others with the young virgin queens are termed cast swarms.
The swarm has to build its comb before eggs can be laid. After that, there is a three week period before there can be replacement for natural casualties although the prime swarm may give a good result if it issues on an optimum date, but in general both the swarm and the parent colony from which it came produce a poor honey harvest.

By modern bee keeping requirements, *Apis mellifera, adonsoni* (Latreille) has a great number of faults. The efforts of the bee breeder are directed towards a non-swarming bee. This means a variety which appears to swarm at intervals of two or three years instead of annually.

Since a colony which has swarmed produces little honey during the season in which it swarms, it becomes a great labour for bee keepers to keep a single colony as a unit. Nigerian bees swarm sometimes twice in a year.

**Mating:-** The virgin queen is mated before the colony can build up to strength again. Mating takes place in flight. The young queen may be mated by several drones on successive mating flights. However once her spermatheca is filled with spermatozoa no more mating takes place during the life period of the queen. From then onwards the queen controls the fertilization of eggs as they pass the duct from the spermatheca.

Eggs which are fertilised became females. Those which are laid without being fertilised became drones.

There is a period of pupation of the young queen plus the period of at least three weeks for her first eggs to develop into imagines. During this period, there are no replacements for natural casualties in the colony from which the swarm has issued.

**Behaviour of Adonsoni Bees:-** *Adonsoni* differs in behaviour from the European varieties in several ways. It constructs its natural brood combs on one-and-a-quarter inch centres instead of one-and-three-eighth of an inch centres. As a result, some authorities have recommended making movable frame hives with the smaller spacing. Experience in Northern Nigeria has shown that the variety will respect the normal one-and-three-eighth of an inch spacing if the frames are fitted with sheets of foundation or even with starters.

Probably as a result of its efficiency in protecting its colony, *Adonsoni* very rarely robs. It has been said that exotic varieties are ‘robbed out’ by *Adonsoni* soon after introduction. This claim has not been proved in Northern Nigeria. The failure to establish exotic varieties is due mainly to the increased numbers
of natural enemies of all varieties with which the introduced varieties are unable to cope.

The cells constructed by *Adonsoni* are slightly smaller than those constructed by European varieties. As with comb spacing, it has been found that *Adonsoni* will respect the cell size of European varieties and it is not necessary to have comb foundation made for that variety.

The maximum effective flying range of *Adonsoni* is less than that of the European varieties. It is therefore an advantage if bees are able to forage within a short distance. Bees will often fly farther than their maximum effective range, particularly in Northern Nigeria, in search of water which is essential to them. The normal range of *Adonsoni* is about one mile.

**Migration:** With most varieties of honey bees, it is rare for a complete colony to move into a new home. But *Adonsoni* variety is very likely to migrate or abscond from a bee keeper's hive for many reasons.

It will do so if it has used up all its food reserves and there is nothing coming in from the fields. It will do so if it is subjected to undue attention from enemies such as lizards. It will frequently migrate as a result of what could be termed management with other varieties. These migrating colonies are even more vicious at normal times. They possibly could be responsible for the mass attacks reported from parts of Northern Nigeria periodically.

**FOOD OF HONEY BEES**

**Nectar and pollen:** The food of the honey bee colony consists of nectar and pollen. Nectar forms the carbohydrate and the pollen forms the protein part of the diet. Adult bees do not need a great deal of pollen but no larvae will be reared if it is not available. Since both of these are not obtainable at all times, the colony stores them against the period of death. Nectar will not keep in good condition hence it is converted into honey for storage.

A point to note here is that the bees store food for their own use during the time when they are able to gather none. For this reason the bee keeper can only harvest the 'surplus' above the bee's requirements. If he takes all the honey from the colony the bees will certainly die.

In the Northern Nigeria where most of the food is gathered during the dry season, a small amount of nectar can be gathered all the year.
BEE KEEPING IN NORTHERN NIGERIA

Gourd Hives:- In almost every part of Northern Nigeria, bee keeping is a traditional occupation. In some areas, men who have no hives raid the colonies of bees in natural habitats when they are discovered. The types of hive used varies from area to area. The hives and methods in use have remained unchanged for years.

In the southern part of Ilorin province most bee keepers use large gourds as hives. Holes are drilled in the gourd to form a suitable entrance for the bees. A branch is cut from a shrub and the stalk of the gourd is forced unto the stump remaining on the main stem. Suitable 'medicine' is generally put into the hive to attract bees into it.

A. Gourd being used as a hive
Once the hive has been installed, the bee keeper does not visit it often until the end of the season. In harvesting the honey the bees are driven out with smoke and the gourd broken. All the comb is taken from the bees. Parts of the comb that contains the brood are thrown away. A new empty gourd hive is put on the tree for the colony to enter.

Since the honey bee is ‘place conscious’ rather than ‘hive conscious’ they usually go into the new empty hive and their chances of survival are very small. Under this condition the bees are unable to construct new combs in which the brood is reared and so the colony gradually becomes reduced until it finally dies of starvation.

Pot Hives:- In the southern part of Niger province and in Benue and Adamawa provinces earthenware cooking pots are generally used as hives. The mouth of the pot is closed with a piece of broken pot or other suitable material. It is sealed to it with mud or dung.

In parts of Adamawa, a smaller cooking pot is jammed into the mouth of the larger one to form a closure. Usually three holes are made in the closure to give the bees entrance. ‘Medicine’ is put in the hive which is lashed in the fork of a tree or shrub in a horizontal position.

In a small area around Abuja the pot is stood mouth downwards on a
flat piece of rock fixed into the fork of a shrub or even standing on the ground. In this case the entrance is made by knocking a hole in the side of the pot and reducing its size by wedging stones into it.

Cooking pots are used also in Plateau and Southern Bauchi provinces.

A cooking pot hive is not broken when harvesting the honey, but since the brood and honey are all on the same comb the bees are left with an empty hive after harvesting. Infact every colony of bees in Northern Nigeria living in traditional hives have little chance of survival after harvesting.

**Basket Hives:** Around Kagoro in southern Zaria, some of the bee keepers use a hive made of woven reeds like a round basket coming to a point at the top. The basket is made water-proof with a thick layer of dung and mud. A 'hackle' of grass is put on the top to protect the basket hive from rain. The basket is put on a fork of a tree about ten feet from the ground. A large hole is left in the side of the basket so that the owner is able to put his hand inside and take out the combs. Unfortunately it leads to too frequent harvesting.

C.
Rolled-up-Bark Hives: Jema’a in Southern Zaria is one of the small areas where hives made from rolled-up bark stripped from living trees are in use. This type of hive is common in other countries in Tropical Africa but is rare in Northern Nigeria. It is occasionally seen in Sardauna province. The practice is discouraged by the Ministry of Animal and Forest Resources.

Straw Hives: In Northern Niger, Northern Zaria, Katsina, Sokoto, Kano, Bornu and Northern Bauchi provinces, the long straw covered hive is popular. It is made from a basket of reeds or from a mat of guineacorn stalks rolled to form a cylinder. The reed basket may be cylindrical or it may taper at one end. Both types are thickly coated with dung on the inside and the outside. It is thatched with grass bound along the length of the hive. The ends of the cylinder are closed with broken calabash or with reed mats woven for the purpose. The closure are kept in place by wooden pegs. The hive is then lashed horizontally on the fork of a tree. As it is flammable it is placed as high as possible.

In general, bee hives in some parts of the Riverain provinces are only a few feet from the ground but they are installed higher on trees when one goes further north.

The cylindrical straw hive is found in all areas where Hausa influence is very strong.

D.
Kabba province is the one area in the riverain provinces where bee keeping is not generally traditional. Bee hives which can be seen near the villages are usually the properties of fishermen who have come from other areas.

Most of the hives mentioned above are put on the branches of trees.

Many bee keepers favour one particular specie of tree on which to site their hives. This leads to scattered siting. Only very rarely are two hives put on one tree. Because of this scattered siting of hives, one may walk many miles in a day to be able to visit six hives.

**MODERN BEE KEEPING**

**Temperate Climate:** In temperate areas bee keeping has become a highly specialised craft giving far greater reward than the traditional methods used in Northern Nigeria. The methods used are based on two facts.

The first is that bees always store their honey at the *top of the combs*. This means that, in a state of nature, if we examine the combs at the time when there is most honey in the colony we should see this:

![Diagram of a bee hive with honey and brood](image)

The shaded area represents pollen which is always stored near to the brood nest.
Since the brood and the honey are in the same comb, and since the combs are attached at the top; it is necessary to remove it all in order to harvest the honey.

**Box Hives:** The method illustrated in illustration ‘F’ is achieved in modern bee keeping by having a hive in the form of a box with a removable top.

Inside this box the combs are contained in wooden frames which the bee keeper can remove for inspection. This box is called the brood chamber of the hive and forms the permanent place where the young bees will be reared. See illustration below:

Schematic view of a brood chamber with part of one side cut away to the ends of the combs in which brood is reared.
During the season, i.e. the time when the bees can gather more food than their requirements, the cover is removed and another box containing frames installed above the brood chamber. Since no colony of bees has ever had a space above its combs in a state of nature, this second box (illustration below) is utilised for the storage of honey and can be removed without disturbing the brood nest.

(Schematic view of a ‘supered’ hive with part of the end walls cut away to show the frames of the brood chamber and the honey super.)

When the ‘honey super’ is nearly full the cover can again be removed and another installed above the first.

With the modern hive the bee keeper starts the season with a full colony. If the colony does not swarm it will give a good harvest. The fact of putting the super in place reduces the incidence of swarming since the honey is stored there instead of reducing the size of the brood nest. This means that higher yields will be obtained from a “supered” hive. The bees survive from one season to the next. This means too that the bee keeper will get a harvest every year from his occupied hives instead of being dependent upon the arrival of swarms.
The bee keeper in temperate climate is able to control the activities of the bees to a large extent since he is able to remove the brood combs from the hive for inspection and if the colony does make preparations for swarming he can do something about it instead of losing the bees.

The latter work requires a good knowledge of bee keeping techniques and of the behaviour patterns of the honey bee.

In good bee keeping areas, with good management and a good strain of bees, annual yields of 200 or 300 lbs are not uncommon.

**Movable Frame Hives:-** The bee keeper in Northern Nigeria might keep his bees in movable frame hives but not to practice any form of management. This could be compared with buying a tractor and only using it to power a grist mill. The modern bee hive is essentially of very accurate construction. Its parts and fittings are machine cut. To endeavour to make them by hand would be extremely expensive or would result in a second best product. It is therefore necessary to import hives until commercial wood working machinery is common in Northern Nigeria. Unless management of a high order is practised there is no hope of receiving an economic return upon the cost of an imported hive.

The Northern Nigeria bee keeper is therefore faced with the problem of improving on the traditional methods, using materials which are available locally and methods which the bee keeper can easily understand.

**Suitable Hives:-** The most important thing which must be introduced is the two compartment hive extendable upwards. The cooking pot used upside down is the most suitable for this purpose. It is cheap. It is durable and not liable to be attacked by termites. It forms a favourable habitat for the bees.

To form a brood chamber, a cooking pot of the size used by a family of ten people is required. Before installing it, it should be prepared by making two holes in it which will provide the bee-way from one compartment to another. (See illustration on page 18).

These holes can be easily made by scoring their outline with a screw driver or similar piece of metal. As soon as the metal has pierced the pot in one place, (the bottom is always the thinnest) the rest of the holes can be broken out in small pieces.
These holes are to be at the top of the hive and so it is necessary to shade it from rain. This is best done with a piece of broken pot kept in position by a mortar made of dung. A smaller hole, about one inch in diameter must be made in the lower slope of the hive to form an entrance for the bees.

Attracting Bees:- If the bee keeper has any favourite ‘medicine’ to attract bees to his hives he can use it in this brood chamber. Failing this a little bees wax and propolis can be melted and poured into the hive. The most attractive smell to a swarm of bees looking for a home is that associated with bees.

The hive can be stood on a flat piece of timber or any flat material. If nothing can be found to form a floor board, the mouth of the pot will have to be closed with a piece of broken pot of similar material. The hive should be installed about two feet from ground level.

The practice of putting the hives high on trees should be discouraged. One reason for this is that by climbing the tree the bee keeper is alerting the bees so that a ‘reception committee’ is waiting for him. A suitable stand for hives can be made from concrete building blocks with ‘azara’ poles resting on them. If the building blocks are soaked in old engine oil ants will be discouraged.
Siting Hives: Hives should be grouped together. In most areas up to thirty hives can be kept in one place. If they are grouped in this way the bee keeper can visit them more easily without walking many miles.

Where hives are sited and grouped together, the bee keeper should clear the bush around the place to avoid bush fires.

Bee hives need shade. The interior of the hive has to be kept at a constant temperature for brood rearing. In Northern Nigeria some bee keepers cool their hives by evaporating water on them. If the hive is put in the sun, it will have to gather more water. Bees which are gathering water cannot at the same time gather nectar. This is why a hive which is without a shade will produce less than one in the shade.

For the same reason hives should be located within easy flying distance of a perennial water source.

Frequently a tree can be found which will provide shade for a number of hives but care should be taken to choose a tree which is not completely bare of leaves at any period of the year. If a suitable shade cannot be found, it is an economic proposition to erect a shade using ‘azara’ or bushpoles for a framework and guineacorn stalks for the roof.
Once the hives are installed the bee keeper usually will be content to wait for swarms to enter them. During the swarming season, this varies from area to area but always in the dry season, this will occur fairly frequently. A notable example is that of the three hives occupied in three weeks at the Government Reservation Area in Zaria.

The bee keeper should note when the hives are occupied by visiting the apiary periodically. If they are occupied early in the dry season they will construct their brood nest and be ready to produce honey later in the same season. If, however, they arrive towards the end of the dry season it will be better for the owner to leave them undisturbed until the next season.

When the main nectar flowers start, the roof should be removed and a second pot put in place as a honey super. This is the pot which will contain the honey harvest and it will be removed at the end of season when the bee keeper will normally harvest his traditional hives. When the super is removed the piece of broken pot should be replaced on the brood chamber and the colony left undisturbed until next season.
A cooking pot hive of this kind has the following advantages when compared with the traditional chambered hives:-

(a) It introduces continuity into bee keeping and stimulates interest by providing a regular income.

(b) It gives a higher yield per colony after the first season and the hive is occupied by a full colony at the beginning of the season.

(c) Honey harvesting is easier since the bee keeper does not have to drive out all the bees at harvesting time.

The frame hive of modern bee keeping should not be recommended to the bee keeper at present time. Educated bee keepers will later like to try it after seeing the advantages.

Management of frame hives is not included in this note. At the present time frame hives have a use in this country but it is limited to experiment and instructional use.

**ECONOMICS OF BEE KEEPING**

**Time Factor:** A large number of occupations can appear to be economic if they are conducted by one man and that man does not consider the value of the time which he spends on them. This is particularly true of bee keeping.

A straw hive can be made by the bee keeper himself from materials which will cost him nothing. If he is fortunate a swarm may enter the hive and may have stored some honey by the time he goes to harvest from the hive. Thus if he harvests only 12 lbs (about the average from traditional hives) and sells this in the market for twelve shillings, he may consider that he has made a profit.

Indeed if one considers the length of time which he has spent altogether, the reward is extremely poor. If he is unlucky and no swarm enters the hive he has lost nothing except his time.

In a community where subsistence farming is general, bee keeping in this manner will survive as a craft. However, in any country with a rising standard of living where the farmer has an increasing income from cash crops, bee keepers become less in number and there is a danger of the craft dying altogether. This trend is important, not only because of the loss of an outstanding food source, but also because an adequate bee population is essential to other branches of agriculture.
Harvesting in Tropics and Temperate Areas: The harvest from a colony of bees in the tropics usually will be less than the harvest from a comparable colony in temperate areas. The main reasons for this are:

(a) In temperate climates bees have a considerable period in each year when their activities are negligible and the amount of brood reared is at a minimum. This means that the amount of food eaten during this period is greatly reduced and hence a greater amount of the total harvest is available to the beekeeper.

(b) In the tropics the bees are active for the entire year (365 days) and hence the natural casualties are more numerous and a large brood nest must be maintained to replace these casualties.

(c) The nectar producing flora of the tropics generally does not compare with that of the temperate regions. Hence one should not take seriously the views of many textbooks which have been written about beekeeping in temperate climates and consider what is feasible in Northern Nigeria at the present time.

The average yield from a traditional hive is 12 lbs. The indigenous beekeeper often claims considerably more than the cubic capacity of hives. However many of the occupied hives have been occupied for such a short time that only a few ounces can be taken. In arriving at this average no consideration has been given to the fact that only about a third of the hives put out are occupied by bees in any one season.

Superable and Traditional Hives Harvests: The beekeeper using superable (two chamber) hives will harvest no more than the man using traditional hives during the first season. Thereafter he will harvest more since his hives will be occupied by full colonies at the beginning of the season.

We will first consider that a man installs ten empty traditional hives and ten empty double chambered hives and that the same number of swarms enter each group in each year. During the first year the position will be:

<table>
<thead>
<tr>
<th>Single Chamber</th>
<th>Double Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of swarms</td>
<td>No. of swarms</td>
</tr>
<tr>
<td>Hives with bees</td>
<td>Hives with bees</td>
</tr>
<tr>
<td>Honey</td>
<td>Honey</td>
</tr>
<tr>
<td>Cash</td>
<td>Cash</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>48lbs</td>
<td>48lbs</td>
</tr>
<tr>
<td>48/-</td>
<td>48/-</td>
</tr>
</tbody>
</table>
After harvest, bees in the single chamber hives will die while those in the double chambered hives will survive by living in the lower bottom pot hive and feeding on the honey left unharvested. During the second year the position will be as follows:

<table>
<thead>
<tr>
<th>Single Chamber</th>
<th>Double Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of swarms</td>
<td>No. of swarms</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Here, the bees in the single chamber hives perished. In the third year, the position will be:

<table>
<thead>
<tr>
<th>Single Chamber</th>
<th>Double Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of swarms</td>
<td>No. of swarms</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

During the three years shown above the single chamber hives have produced an income of £5: 18/- while the double chamber hives have earned £21: 18/-.

The economic advantage of the permanently occupied two chambered-hive is clearly demonstrated.

**HONEY**

**Honey As Food:** Only comb which is sealed over contain honey. Any comb in which the liquid can be seen, contains nectar or nectar which has not yet been completely ripened.

One of the disadvantages of primitive hives is that once the hive is opened the harvest must be taken whether it is ripe or not. Hence most of the ‘ruwan zuma’ offered for sale in the markets of Northern Nigeria has a higher water content than honey. In this condition it must be sold, and consumed, at once or fermentation will spoil it.
After harvesting, ripe honey will keep indefinitely in suitable air-tight containers. The bee keeper who is using a superable hive can replace the super if he sees that the bees have not yet finished their work.

As human food, honey requires no digestion since all the saccharides are in simple form and are immediately assimilable. It provides immediate energy and for that reason it is favoured by athletes. It is an ideal food for invalids, growing children and the aged people.

Its very low ash content makes it a ‘good value’ food. Due to its low water content, it is safe food too.

Honey from nectars of different floral sources each has its own particular flavour. The colour of honey also varies from water white to very dark amber, almost black. In general, honey flavours in Northern Nigeria are good. On the world market light honey is usually preferred but dark honey frequently has local appeal.

Storing:- When honey is extracted from the comb and stored, most of it will become solid in appearance. This is known as crystallisation. This occurs because honey is super saturated solution and sugar crystalises out from solution.

Honey Flora Trees:- Honey flora of Northern Nigeria does not compare with that of temperate countries. To a large extent this is due to the fact that none of the crops planted by farmers produce nectar.

In some countries cotton is a major nectar producer but here it produces nothing. There are indications that higher applications of fertilisers than are generally used at present will rectify this.

Outstanding amongst the nectar producers is the ‘dorowa’ tree, (Parkia clappertonia Dalziel). In areas where it is common the bulk of the honey comes from this source.

Further north, Acacia species supply most of the nectar. Where Eucalyptus species have been introduced they yield nectar freely and plantations could easily be the major bee forage.

MARKET

Local Market:- Comparisons have been made with the temperate areas of the world. Although trade in honey in the local market is quite large, it is
related to the times of harvest in the areas. The production could be increased by 100% and still find market within the country.

The present consumption of honey, per capital probably does not amount to one ounce per annum. The potential production is sufficient to allow a consumption of up to 10 lbs per person per annum. This figure is about that of the largest honey consuming countries of the world, and it would be very wrong to consider the export of honey until this figure is reached.

The honey which is sold in the markets is sometimes sold as harvested, that is in the comb, or is expressed from the comb and sold in bottles. Many consumers insist on honey in the comb because of a well founded suspicion that the bottled product may be watered. Occasionally one finds a vendor who will offer watered or un-watered honey at different prices.

Most of the honey on sale has a high pollen content because it is harvested from single chamber hives. The pollen is not harmful but it gives the honey a 'powdery' taste.

Due to its nature the honey attracts a fair amount of dust before it is sold. The pollen and the dust give it an appearance of 'thickness' which is not justified by its water content.

Local consumers, when shown a sample of clean honey with the correct water content, usually say that it is not honey or that it has been watered.

Some consumers, boil the local product in order to 'sterilise' it. The constituents of honey which give it its aroma and flavour are highly volatile. In addition the saccharides are easily caramelised. Hence when the local product is boiled, although it may still be a sweet liquid, it is certainly not honey.

If market saturation is ever reached here, the quality of the local honey and the method of handling it would require considerable improvement before it would be acceptable overseas.

Bee's Wax:- Unlike honey, bee's wax is for export. Uses of bee's wax in Northern Nigeria are very few. Commercial bee keeping methods of the temperate areas produce very little wax.

More than half of the bee's wax produced in the world at the present time is used by the cosmetic industry and the demand for this purpose is still rising. Church candles are made from bee's wax. Printer's ink and carbon papers owe their non-sticking qualities to bee's wax. The dental profession regularly uses it.
Trading companies in Northern Nigeria are anxious to buy bee's wax. In recent years the price paid has fluctuated between two shillings and six pence and three shillings and three pence per pound weight. Each hive will produce about one to four pounds (weight) in a season.

In spite of this, most of the bee's wax from colonies of bees in Northern Nigeria is still thrown away. The reason for this is that bee keepers live in remote areas. Some could not sell wax and traders who will buy it from them locally will give only a fraction of its value.

**Royal Jelly:** The royal jelly is the larval food for the queen bee. At first, it found a ready market at £14 an ounce. Some amazing claims were made that it had cured a large number of diseases. Since that time investigations have shown that royal jelly or some part of it may have some use in medicine. The production of royal jelly in Northern Nigeria will not be possible at present with the indigenous bees.

**Bee Sting:** The venom from the sting of the honey bee has a limited market for use in bee sting therapy. This market is satisfied by a few specialists and it is unlikely that the demand will increase. The stings are deterrent to would-be bee keepers. There are a small number of people who are allergic to bee stings and even one sting can make them seriously ill. A bee veil which can be easily made from a wide brimmed hat and a length of mosquito netting should be worn in order to protect the eyes.

There are several things which provoke bees to sting. The smell of stale perspiration on the human body or on clothing is objectionable to bees and will invite attack. Bees resent sudden movements and will sting as a result of such. The person who wildly waves his arms in the air when near bees is certain to be stung. Dark, wooly clothing invites more stings than white coloured smooth textured cloth. The traditional loose fitting clothing of Northern Nigeria is particularly unsuited to bee keepers because it can easily trap a bee. A trapped bee will sting because it is confused.

Clumsy handling of bees and their hives invites stings. The 'fear odour' given off by the human body is responsible for many sting attacks.

Unfortunately there is nothing which one can do about this, but usually it disappears after a person has become accustomed to having bees flying around.
ENEMIES OF BEES

Lizards:- Honey bees in the Northern Nigeria have more enemies to contend with than in most countries. Lizards are wise to take up a position on or near every colony of bees, and spend most of the day-light hours feeding on bees.

From the viewpoint of the bee keeper each of these bees has to be replaced and it takes the equivalent of one cell filled with honey to rear the replacement.

Tests are underway to decide if it is economical to install bee hives on stands which will prevent lizards from getting nearer to them.

Ants:- Ants are also frequently seen trying to enter hives. Although the amount of damage caused by them is normally small, they are a disturbing factor to the colony. A colony which is constantly alerted for defense will produce less than a colony which is undisturbed. If hives are kept near the ground, they can be stood on concrete building blocks which have been soaked in old engine oil. The engine oil periodically applied will prevent the ants from entering the hives.

Insectivorous Birds:- Insectivorous birds of all kinds will prevent the ants from entering the hives.

Merops Species:- Merops species, the bee-eaters are common at certain times of the year in parts of Northern Nigeria. They prefer a diet of bees and depopulate a colony by taking up positions near an apiary.

It has been reported that if a number of bee eaters are near an apiary, the bees will cease flying with a consequent cessation of work. If only one or two of the birds are seen near an apiary, it is hardly worth taking any action against them. If the apiary is near to a nesting site, twenty or more birds may be seen. In this case a length of fishing net hung in the line of flight of the bees will result in the bees flying through the mesh while the bee eater will be caught in the mesh on following the flying bees. The net should be secured at the top only or the birds will free themselves.

Hawk Moth:- Deaths'-Head Hawk Moth (*Acherontia atropos*) does considerable damage if it gains an entrance to a hive.

Large Hive Beetle:- The large Hive Beetle, (*Hoplostomus fuligineus*) is common in Nigeria. It is found in the nest of bees and termites. It has been

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reported to live on honey but it is only seen on pupating brood. It chews off the cell capping and eats the head and part of the thorax of the pupa.

The bees are helpless since the beetle moves slowly over the combs and never exposes any part of its body which would be vulnerable to stings. It is sufficiently large to be excluded from the hive by the small entrances mentioned above.

**Small Hive Beetles:** The Small Hive Beetle (*Aethinia tumida*) is found in every colony of the bees in this country. Its larvae live on pollen, and possibly honey stored in the comb. They also feed on the debris at the bottom of a hive. Although the contents of the cells visited by the beetle larvae often ferment, this does not appear to be the worst effect. This is the fact that the imagines disturb the work of the colony by their presence. The bees appear powerless to deal with them since they are too small (about three sixteenth of an inch) to be stung and in any case, successfully evade pursuit. Hence worker bees are constantly chasing them.

**Bee Louse:** (*Braula coeca Nitz*). The bee louse is found in all countries where bees are kept. It is more common in the tropics than elsewhere. In Northern Nigeria, most colonies have a few of them but some hives have hundreds. It is a small wingless fly, (the size of pin head,) not a louse and it is found on the outside of the body of the bee, usually on the thorax.

The imago lives on food taken from the mouthparts of the bee during food sharing or the feeding of larvae. Since the queen has a large amount of food passed to her, she often has a large number on her body.

The larvae are responsible for damaging honey comb. They burrow under the cappings leaving a web and feaces behind them.

Tobacco smoke and the smell of camphor have both been recommended for clearing the parasite from the hives although re-infestation occurs rapidly. Neither is very effective. In view of the widespread infestation in Northern Nigeria it would be a waste of time.

**Wax Moths:** Wax moths occur in all countries where bees are kept. The Greater Wax Moth, (*Galleria mellonella, Linn.*) and Lesser Wax Moth, (*Achroia grisella, Fabr.*) are both common in Northern Nigeria where they are a greater problem than in the temperate areas because they have a year round breeding season. The habits of both are similar. Eggs are laid on combs which the bees are not occupying. The resultant larvae burrow through the
comb leaving wax and feaces behind them. Sometimes comb which the bees are using will be attacked, leading to the condition known as ‘bald-headed brood’, where the cappings have been eaten away. Strong colonies of bees occupying all their combs can keep down wax moth by dumping the larvae outside the hives.

Unoccupied comb can quickly be completely destroyed and the bees are unable to rebuild because of the mass of webs.

In some cases the colony can be reduced to the extent that it will die out as more and more of its combs become less visible. Combs which are kept in store are very liable to be attacked.

**Honey Badger:** The honey badger (*Mellivora capensis*) is widely distributed in Tropical Africa. It has not been reported in Northern Nigeria. It is capable of completely smashing a bee hive in order to eat the comb.

In some areas of the world spraying has reduced the number of pollinating insects to the extent that bees have to be rented from other areas at blossom time or no crop will result.

**DISEASES**

The main diseases of adult bees are unlikely to occur in Northern Nigeria. Diseases such as acarine, nosema and amoeba are troublesome in the temperate areas but it appears certain that the causative agents thrive in areas where the bees are inactive during a winter period. This condition does not apply in Northern Nigeria.

**Brood Disease:** The serious diseases of the brood are likely to occur here. Countries from which brood diseases have not been reported are countries where methods of bee keeping are old and therefore the bee keeper is unlikely to see anything wrong even if he could recognise such a condition. As modern methods spread to these areas, brood diseases are usually reported.

There are two brood diseases which can seriously affect the bee keeping economy of a country-American Foul Brood (A.F.B.) and European Foul Brood (E.F.B.) Neither name is intended to indicate either the place of origin or the main location of the disease.

**American Foul Brood Disease:** American Foul Brood is caused by spore forming bacteria, *Bacillus larvae* (White.) When spores are introduced to the
body of the larva, from the mouth parts of the workers with larval food, they germinate and multiply and lead to the death of the larva. This occurs just after the cell is sealed over.

The decomposition of the enclosed larvae leads to the capping of the cell becoming damp and hence dark and sunken in appearance.

The worker bees endeavour to remove this unusual capping but, probably because it is damp, rarely do more than make one or two small holes in it. By the time the capping has been removed, the larval remains have dried down onto the bottom of the cell as a hard, black scale which cannot be removed. The attempts of the workers to clean the cells, lead to spores being carried on their mouth parts to other cells and to other larvae.

Opinion is divided in the bee keeping world as to whether (A.F.B.) can be cured. Seeming success has been obtained by treating infected colonies with antibiotics but infection usually re-appears.

In some countries the destruction and burning of the colony and its combs is compulsory by law in order to control the spread of the disease.

It is noteworthy that several countries which until recently permitted treatment, have now amended their laws to make burning compulsory.

**European Foul Brood Disease:** European Foul Brood disease is believed to be caused by *Bacillus pluton* (White) but other bacilli are usually present. The larvae which have been infected through feeding usually die on the fourth day after hatching: i.e. before the cells are sealed over. Usually the dead larvae are pulled out of the cells by the workers and this makes the disease far more difficult to detect in the early stages than (A.F.B.). The larvae take up an unnatural position and collapse to the base of the cells.

If the colony is badly infected and the larvae are not cleared away they become discoloured and dry into a loosely attached scale.

E.F.B. appears to be localised and to appear particularly in areas with acid soils. It has been stated that E.F.B. occurs only in weak colonies. This is not true. In South West England, the area in which most E.F.B. occurs in that country, it has been noted that it is frequently the strongest colony in an apiary which is the first to be affected. It is possible that a strong colony will make a better job of cleaning out dead larvae and hence the disease is not noticed until the colony becomes weak.

Some success has been reported by feeding antibiotics to infected colonies,
but destruction and burning appear to reduce the incidence more successfully.

Chalk Brood Disease: Other brood diseases are by no means serious. Chalk Brood disease is common in Northern Nigeria. It is caused by the fungus *Pericystis apis* (Maaseen) which grows on the outside of the larvae. Soon a mass of *mycelium*, filling the cell, is all that remains.

The workers have difficulty in removing the mass and hence it is left there, looking like a piece of white chalk, until it has shrunk as a result of drying up.

This disease is almost encouraged by damp hive conditions and can be avoided by keeping bees in good hives.

Addled Brood: Addled brood is a genetic disorder in which larvae die without any disease being present. It can be cured by giving the colony a fresh queen reared from a colony which does not display the condition.

**SOME USEFUL HINTS**

Adonsoni Bee: With bees that swarm frequently, the problem of management i.e. keeping the colony as a single unit becomes greater and involves more labour. The *adonsoni* bees swarm too frequently, sometimes twice in a year.

Stinging Habit: Work with bees can never be completely divorced from stings but for comfort of work, it is necessary to have bees which will not sting to excess unless provoked.

The adonsoni bees sting to excess at all times. Work on a colony (in the way it will be understood in temperate areas) is almost impossible without the operator or some innocent passers by receiving hundreds of stings.

Use of Brood Nest: The rearing of brood, i.e. the laying of eggs by the queen should be related to the incoming food supply. The colony of bees which dissipates its food reserves by excessive brood rearing will produce little honey for the bee keeper. Adonsoni keep a full size brood nest at all times even when all the food reserves are used up.

Use of Propolis: Work on a colony is made difficult if they glue all the parts of the hive together. Adonsoni bees use vast quantities of propolis to the extent that hive fittings will break rather than come apart.

Amenability: This is meant the response to the various techniques which
are used in modern bee keeping to ensure a maximum honey harvest. They are too numerous to list here, but can be considered to be the basis of successful commercial bee keeping.

Adonsoni bees resent all forms of management and will often abscond after the smallest manipulation.

**Frame Hive Methods:** There is a great temptation—not only in apiculture—to try to introduce methods of advanced countries in a developing country like Nigeria. If these methods are economically satisfactory, a great step forward is made.

With regard to the frame hive methods of temperate areas, most bee keepers can keep their bees in such hives in Northern Nigeria. However at the present time it will not be proper to do so. The reasons are:

(a) In order to get an economic return from these hives, it is essential that they be used to the best advantage. This entails a regular inspection of the brood nest. Adonsoni varieties resent this and are liable to abscond after it.

(b) The regular inspection is useless unless the bee keeper knows what to do as a result of what he sees. This means a sound knowledge of modern bee keeping techniques and preferably a good knowledge of behaviour and natural history. This implies an educated bee keeper, but the present generation of bee keepers do not qualify.

It is impossible to lay down hard and fast rules for modern bee keeping. It can only consist of decisions made immediately and put into effect after the hive is opened. The success or failure of the colony may depend upon one of those decisions and experience of the bee keeper. This is noticeable in the temperate climates where commercial bee keepers invariably obtain a larger average harvest per hive than do the enthusiastic amateurs.