

Factors Influencing Quality Honey Production

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Abstract

The study was conducted to factors influencing quality honey production: a case of honey care Africa in Trans Nzoia East Sub County. A descriptive research design will be used in this study. Simple random sampling technique was used to select respondents from the beekeepers. The sample size of 90 will be selected. The main research instruments that will be used in this study were the questionnaires and interview schedules. Data was both quantitative and qualitative and data was presented using tables and percentages.

Keywords: Bee Products, Quality Honey, Bee Hive Technology, Agricultural Practices, Bee Keeping Management Practices

1. Introduction

Although much work and study has focused on improving the practice of beekeeping, or apiculture, it is still possible and prevalent to manage beehives at a very low level of technological and capital input. Their cosmopolitan distribution, multipurpose nature and relative simplicity in management combine to make bees a natural agricultural supplement for many types of farm systems, (Bradbear, 2009). Beekeeping is thriving in cities across the world driven by young hobbyists, commercial beekeepers, sideliners and green entrepreneurs (Bradbear, 2009). Beekeeping contributes to food security, poverty reduction, and employment creation and income generation in not only in the arid and semi-arid areas in Kenya but in majority of the sub-Saharan Africa rural areas (Kugonza, 2009). Beekeeping requires little space and compliments other farm activities. It does not need good soil. There are about 20,000 different bee species in the world. Most of them solitary or live alone. A few species of bees are kept to produce honey (Carroll, 2006). Kenya is largely a traditional beekeeping country which is mostly practiced in Arid and Semi-Arid areas (with about 10 million people) (MoLFD, 2007). With the Development of the Kenya Top Bar Hive, there was need for farmers to adopt movable Bar Technology as a transition hive between the traditional log hive and the Langstroth. Unfortunately, technology adoption has been very slow among Kenyan Beekeepers.

1.1. Research Questions

1. To what extent does bee hive technology influence the quality of honey produces in Trans Nzoia East Sub-County?
2. How do harvesting and processing methods influence the quality of honey harvested in Trans – Nzoia East sub-county?
3. In which ways has intensified agricultural practices affected the quality of honey produced in Trans Nzoia East Sub County?
4. In what ways do pests and predators influence the quality of honey produced in Trans Nzoia East Sub-County?

1.2 Research Objectives

1. To assess the influence of bee hive technology on the quality of honey produced in Trans Nzoia East Sub-county.
2. To determine how harvesting and processing methods on the quality of honey produced in Trans Nzoia East sub-county
3. To establish the level to which intensified agricultural practices influence the quality of honey produced in Trans Nzoia East sub-county
4. To investigate the influence of pests and predators on the quality of honey produced in Trans Nzoia East Sub County

2. Literature review

2.1. Beehive technology as a factor affecting quality of honey production

According to (Croft, 2007) beekeeping is the maintenance of honey bee colonies, commonly in hives, by humans. There are many types of bee hives commonly used by bee keepers throughout the world for honey production. They are all categorized as modern and traditional bee hives (MORAD, 2008). (Croft, 2007) Stated that beekeeping is the maintenance of honey bee colonies, commonly in hives, by humans. Low-technology hives have been developed as a way of obtaining the advantages of movable frame hives (no need to break combs, standardization, manageability, efficient honey harvest) without the disadvantage of high cost manufacture. The container for the hive may, like traditional hives, be constructed from whatever materials are locally available. Low-technology hives can be kept near home, and can, if constructed and transported with care, be moved between crops as they flower successively (Global Development Solutions, 2009). For modern hives the combs can be lifted from the hive and then replaced and this allows the beekeeper to examine the condition of the colony without harming it. Honeycombs can also be removed from the hive for harvesting without disturbing combs containing brood. The colony is therefore not harmed and the bees can continue gathering honey to replace that which has been harvested which ensures good quality honey can be harvested, free of contaminating pollen or brood (Logan, 1990).

2.2. Harvesting and processing methods

Harvesting and processing methods. In Africa, the meeting of the factors necessary for the implementation of beekeeping has allowed this activity to acquire an important place in agricultural development programs since the agricultural revolution until today (Ruttner, 1988). Different management, harvesting and processing techniques can influence the final quality of honey (Krell, Ricciardelli & Oddo, the influence of harvesting and processing methods on honey quality in Zambia and Malawi, 1988). Beekeepers harvest honey by cutting the combs which are then put in a container. Processing Honey should be processed as soon as possible after removal from the hive. Honey processing is a sticky operation, in which time and patience are required to achieve the best results. Careful protection against contamination by ants and flying insects is needed at all stages of processing. It is important to remember that, Honey is a food and it must therefore be handled hygienically, and all equipment must be perfectly clean and that honey is hygroscopic and will absorb moisture, therefore all honey processing equipment must be perfectly dry. Too much water in honey causes it to ferment (Honey Care Africa, Beekeeping in Africa Honey Care Agricultural Services Bulletin 68/6, 2010)

2.3. Influence of agrochemicals on honey quality

In Canada, USA, UK and Italy, honeybees were used to monitor environmental pollution, since accumulations of certain metals and other substances could be measured in hive products, mostly in pollen but also in honey (MP. & JP., 2007). All make the impact of current agriculture on the environment a tremendously damaging one (Tillman et al., 2001). These insecticides, herbicides and fungicides are applied to crops, but reach the bees through pollen, nectar, and through the air, water or soil (Oliver, 2012). This occurs when bees are on the flowers at the time of application of the insecticide, and the bees die instantly. Some other types of pesticides, allow the bees to return home and then they die. Such types are easy to identify than the first ones. There are certain pesticides that do not have any effect on the adult honey bees, but cause damage to young, immature bees (Evans & Schwarz., 2011). Historically, insecticide sprays were responsible for a number of fatal incidents with bees and also continuous contamination of honey which leads to production of low quality honey (Oliver, 2012). Insecticides and herbicides are now major problems to the beekeepers. Worker bees of all ages are susceptible to the effects of pesticide exposure (Rotais , Arnold , Halm , & Touffet - Briens, 2005) but beeswax contamination primarily affects the brood because of its direct contact with the brood cell wall. The main reason for toxicity is grayanotoxins, also known as andromedotoxins. Organic contaminants and polychlorinated biphenyl (PCB's), which originate from motor oil, coolants, and lubricants, are still present in the environment and can contaminate bees and their products (Carrié, George, & Wäckers, 2012).

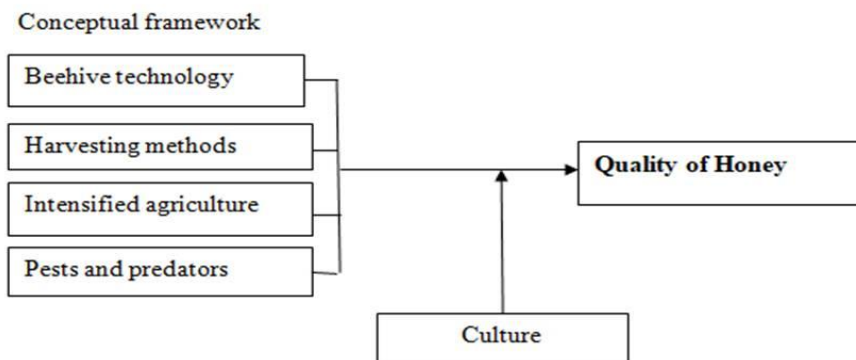
2.4. Influence of intensified farming practices on the quality of honey Intensification of agriculture prompts the loss and fragmentation of valuable natural to semi-natural perennial habitats for bees, such as agroforestry systems, grasslands, old fields, shrub lands, forests, and hedgerows. This is thought to be the major cause of decline in quantity of honey produced and impacts on its quality (Brown & Paxton, 2009).

There may be periods when sufficient suitable pollen or nectar producing plants are not available because grazing/mowing may occur before flowering (Honey Care, 2009). Intensification of agriculture has been associated with significant losses of biodiversity on farmland (Aizen, Garibaldi, Cunningham, & Klein, 2007). Industrial farming monocultures, and more generally the lack of wild flower diversity within and around croplands, limit the amount of food that bees have access to both in space and in time. Bees can go hungry as farming becomes more intensified (Holmes, 2012). This has potentially damaging effects upon bees because they need an optimum nutrient balance for support of their growth and reproduction (Vanbergen & The Insect Pollinators Initiative, 2016). Urbanization and increasing agricultural intensification have destroyed and fragmented many natural habitats (Vanbergen et al. 2013) Intensified farming methods are driving the loss of valuable natural and semi-natural habitats on farms.

2.5. Honey bee Pests and Predators

There are several different beetles living in honey bee colonies. Most are harmless and feed on pollen or honey. Weak colonies or storage combs are affected. This beetle lives and multiplies within and outside bee colonies. The beetle deposits larger deposits of nests of eggs within a bee colony, in fissures and recesses out of reach of the bees. The larvae of this beetle preferably live on and in pollen and honeycombs. Larvae are whitish, often covered with a slimy sticky coating. Larvae can be found mining in combs or in the debris. Wandering small hive beetles larvae often leave smear trails inside and outside the colony (Bailey & Ball, 1991). Ants are among the most common predators of honey bees in tropical and subtropical Asia. They are highly social insects and will attack the hives en masse, taking virtually everything in them: dead or alive adult bees, the brood and honey. In addition to this destruction, they can also be a nuisance to beekeepers and may sometimes cause pain from their bites (Wallner K., 1995). Beekeeping in tropical climates frequently suffers from damage caused by amphibians: toads including *Bufo melanostictus* and *Kaloula pulchra* and frogs including *Rana limnocharis* and *Rana tigrina*.

2.8. Conceptual Framework



3. Methodology of research

3.1. Research Design

The study used descriptive survey research design. Descriptive studies as described in (Mugenda & Mugenda, 2003) is a study that seeks to obtain information that describes existing phenomenon

3.2. Data Collection Instruments and Sampling Techniques

Data was collected using self-administered questionnaires interview schedules and observations. Questionnaires give the respondents freedom to express their views and opinions and to make suggestions while the interview schedule was designed to collect information from the field officers.

3.3. Data Analysis

The study used both quantitative and qualitative data analysis approaches. Qualitative method was used to analyze data from the key informant interviews while quantitative method was used to analyze data obtained from sample respondent interview schedules. Both descriptive and inferential statistics will be used.

3.4. Results of the Study

Table 4.3 influence of beehive technology on the quality of honey produced

| Statement | mean | Std deviation |
|---|------|---------------|
| Good hived translates to high yields | 1.24 | 0.48 |
| Modern hives translates to high quality honey | 1.43 | 0.8 |
| Farmers who have adopted use langstroth hives | 1.90 | 0.84 |
| Loghives are still very common in the region | 2.57 | 0.99 |

From the table statements 1-3 range in the scale 1 indicating that that the respondents are in agreement with the statements in the questionnaire. Statement 1 with a mean of 1.24 indicate that the respondents strongly agree that good hives translate to high yields of honey. Statement 2 with a mean of 1.43 indicate that farmers strongly agree that modern hives translate to high quality honey. Statement 3 with a mean of 1.9 indicate that the respondents agree with the statement that majority of the farmers agree with the fact that most respondents have adopted the modern langstroth hives. Statement 4 with a mean of 2.57 indicate that farmers disagreed with the statement that log hives are still very common in the study area.

Harvesting and processing methods in relation to honey quality

Table 4.7 harvesting and processing methods

| Method of harvesting | frequency | percentage |
|-----------------------------|------------------|-------------------|
| Smoker | 68 | 75.6 |
| Fire and smoke | 22 | 24.4 |
| Others | 0 | 0 |
| Total | 90 | 100 |

Majority of the farmers with loghives admitted to still use smoke and fire. Langstroth and KTBH are usually strategically located near homesteads and also placed in low heights mostly in constructed structures or shades which makes it convenient to harvest using the smoker. Farmers using smoke and fire in log hives cite the reason for their preference due to the fact that these hives mostly are placed in very tall trees making their harvesting difficult. This the farmers said was to protect the hives from predators which eat the honey. The farmers with traditional log hives admitted that harvesting from the traditional hives is done at night affecting honey quality this is because smoke and ashes from the fire ends up mixing with the harvested honey. Those with Langstroth harvest anytime of the day giving high quality honey. None of the respondents cited any other method of harvesting honey.

Processing honey

None of the farmers interviewed had processing machines for the harvested honey. After harvesting comb selection is done to eliminating pieces of comb with pollen or even broodHoney harvested. Honey is processed locally using a bucket and a sieve for draining liquid honey from combs.

Honey bee pests and predators

Table 4.8 Types of pests and rodents that affect bees

| Type of pest/rodent | frequency | percentage |
|---------------------|-----------|------------|
| Ants | 68 | 75.6 |
| Mites | 56 | 62.2 |
| Beetles | 47 | 52.2 |

Ants invade the hives and take bee larvae and feed on the honey. Ants in some instances take soil to the hives and build their nests inside the hives thereby lowering the quality of honey harvested. Beetles feed on honey and also pollute honey in hives according to the farmers interviewed. Mite usually infest on the poles and frames used to support the hives necessitating regular repairs. They in some cases take chunks of soil to the hives which mixes with the honey thereby lowering its quality.

Conclusions and discussions

It was found out from the analysis modern hives generate more income than traditional hives with langstroth hives producing the highest followed by KTBH with log hive producing the lowest income. The study findings also established that majority of the farmers of the farmers had adopted the use of smoker and protective clothing. This was the case since Honey Care Africa gave all the farmers free smokers and protective clothing on the first time they were given bee hives which has encouraged farmers to buy them after the initial ones are worn out. The study showed that the various agricultural practices stated had diverse effects on both the bees and the quality of honey produced. Finally, it was the common types of pests and rodents stated by farmers are ants, mites and beetles and that pests and predators lower the quality of honey by eating the honey and pollen while others take lumps of soil and their droppings in the hives which lowers the quality of honey greatly.

5.3 Recommendations

It is essential that the government and relevant development partners work hand in hand to design and promote forums through which bee farmers can be trained on management of bee hives, identification of hive products and how to add value onto the products. The central government in conjunction with the county government should carry out public education on how to improve bee keeping and the quality and quantity of honey they produce. Farmers should also be educated on where to access services and advice given the new system of devolved governance. Financial education is also very necessary for the farmers since many farmers do not keep records of the income they get from selling honey. Financial empowerment is necessary to ensure that farmers improve the quality and quantity of honey. The financial help will help farmers improve their harvesting, processing and storing methods.

Financial help too will farmers' accessibility to markets, far beyond the county level thereby increasing income from hive products.

5.4 Suggestion for further research.

Research context was limited to bee farming sector in Trans Nzoia East Sub County, while the future research can be extended to different sectors of agriculture sub sector across the country get more significant results. There is also need to conduct a research on the possibility of value addition for the honey harvested by farmers to ensure that they get more value for their honey.

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