The potential of beekeeping industry in enhancing rural household incomes in Botswana: a case study of Gaborone region

J. P. Lepetu¹, O. Thelo², and N. V. Sebina³

¹ Department of Crop Science and Production, Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana
² Ministry of Agriculture, Private Bag 005, Gaborone, Botswana
³ Department of Agricultural Economics, Education and Extension, Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana

ABSTRACT
A study was conducted on 47 beekeeping projects with 112 bee colonies (5 agricultural districts). Data collection was from October 2001 honey flow period. 83 bee colonies produced 2578.70 kg of comb honey, which generated total income of P36,930.00. 49 bee colonies were not harvested at all. Average honey harvested per colony was 37.05 kg, 25.66 kg and 35 kg for individual beekeepers, 4B beekeeping clubs and the government apiaries respectively. Most beekeepers were supplementary feeding their bee colonies with sugar solution. Availability of natural and artificial bee pastures planted around apiaries played an important role in an increase in honey production per colony. Comb honey is mostly being produced and wax that is supposed to be processed is wasted. Beekeeping calendar is not followed; some beekeepers are hobbyist that is they keep bees for pleasure without any interest to profit. The beekeeper’s major problems are lack of bee management skills (78.72%), insufficient visits by beekeeping personnel (70.21%), attack by ants (53.19%) and bee pirates (31.91%). This shows that there is shortage of appropriate technical assistance, which hinders farmers from attaining maximum production in the beekeeping projects.

Keywords: bee colonies, beekeepers, honey comb, apiary.

INTRODUCTION
Beekeeping (Apiculture) conveys many benefits. It provides not only direct job opportunities, cash income and food in the rural areas, but also assists the increased agricultural production of various crops. As the population of pollinator vectors of wild species is dwindling in most agricultural regions in tropical climates, honey bees will play an increasingly significant role as pollen carriers to ensure high yields. Beekeeping is suitable for poor people and should be decentralized to as many producers as possible. Beekeeping techniques should be resource neutral, sustainable and so simple than an expansion of the number of beekeepers could take place spontaneously. It should be income generating and its activities should be environmentally sound.

There are countries with active beekeeping programmes and lively honey production, Tanzania, Kenya, Uganda, Belize, Jamaica, Trinidad and to some extend Srilanka. At least half of honey produced is consumed internally and some countries have surplus for export. Beekeeping is likely to be at its most profitable if high yielding bees can be used in areas selected for high nectar and pollen yields and if pesticides are not used in such a way that the foraging bees are killed. We should however be concerned that the fundamental potential of honey production should be more nearly fulfilled in countries where sources of agricultural income and employment are limited. This can be done through the promotion of beekeeping among agricultural populations. In those developing countries where honey has entered commercial markets, the development of the industry has often been based initially on primitive honey collection procedures, and has graduated into the use of improved hives.
Africa, with its offshore islands, is the only region with native tropical subspecies of *Alpis mellifera*. In those developing countries where honey has entered commercial markets, the development of the industry has often been based initially on primitive honey collection procedures and has graduated into the use of improved beehives. But almost everywhere in these countries production is on the hands of small-scale producers who may produce only 30kg per year, whereas the annual output of an individual Australian honey producer might be 10-20 tones and a large-scale operation in Australia or Canada might produce 1000 tones or more (Crane, 1979).

Beekeeping has been practiced in Botswana now for almost twenty-five years. The first formal beekeeping project was in 1976 by Kweneng Rural development Association (K.R.D.A.). In 1981, a beekeeping init was established in the Ministry of Agriculture as an off farm activity. The aim was to help farmers especially women to generate income to supplement the income generated from sale of other farm products. It has become popular and its importance in diversifying the agricultural production is realized. It has proved to be a viable project especially for people in rural areas in the low-income bracket. Basic courses were conducted for farmers, by Non-Governmental Organizations (NGOs) who are directly working with the communities. After training, farmers were assisted to establish backyard apiaries with at least one beehive where they could practice their skills of bee management. In Botswana, country-wide beekeeping section (1999/2000) reported 222 individual beekeepers, 85 beekeeping 4B clubs, 40 government demonstration apiaries and 16 beekeeping groups with 232, 86, 97 and 24 bee colonies respectively.

There are several reasons for keeping bees; bee products that are honey and beeswax can be sold locally to generate income. Bees play an important role in the pollination of many flowering plants such as beans, melons and fruit trees, thus improving crop yields. The nutritional value of bee products (honey, pollen and propolis) is very high and can be used to supplement the diets of the people.

The honeybee does not compete for resources with other agricultural enterprises. A beekeeper at subsistence level does not have to own land to produce cash crop as bees collect their food in wild, cultivated and wasteland areas. Beekeeping can be practiced in areas of little agricultural activities such as crop, livestock farming and agro-forestry. Either individual or groups can initiate it. It requires little and minimal dependence on foreign technology.

There are however, major obstacles to apicultural development in Tropical counties mainly due to lack of capital as well as shortage of appropriate technical assistance for beekeepers. In spite of the favourable climatic and socio-economic environment, low-cost and sufficient availability of honey resources and manpower, most developing countries have the following problems in common; lack of trained manpower and appropriate technical transfer, limitation in resources, especially in the case of endemic diseases affecting bee colonies for their systematic prevention and control, lack of information on suitable internal/external markets and relevant processing technology for product diversification, lack of financial resources for sustainable apiculture development.

There are several bee pests, which affect production of honey and beeswax. These are man (*Homo sapiens*), ants (*Pheidole megacephala*), bee-pirate (*Palrus lantrons*), Waxmoth (*Galleria mellonella*), honey badger (*Mellivora capensis*) large hive beetle (*Hoplostomus fuligineus*) and small hive beetle (*Aethina tumida*). One of major concerns of beekeepers is insufficient flow of nectar sources throughout the year for honeybees. Natural bee pastures are some of the acacia
species. Artificial bee pastures include, eucalyptus species, bottlebrush, golden shower, chemise jasmine, clock vine and honey suckle. Therefore, the objectives of this study were to:

- estimate the amount of honey produced in a year in Gaborone region
- estimate the amount of honey produced by one bee colony in a year in Gaborone region
- identify problems encountered by beekeepers in Gaborone region.

MATERIAL AND METHODS

A study was conducted on 47 beekeeping projects in Gaborone region with a total of 122 bee colonies. The areas visited were Kgatleng, Kweneng West, Kweneng South, Kweneng North and South East Agricultural Districts. Beekeeping projects visited include 21 individual beekeepers, 17 4B beekeeping clubs, e beekeeping groups and 6 government apiaries with 71, 13, 4, and 16 bee colonies respectively.

Data collected was by use of structured questionnaire, which was administered on a one to one basis to each beekeeper in Setswana language. The information gathered related to; management activities, production per colony in a year, kind of honey produced, skills acquired and constraints to beekeeping.

Direct observation of the apiaries was done by visual appraisal; physical counting and inspection of the beehives were performed. Data collected was from October 2000 to July 2001 honey flow period.

RESULTS AND DISCUSSION

The results in Table 1 indicate that 73 bee colonies produced 2578.70 kg of comb honey, which generated a total income of P36, 930.00 during the honey flow period of October 2000 to July 2001. 9 bee colonies were not harvested at all. The average kilograms harvested per beehive were 37.05, 25.66 and 35.00 for individual beekeepers, 4B beekeeping clubs and government apiaries respectively. According to AFD 1999 report in Ethiopia yield per hive has increased to 15 kg. While (David, 1990) stated that a harvest from a top-bar hive can be 10 kg compared with 7 kg from a traditional hive. The results from the survey are different theirs this might be as a result of differences in environmental factors.

Table 1: Honey production inventory, October 2000 to July 2001

<table>
<thead>
<tr>
<th>Name</th>
<th>No. of colonies</th>
<th>Kg/harvested</th>
<th>Average/hive</th>
<th>Price/kg (Pula)</th>
<th>Income generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual beekeepers</td>
<td>47</td>
<td>1741.20</td>
<td>37.05</td>
<td>15.00</td>
<td>26118.00</td>
</tr>
<tr>
<td>4B beekeeping clubs</td>
<td>19</td>
<td>487.50</td>
<td>25.66</td>
<td>15.00</td>
<td>7312.50</td>
</tr>
<tr>
<td>Government apiaries</td>
<td>7</td>
<td>350.00</td>
<td>35.00</td>
<td>10.00</td>
<td>3500.00</td>
</tr>
<tr>
<td>Totals</td>
<td>73</td>
<td>2578.70</td>
<td></td>
<td></td>
<td>36930.00</td>
</tr>
</tbody>
</table>

*According to the study of (FAO agricultural bulletin no.68) found that with supplementary (sugar) feeding *Apis cerena* could produce an average of 15 kg /colony and *Apis mellifera* 60 kg/colony. Most of the beekeepers in the region are supplementary feeding their bee colonies with sugar solution. The availability of natural pastures such as *Acacia species* played an important role in the
increase in production per colony. Some beekeepers have planted artificial bee plants around their apiaries, these include some eucalyptus species, bottlebrush, and golden shower, clock vine, and honey suckle which flowers all year round. According to the study beekeepers produce mostly comb honey and the wax that is supposed to be processed is wasted. It should be noted that Batswana like other Africans prefer natural honey than processed liquid honey.

Though the averages produced per colony are high there is an indication that the demand for bee products in the country is high. During the National Development Plan period (1991-1997) only 2 tons of honey was produced locally and 206 tons of honey and 10 tons of beeswax were imported from neighbouring countries of Zambia, Zimbabwe and South Africa. This is because beekeepers do not follow beekeeping calendar and bee colonies established as far as 1997 have never been harvested to date. Some beekeepers are hobbyist that is they keep bees for pleasure without any interest to profit.

The beekeepers leading problems as indicated in Table 2, are lack of bee management skills, insufficient visits by beekeeping personnel, and attack by ant’s bee pirates. This shows that there is a shortage of appropriate technical assistance for beekeepers. Phokedi (1985) writing about apiculture and its problems in Botswana noted that the shortage of qualified personnel to extend and consolidate beekeeping among farmers was a major constraint.

Table 2: Problems stipulated by Gaborone region beekeepers (Number of beekeepers interviewed was 47)

<table>
<thead>
<tr>
<th>Problem</th>
<th>N. of Beekeepers</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robbed by man</td>
<td>2</td>
<td>10.64</td>
</tr>
<tr>
<td>Attack by bee pirate</td>
<td>15</td>
<td>31.91</td>
</tr>
<tr>
<td>Absconding of bee colonies</td>
<td>6</td>
<td>12.77</td>
</tr>
<tr>
<td>Lack of bee management skills</td>
<td>37</td>
<td>78.72</td>
</tr>
<tr>
<td>Absconsion by drought effects</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Insufficient bee pasture</td>
<td>4</td>
<td>8.51</td>
</tr>
<tr>
<td>Insufficient visit by beekeeping personnel</td>
<td>33</td>
<td>70.21</td>
</tr>
<tr>
<td>Attack by wax moth</td>
<td>6</td>
<td>12.77</td>
</tr>
<tr>
<td>Attack by ants</td>
<td>25</td>
<td>53.19</td>
</tr>
</tbody>
</table>

However it is promising to realize that bee asbsconsion due to drought effects etc. is not a major concern for beekeeping production. This shows that there is a major potential for increasing production if farmers can improve their bee pastures by growing appropriate trees which can extend the period when nectar and pollen are not available. A potential tree for dry land beekeepers is such as farherbia albida (mokosho) which has the advantage of flowering after the rains (during the dry season). Therefore increased planting of this species could possibly provide valuable bee forage.

**CONCLUSIONS AND RECOMMENDATIONS**

Beekeeping is a viable project in Gaborone region and can therefore be said it’s true for the whole country since the ecological conditions are similar. It diversifies agriculture and provides employment opportunities in the rural and urban areas. Beekeeping requires little capital minimal and dependence on foreign technology. Honey production is dependent on many factors beyond the beekeepers control and variations of ± 100% are usual due to environmental factors. The beekeeper should take these variations into account when planning activities and budgets. But it should be assumed that variations in honey production and occupation of hives will occur even in
the best managed apiaries. It may be concluded that beekeepers in Gaborone region produce comb honey but this trend will certainly change as more beekeepers are now getting familiar with the use of modern hives that eases extraction of honey form the combs. It can therefore be recommended that:

- The region should shift from establishing more colonies to replacement of absconded colonies and strengthening existing colonies so that they can yield better results.
- The beekeepers should be equipped with bee management skills so that they can be able to perform all the management activities themselves.
- Improved extension programmes or organization of co-operatives and training in the use of modern hives and hiving techniques are also required.
- There is need to increase the number of beekeeping personnel in the region as the number of colonies is high.
- Proper management practices need to be enhanced and intensified to facilitate production increase per unit; otherwise the viability and potentiality of beekeeping will continue to be a long and endless dream.

REFERENCES


