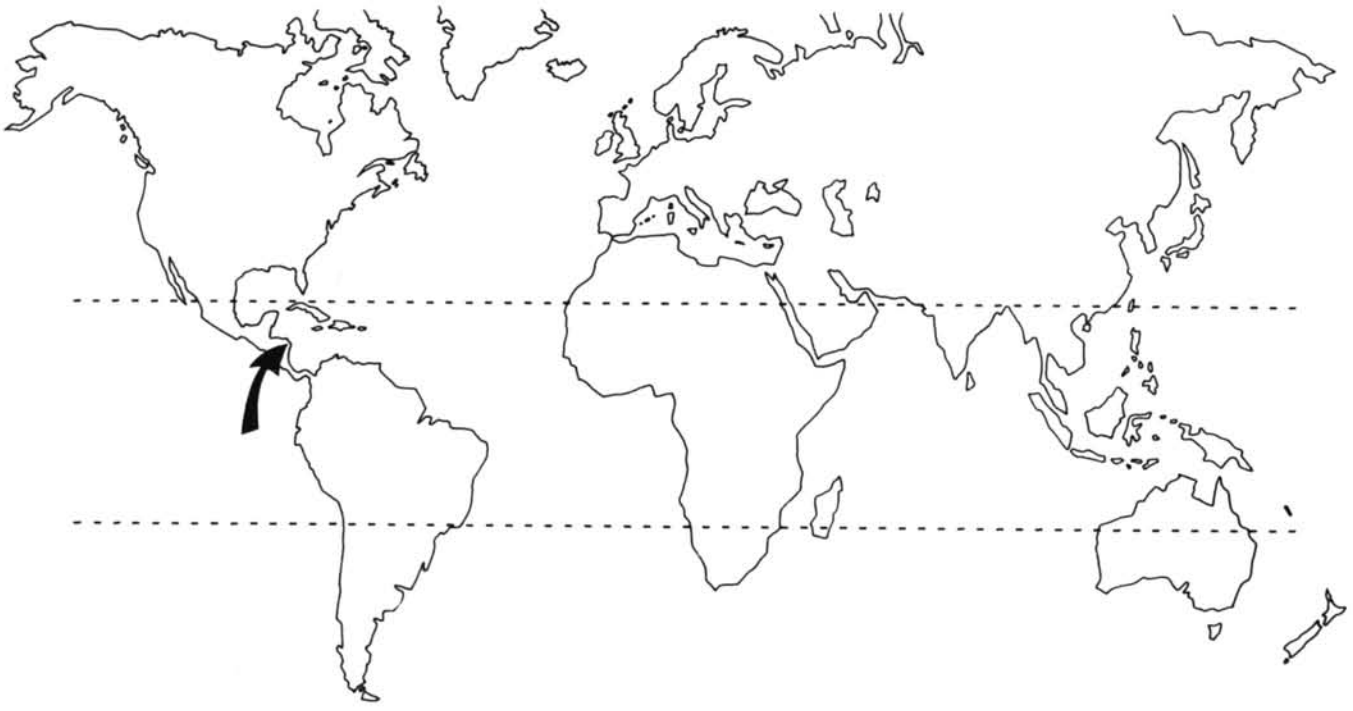

BEEKEEPING IN BELIZE

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Introduction

Belize is located on the east coast of Central America, bounded on the north by Mexico and on the west and south by Guatemala. At 22,000 sq km, Belize is about twice the size of Jamaica; slightly larger than the republic of El Salavador, and is the second smallest country on the American continent. The climate is sub-tropical, and it has been demonstrated that the natural environment of Belize is very favourable to beekeeping [5]. This paper describes the introduction of Apis mellifera to Belize and the beekeeping industry as its exists today.

Beekeeping In The Early Years

Although beekeeping with Apis mellifera is just 20 years old in Belize (formerly British Honduras), it has a beekeeping heritage that dates from antiquity. According to Gahne [4], a noted Belizean journalist writer in 1902, "beekeeping has been known in British Honduras as far back as the history of the Colony. Bees were kept in logs in which they first built, the honey being drawn at intervals by probing into the log with a sharpened stick [11]. Gahne was certainly referring to stingless bees (Meliponinae), probably to those known in Mopan Maya as "Chuc-Cho". These are the bees believed to be characterized in the Mayan Codex Tro-Cortesianus [14]. Stingless bees are still kept in some of the more remote villages of Belize, in the same way as the Maya have done for hundreds of years.

This meliponiculture has now greatly declined, and this is unfortunate because the stingless bees Melipona and Trigona are believed to be more efficient pollinators of certain tropical crops than the imported Apis mellifera. Traditional and mechanized farming methods have contributed to this decline by severely reducing the number of natural nesting sites [1]. In 1957, the first hives of Apis mellifera were introduced to the Northern Districts of Corozal and Orange Walk via Quintana Roo, Mexico, by Veterinary Officer John Robbins [13]. This introduction was seen as a means of reinstating pollinating insects in an area under intensive cultivation for sugar cane, and of re-establishment of an age-old trade and industry [2]. One year after the initial introduction of Apis mellifera to Belize, more than 978 hives were established in the country, with apiaries as far south as the Toledo District [12].

Beekeeping Conditions and Practices

In the sub-tropical climatic conditions of Belize, two distinct beekeeping regions can be distinguished: the Dry Tropical Region (DT) which dominates the northern half of the country, and the Wet Sub-Tropical Region (WST) of the lower southern part.

The DT Region represents almost half the beekeeping area: the mean annual temperature is more than 24°C, and the annual rainfall is less than 80 inches; 4 months have less than 2 inches; and evaporation exceeds precipitation; 3 months have more than 6 inches each. The DT Region has clearly defined wet and dry seasons and is frequently subjected to extremes of one or both conditions. Generally, the rainy season lasts from May to October and dry season from November to April.

Beekeeping conditions in the DT Region are very favourable, and account for nearly 95% of the total honey production. The year starts in mid-November, the final weeks of the rainy season. Requeening (though not widely practised) is done at this time, along with the "equalization of colonies". Swarm control measures (hive manipulations and a Belizean version of the American Demaree system) are instituted in January, March and July, prior to the three nectar flows, which occur in early December, February/March the major flow, and August. August represents the end of the beekeepers' year and is also the time when most beekeepers increase their number of colonies by making divisions (dividing one colony into two, one of which rears a new queen or is given one). Divisions are also made during April as a swarm control measure on premature build up. Drought in the DT Region is always a threat, and beekeepers sometimes provide permanent water vats with feeding reservoirs for the bees near their apiaries. Honey yields in the DT Region average 51 kg per hive.(6)

The Wet Sub-Tropical Region (WST) lies in the southern portion of Belize and constitutes about 25% of the land area. It is characterized by its mean annual temperature of less than 24°C and an annual rainfall of more than 150 inches. Only one month has less than 2 inches (i.e. evaporation exceeds precipitation), and more than 10 months have more than 6 inches each. The WST Region is one of extreme variability. The "break" and "start" of the Wet/Dry Seasons vary from year to year, and so there are no set monthly activities. Usually, the dry occurs between November and March, and a locally termed "Little Dry" occurs in the latter part of August or early September.

The WST Region may appear to have some adverse beekeeping conditions, but it is in fact quite productive in the upland areas with tropical hardwood forests, which provide continuous pollen and nectar sources. The weather is rarely so adverse as to keep the bees in the hives over an extended period, near the brink of starvation. The beekeeping Mayan Indians of this region rely on certain indicator plants to forecast nectar flows and plan their beekeeping activities. The Mayan (Mopan) Indians know that suchah (Cordia alliodora) flowers 5 weeks after the minor nectar source Erythrina glaucus is in full bloom, and all weak colonies must then be built up in time for the upcoming flow. Honey yields in the upland WST Region exceed 75 kg per hive, without the use of elaborate practices and expertise.(8) The more highly cultivated lowland WST Region is less productive, being hampered by easterly winds most of the year, and the average is only 23 kg per hive. For this reason beekeepers in and around the coastal town of Punta Gorda are beginning to establish out-apiaries farther inland and in the uplands, to utilize the lush tropical cover, a

prime contributor to the upland productivity. The WST Region as a whole averages 44 kg of honey per hive.(9)

Pollen and Nectar Sources

There are a great many floral sources which provide nectar to the bees and determine the characteristics of Belizean honey.

Some of the abundant pollen plants are Bixa ornella, Vochysia hondurensis Sprague, Orbignya cohune (Mart) and Mangifera indica. Pollen is abundantly available throughout the year, so supplemental pollen feeding is unnecessary. The major nectar producing plants constitute a wide array of flowering trees. These include Cordia alliodora (Ruiz and Paron) which produces a viscous extra-white honey, and Piscidia piscipula (L), another producer of extra-white honey of extremely good quality. Other major floral sources include Coccobola belizensis (Standl), Bucidia buceras (L), Guaicum officinale and Glyricidia sepium. Again, the diversity is virtually endless, and varies sometimes even within the individual political districts. A list of pollen and nectar sources of Belize is given in Table 1. Some floral sources (such as Lonchocarpus amarus and Sapindus sapondia) produce bitter or otherwise objectionable honey, which is usually fed back to the colonies. An extrafloral source in the northern districts is cut sugar cane during harvesting season. The resulting honey is only of Bakery Grade quality.(7)

Honey Production and the Beekeeping Industry

Belize has in recent years steadily increased its annual honey production to more than 280 tons (1976). And with the recent but rapid expansion of the beekeeping industry to the west (Cayo) and south (Toledo), in conjunction with the present hive density of only 0.75 per square mile, such production could be quadrupled. The distribution map (Fig. 1) shows the main areas of beekeeping activity and the numbers of beekeepers and their hives in the individual districts. The main concentrations continue to be the northern districts of Orange Walk and Corozal, which account for 80% of the honey produced in Belize today. Honey yields in Belize have recently been estimated at 44.5 kg per hive.

Most of the honey produced is exported in 55-gallon drums to the the United Kingdom and a smaller amount to the United States. All exports of honey are transacted by the Federated Beekeeping Co-operatives of Belize (formerly The Norwalk Honey Producers Federation), on behalf of its five member co-operatives. This newly expanded federation provides its members with marketing extension and concessionary services (bee supplies). In order of production, these individual co-operatives are the Orange Walk Beekeepers, the Northern Beekeepers of Corozal, Euri Beekeepers of Cayo, Mopan Beekeepers of the Toledo District and the Lucy St. Anne's of Belize District. The managing committee of the Federation consists of 3 members of the individual co-operatives who, with the support of various government ministries (Trade & Industry and Agriculture) help to formulate beekeeping policy in Belize.

Imports of honey to Belize are negligible; they are subject to a 25% customs tariff to help to promote and protect the developing industry. Domestic consumption of honey in Belize has been, by tradition, for medicinal use and as a sweetener for

infant foods, and for many years amounted to only 28 g per capita capita [11]. But through the use of radio programmes, educational popular publications and agricultural displays, consumption today stands at more than 114 g per capita [10] This is despite the fact that many other natural sweetners (brown sugar, molasses and tropical fruits) abound at more economical prices. Honey is sold locally in pint bottles at approximately $0.90BH (US$1 = $0.50BH) or in 1-lb plastic jars, notably from the Mopan Farmers' Co-operative which provides the bulk of retail sales of honey in this form domestically.

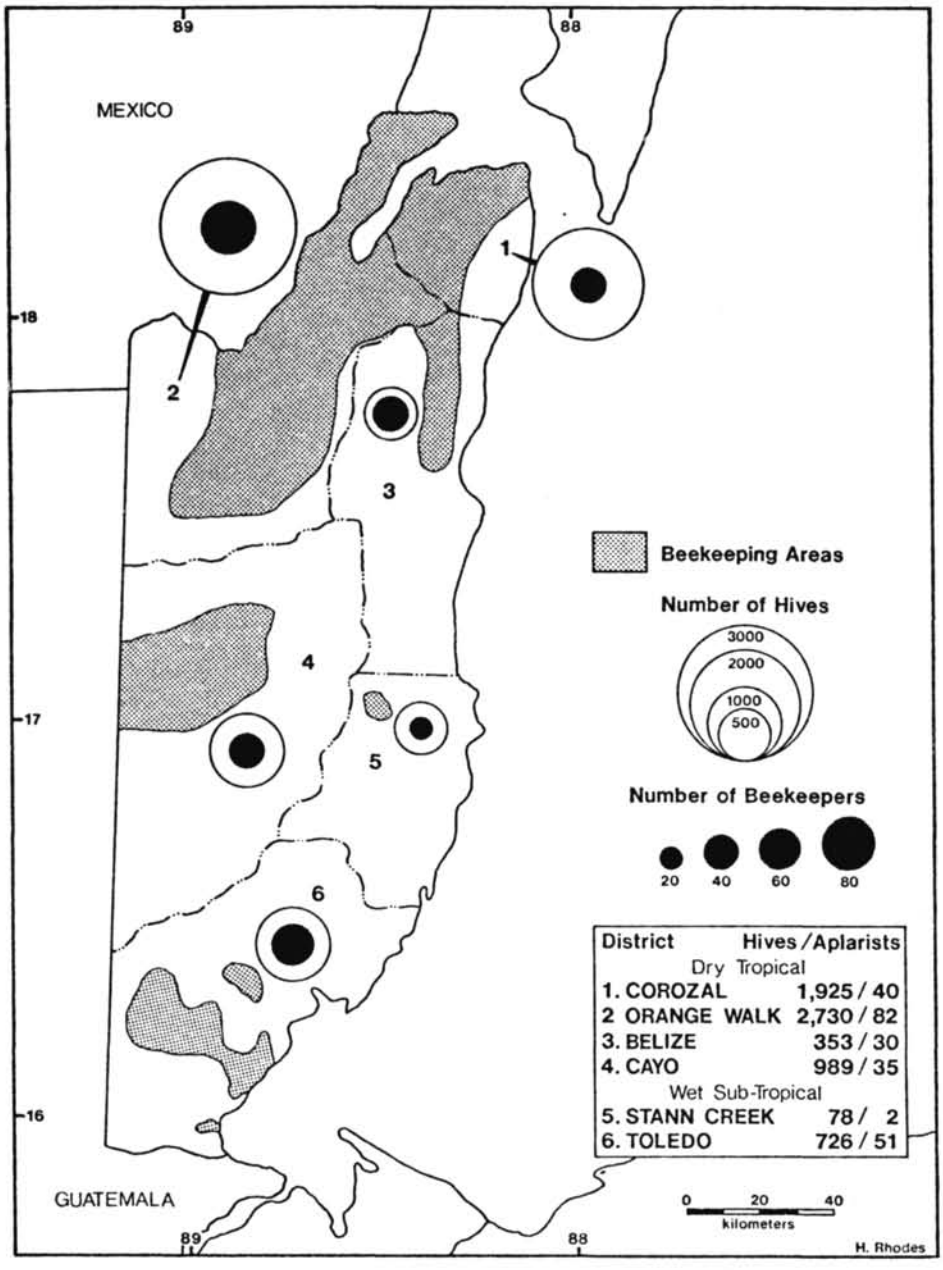
Each year, at the National Agricultural Show, beekeepers and co-operatives from all over the country vie for the best booth, and individual awards are given to the superior grades of extracted, comb and chunk honey and refined beeswax. One traditional use of honey, now diminishing, is practised in the Mayan village of San Antonio: the festive and cultural preparation of a honey wine (mead), known in Mopan Maya as "balche". It was formerly made from Melipona honey, and its potency is strengthened by adding the bark of a tree (Lonchocarpus sp) during the fermentation process. [16]

Beekeeping Materials

Since apiculture is relatively new to Belize, movable-frame hives are in general use, the Langstroth 10-frame hive being the local standard. Some fixed-comb hives are starting to appear in such villages as San Pedro Columbia and Santa Cruz of the Toledo District, where farmers are retrieving feral swarms of Apis mellifera and adopting methods of cultivation simular to those used for Melipona [18]

The main supply of hives and extractors comes from the Mennonite Communities of Spanish Lookout in Cayo, and Shipyard in Orange Walk. These hives are of good quality by Western standards, utilizing such hardwoods as cedar and mahogany, and all frames are self-spacing. There are also substantial imports of Mexican-made hives, which although crude (unplanned and with non-spacing frames) are adequate for local conditions. The poorest quality hives unfortunately come from the sawmills of the Forestry Department. They are not durable, being made from softwoods (Melina), and in general to a modified design to expedite mass production. There are many small hive manufacturers throughout the country whose quality and material vary from place to place.

Only one wax foundation press exists in Belize, and pure beeswax foundation is always in short supply. Most of the wax foundation is imported from Mexico, and as it is only 60-70% beeswax, acceptance by the bees is rather poor. Extractors are manufactured locally by the Mennonities; they are heavy and bulky, but durable and inexpensive. Smokers, hive tools, bee veils and excluders (rarely used) are primarily imported from Merida in Mexico. Occasional but large orders of bee supplies are obtained from the United States and the United Kingdom. Import of package bees from the United States has been discouraged, due to previous experiences with devastating losses. Queen bees are, however, purchased from time to time by individual beekeepers, and arrive in good condition.


89
88
MEXICO
18
17
16
GUATEMALA
1
2
3
4
5
6
Beekeeping Areas
Number of Hives
3000
2000
1000
500
Number of Beekeepers
20
40
60
80
District Hives / Aplarists
Dry Tropical
1. COROZAL 1,925 / 40
2 ORANGE WALK 2,730 / 82
3. BELIZE 353 / 30
4. CAYO 989 / 35
Wet Sub-Tropical
5. STANN CREEK 78 / 2
6. TOLEDO 726 / 51
0 20 40
kilometers
H. Rhodes

Government Activities In Apiculture

The Crops Development Division of the Ministry of Agriculture maintains a keen interest in beekeeping, and has two demonstration apiaries and three queen mating stations. At Central Farm in the Cayo District, site of one of the two demonstration apiaries, beekeeping courses are conducted biennially for agricultural personnel who will work in the apicultural sector. The beekeeping seminar covers a wide range of topics, with emphasis on diagnosis and control of bee diseases, and productive bee management in the tropics. The other demonstration apiary is at Central Apiaries in Corozal, where queens are reared, nucleus hives maintained, and inexpensive beekeeping equipment devised. At isolated mating stations, Italian, Caucasian and hybridized lines are maintained, and queens are sold to the industry. Africanized bees do not exist in Belize, and a recently established queen-rearing programme aims to make the import of queens unnecessary.

Beekeeping legislation, as formulated by the government and industry, calls for the yearly registration of apiaries and notification of expansion and areas of practice. The Ministry of Social Services sponsors the 4-H programme, with one of its major projects devoted to beekeeping. Youths from all over the country are trained at the 4-H centre in Belmopan, and they attend an annual beekeeping seminar at one of the country's commercial apiaries. Many are fully equipped with hives, veil, smoker and bees with the stipulation that the revenue from the first honey crop be used to start off another 4-H member. The Development Finance Corporation has very recently begun to give small farmer loans for beekeeping, with low interest rates (6%) and easy repayments.

Pesticides, Enemies and Disease

Beekeeping is firmly established in every district of Belize, except Stann Creek, where there is a pesticide spraying programme instituted by the long-established citrus industry. Poor roads to the district prohibit migratory beekeeping operations away from it. An integrated effort of the beekeeping industry and the Citrus Growers' Association could have mutual benefits. Pesticide spraying also occurs in the Orange Walk and Corozal Districts for the cane industry, but agreements between the Cane Farmers' Association and the Beekeeping Co-operatives involved have substantially reduced bee losses as a result of spraying.

Other troubles faced by the Belize beekeeping industry include Chalkbrood (Ascosphaera apis), rarely if ever fatal but potentially debilitating throughout the year. Nosema disease infects colonies slightly during the rainy season, and if left untreated will recur each year. American foul brood is less common, but where it occurs it usually affects entire apiaries.

Enemies include the bird known by its French call "qu'est-ce qu'il dit" or kiskadee (Sulfaratus trinatus), and the bufo toad (Bufo valliceps), which takes bees at the hive entrance. One toad dissected by the author contained 106 honeybees. Finally, the marching army ant (Eciton sp.) has a great appetite for bees, brood, pollen and honey; most hives in Belize are therefore placed on stands with each leg in a can of oil.

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