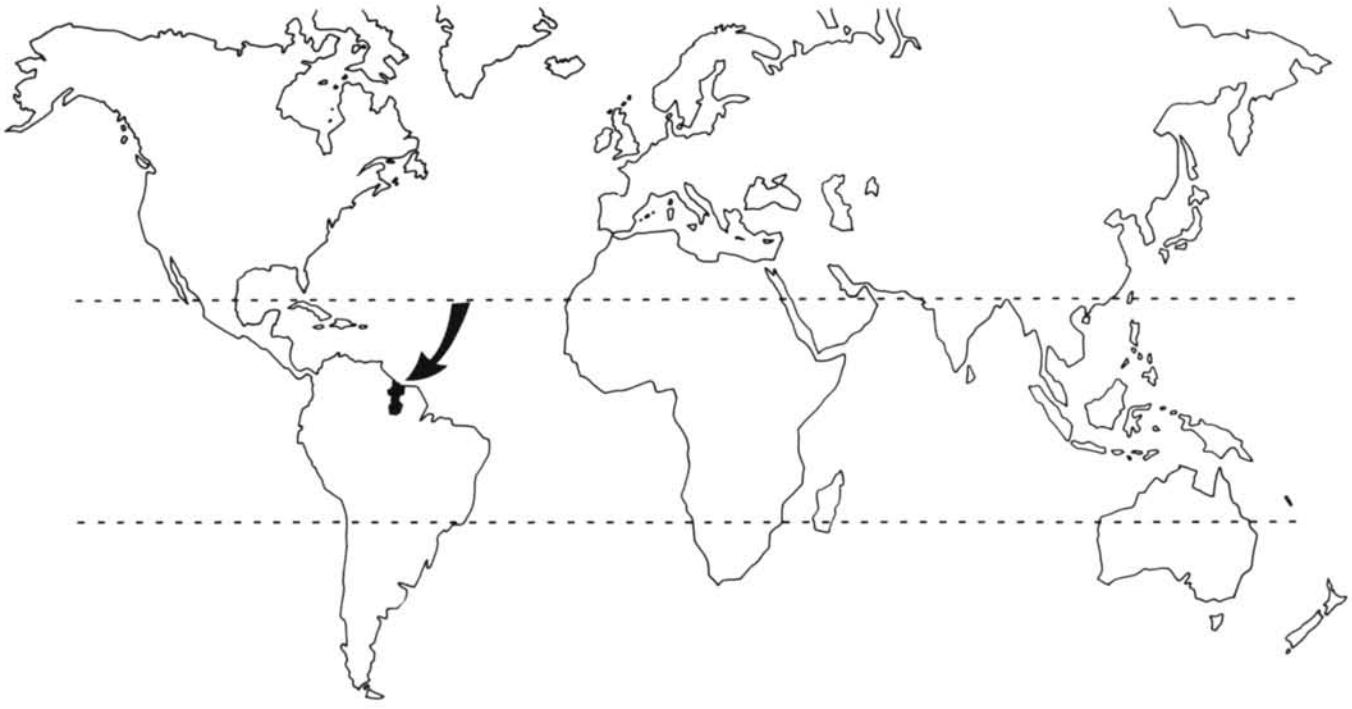

BEEKEEPING IN THE GUIANAS *

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(Departments of Entomology and Systematics and Ecology
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Introduction

Since the introduction of the African bee (Apis mellifera adansonii) in South America, there have been many conflicting reports concerning the effects on beekeeping of the rapid spread of European-African (Africanized) hybrid bees. This article attempts to document the number of beekeepers in the Guianas, their beekeeping practices, and honey and wax production, before the arrival of the Africanized bees. Using this information as a base, it should be possible in the future to assess the effects of Africanized bees as they become abundant in this region, and the time span over which these effects operate.

The Guianas, which considered together are nearly the size of Sweden, consist of three separate political entities situated between 1°13' and 8°24'N, on the north-east coast of South America. French Guiana (a Department of France) is the smallest, with a primarily non-agricultural human population of 55,000. Surinam (pop. 400,000) and Guyana (pop.800,000) are larger countries, more agriculturally and rurally oriented, and more densely populated. The majority of the population, and consequently most of the beekeeping, are confined to a narrow band within 50km of the coast, and often much less (10 km in French Guiana).

This coastal strip is a diverse area with several different habitats: urban area, mangroves, swamps, salt- and fresh-water marshes, fertile coastal plains (in Surinam and Guyana), savannahs, and forests. The sparsely inhabited interior is predominantly rain-forest, except for an extensive region of savannah in extreme southern Surinam and south-western Guyana.

The climate of the coastal region is typically equatorial, with variable but high rainfall, and with greater daily than yearly temperature fluctuations. The mean temperature, 27°C is nearly constant throughout the year with usual day/night differences of only 3°; extreme temperatures rarely exceed 31° in the day or fall below 22° at night. Meteorological records from Paramaribo, Surinam, portray the precipitation pattern typical of this region (Fig.1). Here the yearly rain-fall average between 1901 and 1960 was 2202 mm (87 in) with a range from 1555 to 2559 mm (61 to 101 in). Rainfall in Georgetown,

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Guyana is 2207 mm (87 in), roughly equal to that of Paramaribo[4]. French Guiana, however, receives considerably more precipitation. For example, the average for Kourou is 2820 mm (111 in), with slightly more pronounced wet and dry seasons (Fig. 1).

The coastal region is characterized as having a tropical rainy climate [5]. Rainfall is heaviest from December to July. The primary dry season follows, beginning in late July or August and extending to November or December; it is characterized by clear sunny days, with occasional showers usually in the evening. In addition, there is often a dry period of 2-6 weeks in March or April. The dry seasons are only moderate in severity, and there are no areas in this region where the vegetation becomes noticeably deciduous.

Nectar and Pollen Sources

By far the most important source of nectar is the black mangrove (Avicennia nitida), known in Guyana as "courida", which lines nearly the entire coastline and estuaries of the Guianas. Many beekeepers not living near the coast keep their bees in mangrove areas to increase honey production. Black mangrove nectar is estimated to account for 90% of all Guyana honey (Allicock, personal communication). The major nectar flows occur during the two dry seasons, and heavy rains during these periods can greatly reduce honey production.

Several other common trees are worth noting. Coconut palms (Cocos nucifera) are found at the coast as well as further inland near human habitations, and serve as both a pollen and a nectar source [(3)] which may be important because the trees bloom all year. The papilionaceous legume, Pterocarpus officinalis, is found in coastal marshy habitats. Although individual trees bloom for only one week, the entire flowering season extends from January to March. Triplaris surinamensis flowers from mid August to mid September, thus overlapping with the black mangrove. This species is distributed further inland than the others mentioned. It serves as an important nectar source for bees kept farther from the coast (e.g. Paramaribo region, Surinam). Some beekeepers blame their decreasing yields in this region on recent lumbering of Triplaris for use in the manufacture of plywood. Citrus and mango (Mangifera indica) provide nectar and pollen near human habitations.

The general flowering phenology (appendix) has been assembled from Crane [(1)] and from observations by K. van Deursen in Surinam. The list is not intended to be comprehensive. Most of the species bloom during one or both of the dry seasons.

Effects of the Seasonal Cycle

Brood production, honey storage, and swarming are strongly influenced by climate and abundance of resources. Brood production is generally strong during the two dry seasons as a result of good foraging conditions and/or abundant resources (appendix). During the wetter months, however, insufficient brood is reared to maintain colony strength, and colony populations can become dangerously small. Beekeepers often have to feed their bees during these periods, mostly in June and July, although in some years from February to May also.

Nectar surpluses are accumulated during the dry seasons, and the major honey crop is harvested in October or November. Occasionally a second, smaller crop is extracted in April.

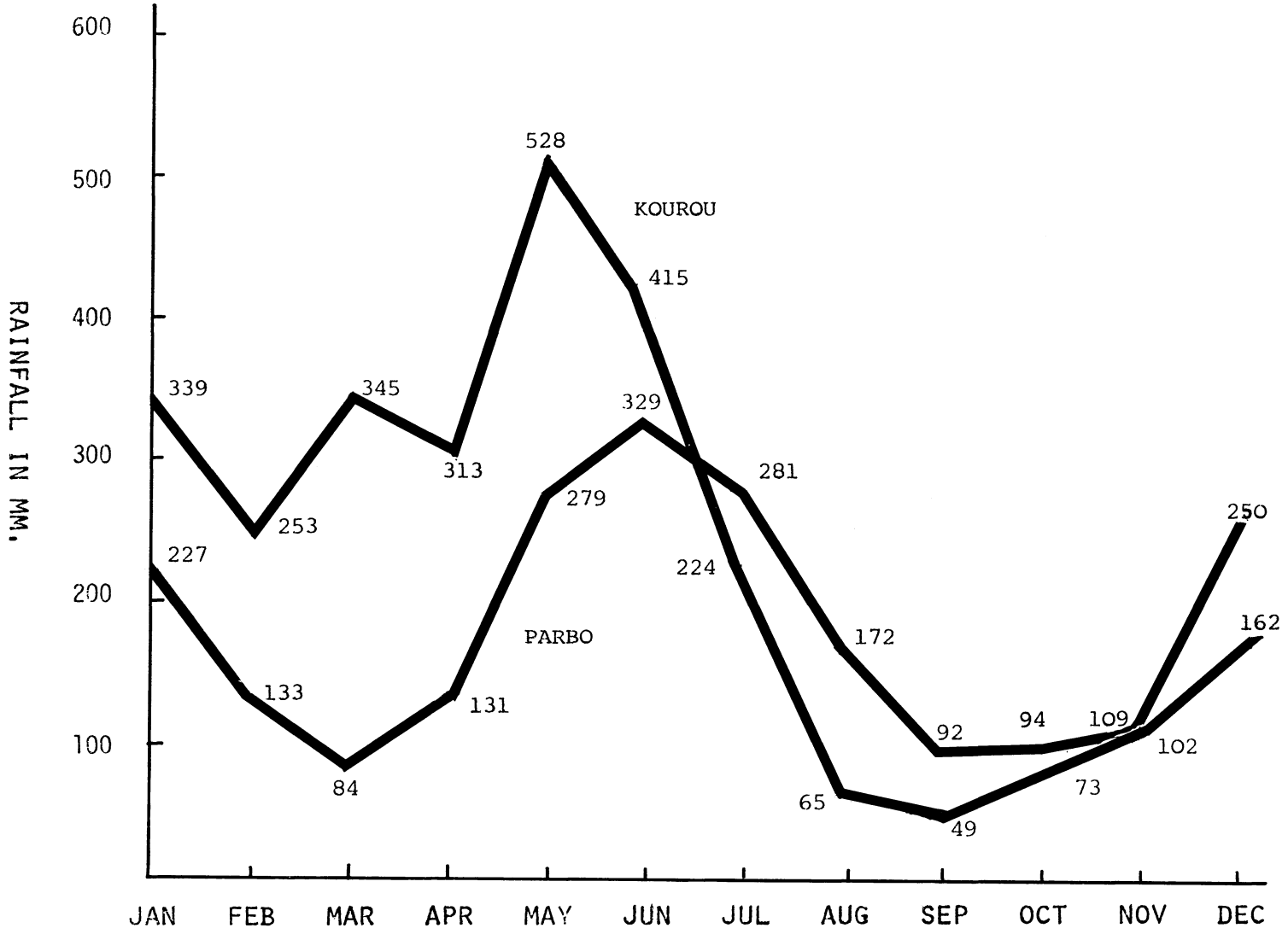

Fig 1. Annual rainfall distribution at Kourou, French Guiana (1965-1975) and Parbo, Suriname

Extended cloudy and rainy periods often occur from December to July, during which rain can wash or dilute nectar from flowers and reduce foraging to a few hours a day. During these periods bees utilize honey and pollen stored during the previous dry season.

Swarming is relatively uncommon, and in some years none occurs, presumably as a result of poor foraging conditions throughout much of the year and lack of crowding in the colonies. LeClerc in French Guiana observed that his colonies swarmed from February to April, most swarms issuing in March. In Surinam most swarming is reported to occur in August and September (van Deursen, personal communication), of these swarming periods coincides with the beginning of a dry season.

Historical Perspective

Beekeeping is not a well developed industry in any of the Guianas. European bees (A.m. ligustica) were first introduced into the region in Surinam in the later 1800s via the Caribbean islands. Here beekeeping flourished in the 1930s and 1940s, especially in the Coronie area along the western coast where several thousand colonies worked black mangrove. In 1932-33, 26,636 litres of honey were exported from Surinam,most of which was produced in Coronie. However, during and after World War II, the numbers of beekeepers and colonies decreased rapidly, and now there are only 130 colonies and 5 beekeepers in Coronie. Partly as a result of this reduction, Surinam now imports small amounts of honey. Possible reasons for the decline are emigration of people from Coronie to Paramaribo; reduced productivity due to erosion and destruction of the mangrove; absence of capital and young people interested in beekeeping; increased production costs.

At present only 36 people are known to keep bees in Surinam. They have 775 colonies, an average of 20.4 per beekeeper. Some rural farmers maintain bees, but the total number of managed colonies in Surinam is estimated to be less than 1000.

In Guyana there was a general expansion of beekeeping after the first introduction of Italian honeybees from North America in 1920; the recent slight decline is probably due to decreased interest by young people. Presently there are about 300 beekeepers, with about 2000 colonies altogether, most of which are found along the coast from the Pomeroon River east to Surinam. A few small operations are scattered in the south western savannah region. Recently, in a government-sponsored project, over 300 colonies were introduced to the extensive mangrove forests near Baramanni in the coastal north west. There have also been at least three attempts to introduce honey-bees to the forested interior at Mahdia and Ebini. These efforts have been generally unsuccessful, the former due to pesticide problems and the latter because of high rainfall and long dearth periods.

In French Guiana, Dr. LeClerc introduced about 20 colonies of Italian bees from Bologna in 1969, but he died 4 years later, and by 1975 only 15 colonies remained.

Many stingless Meliponin bees native to the Guianas can easily be kept in small hives but they are seldom used for honey pro-

duction, and then usually by people who also keep Italian bees.

Beekeeping Organizations and Government Support

Until recently beekeeping in Surinam was always an individual undertaking,often requiring considerable capital of equipment and bees. The founding of a beekeepers' association, Imkers Vereniging Surinam (P.O. Box 459, Paramaribo) in February 1975 siginificantly altered this situation. The goals of this association are to unify beekeepers for purpose of sharing equipment and technical expertise, to generate an interest in bees by non-beekeepers, to expand the honey industry in Surinam, and to disseminate information to beekeepers. The present means of achieving these ends are through educational services, such as the organization's journal, Imker Koerier, films and a ten-session course on the fundamentals of beekeeping. Also, supplies can be purchased in large quantities to reduce costs. The Imkers Vereniging is young and active, and is presently doing much to help the beekeepers of Surinam, where there is no governmental support for beekeeping operations.

The situation in Guyana is different, due to the existence of the Apiary Division of the Department of Agriculture. The Guyana Bee Officer and his two assistants have assumed most of the functions of the Guyana Beekeepers' Association, now 44 years old. The bee officers, who are employed by the government, regularly visit beekeepers, offer assistance and advice to those having difficulties, encourage beekeeping among non-beekeepers, and provide beginners with an initial nucleus colony from the government apiary at nominal cost. At present they concentrate their efforts toward the smaller operations, which have most need of assistance.

In an attempt to revitalize the honey industry, the Guyana Beekeepers' Association has recently requested governmental funds for the purchase of queens and equipment, the hiring and training of additional personnel, and the building of a honey marketing and distribution centre. The Guyana government has funded one major beekeeping experiment already mentioned which involved the equivalent of more than US$ 15,000. This covered the building of a honey-processing centre, and the purchase of supplies, queens and package bees to establish 325 hives in the previously unexploited black mangrove forests at Baramanni.

Unfortunately these apiaries declined to about 25 colonies, probably due to the use of pesticides in the area, although other factors cannot be excluded. The difficulties with this experiment, and with the introductions in the interior, could dampen efforts to expand beekeeping into new areas of Guyana.

Equipment and Supplies

Beekeeping equipment has been imported from Britain, France Canada and the United States, and is made locally usually patterned after the 10-frame Langstroth hive. Imported wood is preferred, especially for frames, because it is well dried and resists warpings. Increased costs of foreign equipment

and wood have recently reduced imports. Foundation is normally imported, but a small amount of high-quality foundation is produced by two beekeepers in Surinam for their own use. Most other beekeeping appliances except extractors are constructed locally. Homemade hives and frames often lack the appropriate "bee-space", and are therefore "cross-combed" by the bees, making inspection and management difficult.

Obtaining queens when needed can be a serious problem where there are no queen-rearing facilities. In the Guianas, most beekeepers rely on natural supercedure. New colonies are started by making divisions: frames containing eggs, young larvae and sealed brood are placed in an empty hive with a large number of workers. Queens are reared from the young larvae in emergency queen cells. This same principle is employed when a colony becomes queenless, a frame with eggs and/or young larvae being placed in the colony. Few colonies are acquired by capturing swarms, because the incidence of swarming is low. Until a few years ago, the government apiary in Guyana produced about 100 queens annually which were distributed to local beekeepers. This programme has been discontinued because of a reduction in staff. Queens and package bees are imported only in Guyana, but there has been a recent decline due to increasing costs.

Beekeeping Products

Few beekeepers in this region keep accurate records of yields, but it appears that honey production varies greatly, as a result of beekeeping practices, local floral resources, and heavy rainfall during honey flows. Leclerc obtained 30 litres per colony annually in Cayenne, French Guiana (personal communication), and under the best conditions in Surinam and Guyana yields are slightly greater. However, yields of 5 to 20 litres are typical, the lower yields often being associated with poorly maintained combs and/or lack of expertise in management. Heavy rains can also eliminate surpluses, as in 1973 in Coronie, Surinam, when no honey was extracted. Honey production in these countries is not sufficient to meet demands and some honey is imported (e.g. 24,000 lb in Guyana in 1973, 10,000 lb in 1974; 1,500 lb in Surinam in 1973).

Honeys in the Guianas are highly variable in quality. Most are amber in colour with a rather strong taste. Honey of exceptional quality is produced from black mangrove (very light in colour with a mild flavour[8], and also from Pterocarpus officinalis (very thick with a mild flavour). Much of the honey, especially that extracted during the wet season, has a high water content.

Honey prices are generally high. In Surinam sell their honey directly to consumers at an average price of US$0.83 per lb. Honey prices vary greatly in different stores, and some imported honey is sold in small quantities for as much as $4.00 per lb. In Guyana, beekeepers sell honey to a central processing company as well as directly to consumers, and prices are lower, ranging from US$0.62 to US$0.92 per lb. All honey sold in French Guiana is imported and sells for about US$2.20 per lb. Apart from the occasional use of beeswax for foundation, no other bee products are marketed in these countries.

Predators, Pests and Pesticides

Many of the general problems in the neotropics affect bee keepers in the Guianas. Predators and pests include several species of ant, robber bees and wasps, greater and lesser wax moths, termites, toads and flycatchers, but no one of these constitutes a serious threat to beekeeping. Problems with pesticides have occurred in certain areas (e.g. Baramanni, Guyana). In addition, the injection of the systemic insecticide monocrotophos into coconut palms, to control two major pests, has been shown to injure honeybees. In a Guyana experiment, the populations of colonies in a coconut grove was estimated to have been reduced by 50% within a week after application of monocrotophos [7]. Widespread use of this pesticide could affect many beekeepers in Guyana and Surinam.

Diseases of brood or adult honeybees are unknown or unrecognised as such. It seems probable that, if pathogens do exist, their occurrence is infrequent and their effects relatively insignificant.

Colonies established by escaped swarms of European bees rarely survive more than a few months in the wild. Exact reasons for this are not know, but the bees may be ill-adapted to survive encounters with predators, or periods of heavy rainfall.

The Africanized Bee

Africanized bees have been recorded recently throughout the coastal region of the Guianas as well as the southern savannah of Guiana [9]. Africanized bees were first observed in French Guiana in August 1974 [10]. Later surveys found them further west in Surinam (March 1975, van Deursen, personal communication) and in Guyana (April 1976, G.W.O). As recently as April 1976, Africanized bees had still been present at very low densities in Surinam and Guyana and had had minimal impact on beekeeping. Given the history of the invasion of Africanized bees in South America, however, it is certain that all established colonies will become Africanized, unless colonies are requeened frequently with imported queens. Since these hybrid or Africanized bees differ from European bees in many characteristics [6] that can effect management (Swarming, absconding, sensitivity to disturbance, etc), beekeepers may be forced to make numerous changes in their operations. The ease with which such changes are made will depend on many factors, including the attitudes of beekeepers, beekeeping organizations, the public, and the respective governments.

It is of interest to note that in our many contacts with beekeepers we learned of no major stinging incidents in recent years. On the contrary, the Italian bees kept in this region are as gentle and manageable as those of North and Central America. In addition, although beekeepers sometimes complain of difficulties with dwindling and starvation, absconding a problem with Africanized bees under unfavourable conditions - is not known to occur.

It will be interesting to compare and contrast the observations reported here with similar notes made 5 and 10 years hence. We will resist the temptation to predict the effects of Africanized bees on beekeeping in the Guianas, except to reiterate that the adaptability of the beekeepers is one of the most important factors.

Acknowledgements

This paper could not have been written without the enthusiastic support and co-operation of many people in the Guianas. We are especially grateful to Kees van Deursen and Paul D. Allicock who provided much of the information used. Some of the comments on beekeeping in French Guiana were obtained from correspondence (1975) between Patricia Richards (University of Michigan) and Dr. Leclerc (Martinique), and we thank them both. The comments and criticisms of Kees van Deursen, David W. Roubik and Constance Corbett Otis are greatly appreciated.

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