

BEEKEEPING IN AFRICA: I- NORTH, EAST, NORTH-EAST AND WEST AFRICAN COUNTRIES

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Abstract

The recent status of beekeeping in North Africa: Algeria (ALG), Egypt (EGY), Lybia (LIY), Morocco (MOR), Tunisia (TUN); in East Africa: Kenya (KEN), Tanzania (TAN), Uganda (UGA); in North-East Africa: Djiboti (DJI), Ethiopia (ETH), Somalia (SOM), Sudan (SUD); in West Africa: Benin (BEN), Burkina-Faso (BUF), The Gambia (GAM), Ghana (GHA), Guinea (GUN), Guinea-Bissau (GUS), Ivory Coast (IVO), Liberia (LIR), Mali (MAL), Niger (NIP), Nigeria (NIR), Senegal (SEN), Sierra-Leone (SIE), Togo (TOG), are described. Races of honeybees, including African honeybees (AHB), bee forage plants, activities of honeybees, honey production, pests, diseases of honeybees, honey hunting (HH), traditional beekeeping (TB) using traditional hives (TH), modern beekeeping (MB) using modern hives (MH), in these 26 countries, are included in this work. History of beekeeping, research activities, and bioneers of beekeeping research in these countries except: MAL, NIP, SIE, are included. More research was conducted in EGY, TAN, ETH, NIR, SEN. Projects, Association, Training Courses, Books, Seminars, Workshops, and Conferences, are summarized. More organization, co-operation, modernization, training, extension, and research, are needed.

Beekeeping Work: I. North African Countries

1. Algeria: History of beekeeping in ALG from ancient times and the development of the horizontal hives was described. A sectional hives suitable for ALG and their use from 1947 to 1950, was described. Native bees and hives in ALG were described. TH from rocks and mud were found in ALG deserts, with excessive temperatures and prevalent winds. ALG, MH are from "Langstroth" (L) type, with some modifications because of hot weather. A good honey crop can be obtained from these hives.

Co-operatives are working hard in beekeeping. Research activities are conducted in "Institute of Small Animals". Chemical and botanical origin of ALG honeys was studied. Beekeeping is practised mainly in the North, where the floral diversity as ensured almost time. Southern ALG is a home land of over one million date palm trees.

2. Egypt: Pharaohs were the first to keep Egyptian race of bees in mud hives placed in piles. Migratory beekeeping was practised. Honey was the delicious food for the Kings and Nobles. It is mentioned in pharaonic papyri as an ingredient in medicines, and in Holly "Koran". EGY is one of the countries with legislation and standard or codex, based on honey to be sold.

The Coptic Organization for Social Services has distributed thousands of MH in El-Minia and Assiut Governorates in order to increase the income of the farmers. Two main honey flows in EGY, during June from clover, and Aug.-Sep., from cotton, and a minor flow from citrus in April. 70% of MH and 40% of TH, are in Delta, from which about 60% of honey is produced, while 40% from Upper EGY. Honey bees was utilized for the pollination of certain crops in newly reclaimed lands. Pollen supplements as well as sugar syrup are fed to the bees for building up populations for pollination. The Egyptian race of bees is resistant to varroa and acarine, and more effective in pollination of some cultivated crops. Isolated Siwa Oasis was used for propagation of this race.

More than 250 MH and Kenyan top-bar hives (KBH) were used. *Varroa* has been identified in Delta. An Arabic language review of scientific papers concerned *Varroa* was prepared by the author.

3- Libya: TB was found in early times in “Jabal Akhdar”, while MB is practised only from 30 years. Two main honey flows. Number of colonies is increased by 20% every year. Beekeeping is practised in Norther LIY and some Southern Oasis. 9 types of honey from which, Sidr, *Eucalyptus*, *Citrus* honeys. Migratory beekeeping is practised. Main honey plants are: *Acacia*, *Pinus*, *Cupressus*, *Thymus*, *Rosemarinus*, *Citrus*, *Eucalyptus*, and many wild plants. Honeybees make liberal use of propolis to keep out introducers. The successful introduction of MH, nectar sources and types of honey produced were described. Apistan and Bayvarol were more effective than Manpu against *Varroa*. Using of plants for controlling of *Varroa* is of special merits.

4- Morocco: TB in baskets (20-30 litre size) are found in MOR. A professional “Beekeeping Institution” is found. In MOR, *Apis mellifera intermissa*, aggressive and swarming honeybee race. In South, Atlas Mountains, a pure yellow colour race, *A.m. sahariensis*. Bees which are kept in cavities of house walls are yellow-red, good tempered and excellent foragers. Citrus, thyme, lavender, rosemary, eucalyptus, are the main honey plants.

A list of honey-yielding plants is included for MOR, which is one of subtropics/temperate countries with legislation based on honey to be sold.

5 - Tunisia: Availability of honey plants, is one of the beekeeping problems in TUN, and expansion of forests is one of the solutions. Co-operatives also needed Unarranged migratory beekeeping leads to dispersal of diseases and less honey production. Research team working in pests & diseases control, genetic improvement of bee race, pollination, bee products. Extension and training are needed for development of beekeeping industry in TUN. Instrumental insemination of Carniolan queens is conducted at a “German Station”.

During 1978, *Varroa* was discovered in Africa for the first time in TUN. A project for promotion of beekeeping in the Sedj enane Region, for *Varroa* control. Privatisation of beekeeping associations was conducted. Introduction of improved management, with GTZ. Another project about *Varroa* control, to develop biological control methods with GTZ. A training programme about “Bee Disease Diagnosis”, was conducted in “Veterinary Research Institute”, in May 1997.

II- East African Countries

1- Kenya: Keeping bees in TH, movable comb frameless hives, KTBH, and TAN transitional Hive (TTH), in which combs are moved in pairs, were described. KTBH is successfully replacing TH. The “David Hive” is more or less like KTBH, full honey combs are extracted. A planned research programme in bee selection in KEN was suggested .80% of KEN-land, including some arid areas, is suitable for beekeeping. In KEN, the imported European bees, suitably managed, were less useful than AHB. the foreign bees is confronted with competition in foraging and defence from AHB, which is well adapted to the tropical conditions. TB, in the Wakamba and Kalenjn, and proposed methods for improvement. TB by various tribes in the Embu District, economic life in Dorobo, hive designs in KEN, and KEN-Pilot Project.

In Nov. 1984 “The 3rd Inter. Conf. on apic. in Trop. Climates, was held in Nairobi. “Inventory of Non-Timber Forest Products”, was held in Feb. 1996 in Nairobi. A regional Workshop organized and sponsored by API-Promo/GTZ, was held in Nyeri, in 1997.

The observations recorded in the “Apicultural Section” of the “Nat. Agric. Laboratories” in 1971, indicated that beekeeping project can be expand rapidly into a major source of income for farmers. “KEN Nat. Beekeeping Station”, was established in the Mount Elgon District of KEN, for training of 15 women’s groups by “Swedish Mount Elgon Assoc”, under funding from SIDA. Main objective of “KEN Indigenous Forest Conservation Project”, in Nakuru, was to encourage beekeepers to adopt methods of extracting resources for hive production with minimal damage to the forest. “Baraka Beekeeping Project” was initiated in 1994, in Molo, with help of UK. “Baraka Agric. College” (BAC), has manufactured KTBH and other equipments. A beekeeping programme in Mau Forest with forest-dwelling “Ndorobo” beekeepers has been intensified and expanded. In 1995, work at BAC is progressing very well with a new honey refining facility being built “Beekeeping Courses” are becoming very popular.

2 - Tanzania: Classical work on identification of pollen grains from 236 plant species, scale-hive records, discovery of EFB, African “Dadant Hive”, reasons for advocating it for, *A.m. adansonii*, production of high quality honey are included. A report covers improvement of beekeeping in Ujamma villages, honey and wax production, hives and management methods for AHB, diseases (EFB only), enemies.

Beeswax is a very important by-product of TB. TAN has been one of largest exporters of wax in the world. In 1973, 275 tons were exported. In Handern District, mean yield/TH, is 15 kg honey. Assuming that 1/2 to 2/3 of harvested wax is obtained for export, the number of colonies must be between 800 thousands to million. MH were used in “Tanga Integrated Rural Development Programme”, in north-eastern TAN, and in Handeni. Abeer “pombe” is prepared from honey. A ratio of 1:15 between wax and honey provides a basis for calculation. TAN-commercial Hive (TCH), and TTH, are the two recommended blank hives. In order to avoid overcrowding, the “Carrying Capacity” of different areas must be investigated.

Problems of beekeeping programme are associated with man and his traditions, and with bees, and its enemies. Financial support is needed. Training in “Tropical Beekeeping” is conducted in “NJIRO Wildlife Research Centre, Arusa”. They produce a “Newsletter” in beekeeping. A “Beekeeping Division” in Min. of Natural Resources & Tourism. Practical approach to beekeeping extension, methods of extension, targets and role of officers. In 1987, the “TAN Beekeepers Association”, TABEA, has been formed through the efforts of G. Ntenga, for development of TAN-beekeeping industry.

“Tabora Beekeepers Co-operative Society”, TBCS, was formed in 1962, with 100 beekeepers. Arusha Branch of “Wildlife Conservation Society of TAN”, is funding “Hadza Beekeeping Scheme”, to assist traditional hunters to use their environment sustainably through production of honey & wax. Care has to be taken when fire is used during harvest. From TBCS, Kipalapala, in 1991, 86.4 tonnes “Organic” honey were exported to UK & Netherlands. However, in 1995, only 10.6 kg honey was collected. In 1997, following “Training Courses” were conducted: “How to teach beekeeping in Africa”; “How can we solve the problem of low productivity of East African Beekeeping”; “Training in beekeeping”, in “Forestry Train. Inst.”, Olmotonyi; “Beekeeping in Rural Development”, in Njiro Centre & Cardiff Univ., UK. Njiro Centre and B & D are co-operating on a project “Sustainable Beekeeping for Africa”, funded by UK, DFID. 1st East Africa Workshop on “Tabora Natural Organic Honey”, gathered without smoke. Nearly all honey are exported. Stored honey for a long time which means high HMF can sell as industrial honey with lower prices. In Njiro Centre, the best time of day to harvest honey combs from TBH is in the evening before dusk. When procedures are followed well, the best honey, with no venom can be obtained, with few dead bees. El-Nino rains affect honey & wax production in June & Aug. 1997 & 98. Members of TBCs, reported that many colonies absconded and again occupied.

3 - Uganda: UGA has a very high potential for honey production, which not yet been fully achieved. TB in Teso and West Nile areas. Trees are the main forage plants, while in the Kigezi area, crops, pasture, weeds and exotic trees. Introduction of MB in UGA was described.

A promotion programme with CARE, YMCA & Red Cross has been started to introduce more effective MB in UGA. 4 major honey refinery plants in Nakasongola, Nalukolonga, Mbale & Soroti, 14 apiary demonstration farms are being established. "UGA Beekeeping Association", UBA, has recently formed in 1986 and 1st edition of their Newsletter was published with CARE-UGA. "Apiculture Section" was established in Min. of Animal Industry & Fisheries, Kampala. Apiculture Project, CARE-UGA, Kampala, was conducted. In 1990, beekeeping was started in Bunyaruguru County-Bushenyi. People drinking their local brew mixed with honey. The UBA has embarked upon a "Beekeeping Research Project", which commenced in Sep. 1995, Luwero District, Kampala. They compared TBH with sloping sides, with straight sides, L hives with TBH instead of frames and TH, concerning production, duration and susceptibility to pests and predators.

III- North-East African Countries

1- Djibouti: Wild honey is collected and beekeeping should be practicable, if some one knew how to do it.

In 1988 "Apiculture Development Project" (TCP/DJI/6651), to evaluate potential for apiculture development in the country & consultancy services were offered.

2 - Ethiopia: ETH is distinguished by 3 zones of climate, "Kolla", "Wonia Dega", "Dega". The "Kolla" or hot zone, where, *Acacia*, *Albizzia*, *Combretum*, *Commiphora*, *Croton*. The "Wonia Dega" or cool-warm zone, where, *Acacia*, *Coffea*, *Combretum*, *Croton*, *Guizotia*, *Trifolium*, *Olea*, *Veronia*. The "Dega" or cold zone, where *Olea*, *Rosa abyssinica*, *Albizzia*, *guizotia*. Swarming in Sep. and April. In "Dega", flowering throughout the year, and bees have fewer enemies. While, in "Kolla", flowering period is short and bees are very productive and aggressive. In "Dega", flowering throughout the year, and bees have fewer enemies. While, in "Kolla", flowering period is short and bees are very productive and aggressive. In "Wonia Dega" bees are either those whose first very active and productive swarms were caught in the low lands "Kolla", or those unproductive swarms from "Dega". Honey production is estimated to be 26547 tons/year. About 2/3 goes into "tej" making. ETH ranks as third exporter of wax in Africa, after TAN & ANG. Gojam, is number one in number of hives & honey production. Only 30 beekeepers are using MH, at present.

ETH, a potential beekeeping giant. In an Abyssinian grain-market, many honey bees were observed collecting from open sacks of shirro (*Cicer arietinum*) as a pollen substitute. Usage of honey for making "tej", and for selling. HH by Majangir and by Andaman islanders, beekeeping in Nakamte & Abyssinia, was described. ETH is one of the homes of *A.m. adansonii*. Bees are kept in TH. Over 3 million TH and one million farmer-beekeepers are in ETH. Beekeeping is divided into: beekeeping as practised in West & South ETH, and beekeeping in the rest of ETH. Majangir people used hollowed-out logs, taken from soft wood trees, *Cordia africana*. Hives were pulled up to high tree branches. Mean yield, 4-9 kg/hive in South & West, while in the rest of ETH, as in Abyssiana, beekeeping is primitive. TH are used. Inhabitants of Tigrai, divided the hives into 2 parts, as in KEN, one is honey chamber, for easier extraction. Abyssinian apiculture has its origins in EGY. *A.m. fasicata*, probably existed in Abyssiana. Honey is harvested twice/year, before & after rainy season. Farmers place water near the apiary during dry period & pollen substitutes, during periods of pollen shortage.

3 - Somalia: Some authorities speculate that bees came to ETH from EGY along the Nile Valley, and that the same bees were also taken to SOM. Somali bee-eater is one of the most serious pests of honeybee colonies in SOM. Beekeeping survey and recommendations for its possible development, made on behalf of the “SOM Agricultural Development Co-operation”.

4 - Sudan: SUD is the largest country, in size, in Africa. Agriculture accounts for 40% of GNP and over 50% of its foreign export earnings. Main agriculture, cotton, peanuts, sorghum, barley, sesame, wheat and gum arabic. *A. mellifera* (indigenous and introduced from EGY), and *A. florea* (introduced, probably from West Asia), and observed for the first time in Africa, Nov. 1985, near Khartoum. Some biological and behavioural observations about this small bees were conducted.

TB: clay pots, cylindrical log hives, SUD bark hives, grasses woven into mats & rolled up, leaves of the doum palm “tangels”. Modern low-technology, KTBH, Omdurman clay hives, Gufa basket hives & MH, are used in SUD. The status of beekeeping in SUD during 1978, was described. Northern SUD is desert, and indigenous honeybees do not exist north of Khartoum. In South, rainfall increases, and so does vegetation through savannah until finally the lush rain-forest near SUD southern boundaries. Thousands of beekeepers in SUD. AHB, nesting in holes, trees, fallen logs, termite mounds, rocks & roofs. Differences in AHB characters from different provinces were observed. The native Khartoum bees was more aggressive than Carniolan race, blue Nile bees & hybrid colonies. Migration, swarming and supersedure of the native honeybees was quite noticeable.

IV- West African Countries

1- Benin: About 75% of BEN population earn a living from agriculture crops include, maize, cassava, sorghum, coffee, cotton, palm oil, peanuts, avocado, coconuts, guava, mango. Beekeeping in Dahomy was described. In 1994, the “BEN Integrated Centre for Tropical Beekeeping”, CIAT, in Parakou, was introduced. CIAT, in the 3 years of activity, besides some projects, succeeded in training 384 persons. Besides, restoration of bee populations, massively destroyed by HH, increasing the yearly income of the trained and assisted beekeepers, generating a mass conscience, and using beekeeping products on a large scale as food & medicine. “National Association of Beekeepers in BEN”, Cotonou, is a member of “West African Beekeepers Association”. Training available at CIAT & in Tobe, near Bassila. 10 projects have included beekeeping in their activities in the past 5 to 10 years.

TB and MB in BEN during 1998-1999 years. “3rd West African Bee Research Seminar”, Cotonou, Dec. 1995. Plants visited by bees were listed. Swarming of *A.m. adansonii*, in Sep.-Oct. HH is still practised as many colonies live in tree cavities or termite mounds or under large baobab, branches or on the ceilings of houses. Calabashes, clay pots, gourds, hollowed-out tree trunks and palm stems are used as TH. In Somba Land, clay hives are built directly into the forks of trees and look like closed water pots. TBH are made from cement, clay & wood. Cylindrical hives made out of iron sheets & insulated with a layer of straw, are used. MH, including Dadant, the “France-Congo” hive, L hives, are used in few apiaries. Best honey harvesting from Nov. to April. Most of Honey comes from HH.

2 - Burkina-Faso: Experiences with a recent project among the Gourmas in Upper Volta, was described. In 1977, “American Peace Crops” started a beekeeping project at a fruit growers’ cooperative. An FAO-UNDP beekeeping project has been underway in BUF, since 1958, to promote use of TBH, with sloping sides & 24 top-bars, from timber or straw which covered with cow-dung. KTBH is the best for AHB. Beekeepers number has risen from 375 in 1986 to 2250 in 1989. Around 700 hives have been built so far.

“7th Inter. IFOAM Conf.” was held in Ougadougou, during Jan. 1989. A project “Apiculture Development” (TCP/BRF/4510), to improve honey production and to establish “Nat. Centre of Apic.” A project “Apiculture Development at Farm Level” (TCP/BKF/5760), to increase honey production at farm level. “Intensification of Apiculture at Farm level” (BKF/87/016), a project to increase the income of 200 farmers/year, from the 2nd year of the project, particularly women & to improve their level of occupation.

3 - The Gambia: GAM, is a small country on the west of the African Sahel. Its people are subsistence farmers. Beeswax was the principal export. TH are used and 4 MH, KTBH, L, Dadant & Zambian. There is a potential for beekeeping development.

A report about 3 years study in Danish/Gambian beekeeping project & training programme, financed by DANIDA, and organized within the programme of co-operation between “Beekeepers Co-operative Association” in GAM, DANIDA, AFET, NGO, formed to link & assist “Kaffos”, & “Danish Beekeepers Association”. Basket hives from leaves of fan or rhum palm, TH are usually made from dead trees of fan or rhum palm & santag. TB includes killing of bees with fire during honey harvesting. Local and modern knowledge are in the training programme. Honey can be harvested without destroying colonies to get more honey and secure strong bee population for pollination. TH are placed in trees after rainy season, Oct.-Nov. Hives were left for 8-9 months before harvest. Using of MH and TBH, is needed. NBA was formed in 1996, to co-ordinate future activities. Individual ownership of hives should be encouraged and used for all new projects. Training & marketing must be effective & appropriate.

4 - Ghana: Beekeeping in Ashanti, HH, pollination by bees, efforts done in 1977, to promote beekeeping industry were reported. The inhabitants of Central regions, Ekumfi District, has been practised TB. Bees are housed in clay pots. Some have as many as 50 “bee pots”. “The Golden Insect”, & “Beekeeping in Africa”, are books for Ghanian & other African beekeepers. For GHA, plants visited by bees were listed.

GHA, is a typical tropical country. Evergreen rainforest occupies the central part of GHA. A narrow strip of the southern coastal lands as well as the northern areas, are covered with the savannah vegetation, that is rich bee forage. TB based on using local materials, which vary with ecological zones (the forest & savannah zones), and with TB, that have been practised by ethnic groups (e.g. use of earthen pots as bee hives by Mid-Volta people). In GHA, and other parts of West Africa, the honeybee-man interactions, is the same as other tropical regions, where numerous species of bees occur. Honey hunters exploit feral nests of *A.m. adansonii*, as well as stingless bees. In West African sub-region, honey season occurs from Sep. to April & a minor peak in Nov.-Dec. Produced honey for local market.

5 - Guinea: Beekeeping in GUN & behaviour of bees from French GUN, imported for the first time to Paris, was described.

A project from Hive-Aid, “Integrated Rural Development in Fouta Djallon (Apiculture Component)”, GUI/86/004, to evaluate potential for apiculture development in the project area. Consultancy services from FAO.

6 - Guinea Bissau: GUS, was going to remain a “green” country, 80% of population work in agriculture. TH are made from local materials. Beekeeping and HH are practised all over the country, particularly in the Eastern Province, with good natural vegetation. During 1960s & 1970s, many tonnes of wax were exports, however exports have now declined. Improvement hot water on the combs. Almost of honey is marketed for alcoholic beverage “Cana”. Beekeeping has existed for centuries in Gabu. Large number of TH are found in the north-east part. About 3200 beekeepers are living in 674 villages in the region. About 150 tonnes honey/year were obtained in May & June, mainly from TH. High quality honey with moisture content from 16% to 18%, from

sealed honey combs, possible to obtain in May-June. KTBH were used in Gabu. A small number of honey hunters collect honey from feral colonies in hollow tree trunks and abandoned termite hills. "Beekeepers Association" of Gabu, began work in 1985, in 19 villages. In 1988, 195 members brought 16600 kg honey combs to the "Honey House" in Gabu.

Beekeeping in oversea provinces was described. *A.m. adansonii*, is a small in size, very productive in honey & wax, aggressive and highly resistant to diseases. A HIVE-AID Project, "Apiculture Development", in 1988, to evaluate potential for beekeeping development in GUS. A "Beekeeping Development Project", funded by FAO, was conducted in Pitche, Eastern Province, to set up a honey collecting centre, to establish a demonstration apiary, to introduce TBH, conduct experiments with MH, a "Workshop for Hive Construction & Training. The Government has set up a "Nat. Beekeeping Dept.", for beekeeping development. There are two methods of honey & wax production, TB & MB. KTBH, L hives, and modified Dadant hives made of good quality, long lasting and expensive wood, are used. In 1989, there are 3 projects in operation in the north, which financed by NGOs from Canada, Germany & Holland. Number of existing TH is estimated as follows, North, 22352; East, 93464; South, 16446 hives.

7 - Ivory Coast: IVO, or Cote d'Ivoire, is a West African Country. *a.m. adansonii*, has adapted successfully to tropical climates, e.g. by using subterranean cavities as nests. Plants visited by bees were listed.

A project, SODEPRA, Apiculture Centre, in Katiola Region, in 1991, to improve extension & marketing, with GTZ.

8 - Liberia: some difficulties of beekeeping in LIR, were described. General standard for the labelling of prepackaged foods, applies to honey.

9 - Mali: A project "Apicultural Development" (MLI/85/003), to consolidate & organize the CNA, in 1986, of Bamako, which has responsibility for training, technical assistance & research. To prepare & initiate applied research programmes. To consolidate rural apiculture activities.

Postage stamps showing AHB in MAL, are produced in 1988. They can be a useful way of promoting interest in beekeeping.

10- Niger: A beekeeping project was underway in Gaya, NIP, to teach beekeepers the skills of beekeeping (as opposed to HH), how to handle & process honey, to teach apiculture to students, who will themselves become teachers. Beekeepers are now interested in starting a beekeeping co-operative to market honey & wax. A project about beekeeping development between EGY & NIP was conducted.

TH are treated with special "medicament", which is the secret of every beekeeper. Before placing a log hive in tree, the beekeeper places the hive over a hole in the ground, which contains burring "medicament". The smoke is believed to give the hives a "taste", which attracts bees. TH from grass are also reported for NIP.

11- Nigeria: During the Middle Ages (1000-1500 AD), Arab travellers in West Africa, which include North NIR, recorded the use of honey as food & mead, and referred to the existence of bee hives & honey.

The forest nesting sites of *A.m. adansonii* & *A.m. unicolor*, beekeeping in NIR, Ngamo practice of beekeeping in hives of plaited grass, pollen analysis from Southern NIR, was studied. TB in Zaria area, was studied. One man could put about 100 hives in trees, in one season. Plants visited by bees, were listed. Honey processing by a hone press (cheese press), from TBH, was described. The honey combs are harvested after dark or after a full moon and before a new one. A torch, from grass provides smoke. A method of beekeeping management, based on colonies seasonal development, was developed. In Adiani Forest Reserve, Kanurii people are using

calabashes in trees as bee hives. TBH from wood or half or quarter steel drums fitted with wooden top-bars & MH at “Inter. Inst. of Trop. Apic.”. IITA, Ibadan, in farms at Ayepe, Osun State, in Oyo North, at Ilesa & Dogon Dawa. Press extraction yields the same net weight of honey/crude comb weight, as a centrifuge, which is usually 70-80%. Some beekeepers in NIR are harvesting annually a metric tone of honey or more from TH.

12- Senegal: SEN is located in the far West of Africa, in the inter-tropical area. For SEN, plants visited by bees were listed. In SEN, the year can be divided into 4 seasons. During rainy season, end of June, no beekeeping. Swarming from Oct. to Dec., Jan., the time to hang up TH in trees. Dry season, end of Oct. to July in the north, and from Dec. to May, in the south. The driest months, March & April. In south, honey harvesting in May & June. Nine climatic & beekeeping regions are found in SEN. Best beekeeping in Lower, Upper, Casamance & Kedougou. Aggressivity of *a.m. adansonii* is more among wild colonies, than those kept in MH. Selecting the most gentle strains is needed. TH used are: Cylindrical hollowed log, used horizontally; conical hollowed log used horizontally; conical skep, woven from straw (Thiadiang) suspended vertically, cylindrical woven hive, used horizontally; conical skep, suspended horizontally. MH adopted in SEN, is of L type, with modifications. Hard, termite & decay-resistant wood of *Cordyla pinnata*, is used. Mahogany, is also used. “Beekeeping Section”, Dakar, supervises 7 “Regional Beekeeping Stations”, set up in the most favourable beekeeping zones. 310 tonnes honey & 30 tonnes wax, mainly from TH, were obtained. Mean yield from MH is 15-20 kg honey/colony.

13- Sierra-Leone: In SIE, a green papaya beswax mould was invented. A hollowed-out green papaya is used. Pour clean, molten bees wax into the mould and rest in a cool place for a few hours until the wax has set hard. The bambo candle moulds was prepared. A section of bamboo with inner diameter about 20 mm was used.

14- Togo: Plants visited by bees were listed. Most people are employed in Agriculture. Main crops include, cocoa, coffee, copra, cotton, maize & groundnuts. Traditionally, honey is used in ceremonies and medicins. Clay hives are used. MB is practised, mostly central & Southern regions. Swarming from Sept. to Dec. Lack of working materials in the local market is a serious handicap to the promotion of beekeeping. 73 bee plants were identified during a study. Major sources in Northern & Central TOG: *Azadirachta indica*, *Parkia biglobosa*, *Vitellaria paradoxa*; In South, *Cosos nucifera*, *Eucalyptus torreliana*, *Mangifera indica*, *Citrus*, *Acacia*. Period of harvest from Dec. to April. In Jan. 1992, a Centre was created at the Univ. of BEN in Lome to promote research. This centre studies the ecoethology of bees in different regions of TOG.

Table 1. Beekeeping research in North, East, North-East and West African Countries.

Country*	Number of published entries	First publication in beekeeping	Pioneers in the field of beekeeping
<u>N. Africa</u>			
1. ALG	17	Doumas (1903)	Doumas, Alber, Andreu, Griessinger, Idir, Jenn.
2. EGY	143	Abushady (1949)	Abushady, Mellor, Wafa, Rashad, Hassanein, Mazeed, Hussein.
3. LIY	6	Brittan (1955/56)	Brittan, El Banby, Mazeed.
4. MOR	27	Haccour (1939)	Haccour, Aloyol, Barbier, Crane, Chapot, Faress, Ruttner.
5. TUN	17	Chenevard (1929)	Chenevard, Matis, Osman, Paterson, Bouderballa.
Total	210		
Mean	42		
<u>E. Africa</u>			
1. KEN	11	Huntingford (1955)	Huntingford, Kigatiira, Nightingale, Riley, Mwaniki.
2. TAN	23	Culwick (1936)	Culwick, Bruijn, Drescher, Hunter, Smith, Ntenga.
3. UGA	12	Kerr (1914)	Kerr, Fagg, Chorley, Driberg, Johnson, Roberts, Lind.
Total	46		
Mean	15.3		
<u>N.E. Africa</u>			
1. DJI	1	Yeates (1978)	Yeates.
2. ERI	1	Scott (1954)	Scott.
3. ETH	13	Julien (1918)	Julien, Ambatchew, Giavarini, Griaule, Mammo, Scott.
4. SOM	3	Paterson (1970)	Paterson, Leuthold
5. SUD	9	King (1920)	King, Marshall, Paterson, kambel, Rashad, El-Sarrag.
Total	27		
Mean	5.4		
<u>W. Africa</u>			
1. BEN	1	Potiron (1972)	Potiron.
2. BUF	2	Swanson (1976)	Swanson.
3. GAM	7	Brooks (1927)	Brooks, Hall, Saunders, Tallantire.
4. GHA	13	Collins (1942)	Collins, Doku, Gornez, Kaufmann, Anno, Adjare.
5. GUN	4	Pogeguain (1906)	Pogeguain, Matis, Mitev.
6. GUS	1	Abelhas (1968)	Abelhas.
7. IVO	3	Darchen (1973)	Darchen, Bornek.
8. LIR	2	Clulow (1969)	Clulow.
9. NIR	17	Lamb (1927)	Lamb. Attfield, Ayuode, Burns, Collins, Corby, Taylor, Sowunmi.
10. SEN	17	Linder (1965)	Linder, Darchen, Douhet, Lavy, N'Diaye, Peled.
11. TOG	2	Petitjean (1975)	Petitjean.
Total	69		
Mean	6.3		
G. Total	352		
G. Mean/country	14.7		

(*) No information about beekeeping from Green Head Island, Mali, Mauritania, and Niger⁽³²⁾. (+) A report about the country⁽³²⁾.

Table 2. Beekeeping in North, East, North-East, and West African Countries.

Country	Area (1000 km ²)	Bees	No. M.H. (1000s) (year)	No. T.H. (1000s) (year)	No. colonies per km ²	M.B. (year)	No. beekeepers (1000s) (year)	No. colonies/bee-keeper	Total honey (tonnes) (year)	Mean honey (kg)/colony	Population (1000s) (year)	Honey (gm)/person
<u>N. Africa</u>												
1. ALG	2382	Ami*	500 (1997)	100 (1997)	0.25	(1995)	70 (1996)	8.57	800 (1994)	1.33	28400**	28.2
2. EGY	1001	Amla, Amc, Aml	1119 (1994)	124 (1994)	1.24	(1880)	110 (1994)	11.30	9112 (1994)	7.33	61900	147.2
3. LIY	1760	Aml, Amc	50 (1996)	few	0.03	(1995)	3 (1996)	16.70	500 (1996)	10	5200	96.2
4. MOR	447	Ami, Amsa	30 (1994)	370 (1994)	0.89	(1960)	27 (1994)	14.80	4400 (1994)	11	29200	150.7
5. TUN	164	Amc, Ami	47 (1996)	138 (1996)	1.13	(1957)	10 (1995)	18.50	1445 (1996)	7.8	8900	162.4
<u>E. Africa</u>												
1. KEN	583	Ama, Aml, Ams, Amm	2100 (1984)	100 (1985)	3.60	(1955)	(-)	(-)	11970 (1985)	5.7	28300	423
2. TAN	945	Ama	1500 (1982)	most (1982)	1.60	(1950)	(-)	(-)	11550 ⁺	7.7	28500	405.3 ⁺
3. UGA	236	Ama	43 (1984)	most (1984)	0.18	(1978)	(-)	(-)	172 ⁺	4	21300	0.008 ⁺
<u>N.E. Africa</u>												
1. ETH	1222	Amab, Amy, Ams, Amm	2520 (1984)	5000 (1996)	2.10	(1970)	1000 (1976)	7.52	23000 (1996)	8.3	56000	410.7
2. SOM	638	Amla, Amc	few (1986)	100 (1986)	0.16	(1970)	3 (1995)	33.30	350 (1995)	3.5	9300	37.6
3. SUD	2506	Amc, Amsu, Af	50 (1994)	250 (1994)	0.12	(1960)	50 (1994)	6	1800 (1994)	6	28100	64.1

Table 2 (Continued). Beekeeping in North, East, North-East, and West African Countries.

W. Africa												
1. BEN	112.6	Ama	4.3 (1986)	4.1 (1986)	0.04	(1972)	(-)	(-)	(-)	(-)	5400	(-)
2. GHA	239	Ama	600 (1986)	most (1986)	2.50	(1964)	(-)	(-)	(-)	(-)	17500	(-)
3. GUS	36	Ama	20 (1984)	132.3 (1989)	0.56	(1968)	(-)	(-)	1000 (1991)	15	1100	909.1
4. IVO	322	Ama	3 (1986)	2.5 (1986)	0.01	(1973)	(-)	(-)	(-)	(-)	14300	(-)
5. MAL	1240	Ama	501 (1982)	500 (1982)	0.40	(1985)	(-)	(-)	8408 ⁺	8.4	9400	894.5 ⁺
6. NIR	924	Ama, Amu	700 (1950)	most (1950)	0.76	(1950)	(-)	(-)	(-)	(-)	111200	(-)
7. SEN	197	Ama	20 (1940)	1000 (1997)	0.10	(1962)	20 (1997)	51	500 (1997)	10.1	8300	60.2
8. TOG	56.8	Ama	(-)	(-)	(-)	(1975)	(-)	(-)	(-)	10 (1998)	4400	(-)

* Ami, *Apis mellifera intermissa*; Amla, *A.m. lamarckii*; Amc, *A.m. carnica*; Aml, *A.m. ligustica*; Amsa, *A.m. sahariensis*; Ama, *A.m. adansonii*; Amli, *A.m. litorea*; Ams, *A.m. scutellata*; Amm, *A.m. monticola*; Amab, *A.m. abyssinica*; Amy, *A.m. yemenitica*; Amsu, *A.m. sudanensis*; Amu, *A.m. unicolor*; Af, *Apis florea*; ** Population based on 1995 data; No information about Mauritania, Green Head Island, DJI, ERI, GAM, BUF, GUN, LIR, NIP, SIE; (-), No information; +, estimated number.

Table 3. Honey pests and diseases in North, East, North East and West African Countries.

Country	Brood diseases					Adult disease		Parasitic mites		Others								
	AFB	EFB	Sac brood	Chalk brood	Stone brood	<i>Nosema</i>	Amoeba	Acarine	<i>Varroa</i>	Bee lice	<i>Merops & birds</i>	Wasps	Ants	<i>Senot-aina</i>	Wax moth & others	Lizards	Honey badger	Hive beetles
<u>N. Africa</u>																		
1- ALG	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-
2- EGY	-	-	+	+	+	+	-	+	+	+	+	+	+	+	+	-	-	-
3- LIY	+	+	-	+	+	+	-	-	+	-	+	+	-	-	-	-	-	-
4- MOR	+	+	-	-	-	+	-	+	+	+	-	-	+	-	-	-	-	-
5- TUN	+	+	+	+	+	+	+	+	+	+	-	-	-	+	-	-	-	-
<u>E. Africa</u>																		
1. KEN	-	-	-	-	-	+	-	-	-	+	+	+	+	-	+	-	+	-
2. TAN	-	+	-	-	-	+	-	-	-	+	-	+	+	-	+	+	+	+
3. UGA	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+	+	-	-
<u>N.E.Africa</u>																		
1. ETH	-	-	-	-	-	+	+	-	-	+	+	-	+	-	+	-	+	-
2. SOM	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
3. SUD	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-
<u>W. Africa</u>																		
1. GHA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-
2. GUS	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
3. NIR	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	+	-	+
4. SEN	-	+	-	-	-	+	-	-	-	+	+	+	+	-	+	+	-	+

Ants, *Dorylus fulvus*, in MOR; Spiders, Snakes and Snails, in TAN; Termites, Mice, Toads, in ETH; A bacterium, *Serratia marcescens*, in SUD; snakes, Mice, *Merops bullocki*, the small hive beetle, *Aethina tumida*, the large hive beetles: *Oplostomus fuliginous*, *Rhizoplatys bituberculatus*, *Goniochilus bicolor* and *Diplognata gagates*, in NIR; Paralysis virus in EGY. After (22) and others.

BEEKEEPING IN AFRICA: I- NORTH, EAST, NORTH-EAST AND WEST AFRICAN COUNTRIES

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- Joined Plant Protection Department, Faculty of Agriculture, Assiut University as an Lecturer (1977).
- Joined the same Department as Professor of Economic Entomology (Apiculture) from 1984 till now.
- Joined as an specialist of Apiculture, Ministry of Agriculture and Fisheries, Muscat (Oman) from January 1984 till August 1987 and from 1993 till 1995.
- My published scientific record includes more than 100 articles published in U.K., Germany, Russia, India, Belgium, Canada, Jordan, Saudi Arabia, Yemen and Egypt and also 5 books about Beekeeping in Egypt and Oman.
- Visiting Asian Institute for Rural Development (AIRD), Bangalore, India for 10 weeks during 1992, for working in "Tropical Sericulture".

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2. International Conference of Apiculture in Tropical Climates, Cairo, Egypt, 1988.
3. National Seminar on Commercial Floriculture in India, Present and Potential, Indo-American Seed Hybrids, July 1992, Bangalore, India.
4. Workshop on "Project Management", July 1992, AIRD AND FIT (Canada), Bangalore, Karnataka, India.
5. International Conference of Silk as Agricultural Industry "ICSAI", Cairo, Egypt, 1997.
6. 35th International Apicultural Congress, APIMONDIA, Belgium, Antwerp, Sept. 1-6, 1997.
7. The second International Arab Apicultural Conference, Royal Cultural Center, Jordan, Amman, Aug. 3-6, 1998.
8. The 36th International Congress of APIMONDIA, Vancouver, Canada, Sep. 12-17, 1999.
9. The 18th International Sericultural Commission Congress, Cairo, Egypt, 12-16 Oct. 1999.
10. Symposium of "Honey Bees and Sidr Trees", Hadramout Univ. of Science and Technology, Yemen, March, 2001.