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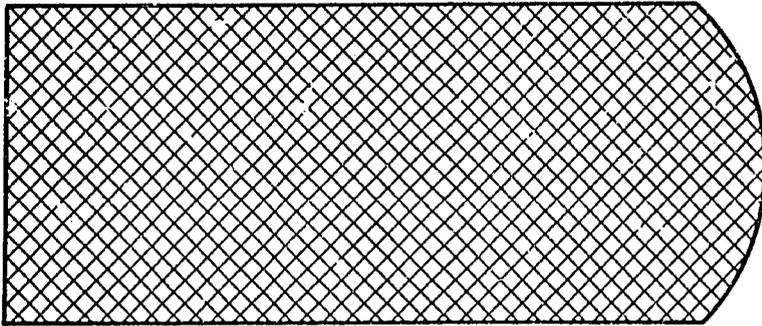
Central African Republic

Unity-Dignity-Labour

MINISTRY FOR THE DEVELOPMENT OF RURAL ECONOMICS AND COOPERATIVE ACTION

IN CHARGE OF THE REORGANIZATION OF AGRICULTURE, LIVESTOCK, WATER AND FOREST RESOURCES,

SHOOTING AND FISHING.



Project for the Development of Bee-Keeping in the Central African Republic

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DESIGN AND COORDINATION

MARCH 1980

This project was prepared at the Bureau d'Etudes et de Coordination by

Messrs. - DAYO, Robert, Stockraising Expert, Head of Department,
Bureau d'Etudes et de Coordination

- YABENZA, Gaston Dechereau, Head of the Bee-Keeping and
Sericulture Department, Stockraising Division.

The source document used is the assignment report by Doctor Douhet,
IEMVT Bee-Keeping Expert

A B S T R A C T

The bee-keeping development project forms part of the Government's policy for economic and social recovery of the Central African Republic.

Bee-keeping is traditionally practised and forms an integral part of rural activities; all the honey is locally consumed, while the wax is exported.

The chief objective is to promote rational bee-keeping in order to provide the peasants with additional resources and the country with higher-quality export produce.

The chief aspects of the project involve:

- increasing apicultural production by a campaign to spread the use of modern hives;
- organisation of marketing, by developing regular markets for apicultural produce;
- improving wax quality by setting up a purification centre;
- and, countering the decline in wax production (80 tonnes exported in 1977). This supervisory project will bring the production level up to the level recorded 30 years ago (350 tonnes).

Financing requirements amount to CFA.F 190 million over 2 years.

The marketing campaign will make the project financially self-sufficient as of year three, and will ensure that the project has lasting effects.

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Development of Bee-Keeping in the
Central African Republic

I. INTRODUCTION

Bee-keeping goes back to prehistoric times. The bee has been employed by man since the Neolithic age. Since those early times when men simply "robbed" the bee of its honey, bee-keeping has passed through three successive stages :

- Simple forms of culture, bee-culture in fixed comb hives, and bee-culture in movable frames.

In those countries which practise simple forms of culture, that is, which merely shift the bee-hives near to their dwellings, the ideal would be the development of bee-culture in movable frames, enabling the honey to be extracted without damaging the wax combs. Unfortunately, in tropical regions, except for regions where the latitude is compensated for by the altitude, all trials of this kind have resulted in failure. In studying the production and marketing of apicultural produce, the ecological conditions on which this production depends must be taken into account, namely, climate, flora, bee types, hives, etc.

As a preliminary, then, a study must be made of the environment on which depend foreseeable apicultural techniques for the future and the organoleptic qualities of the produce.

II. THE POSITION OF BEE-KEEPING IN THE CENTRAL AFRICAN REPUBLIC.

In the Central African Republic, bee-keeping is traditionally practised and forms an integral part of rural activities. The products of bee-keeping are known throughout society in the Central African Republic, and there is no fundamental constraint to the development of bee-keeping,

which is well established in the local way of life, in the same way as hunting and fishing. However, in many cases, this activity is confined to hunting for wild honey gathered by bees dwelling in any old hollow, as is the case in the Northeast of the country, and can hardly be termed bee-keeping. Elsewhere, the villagers are content with a simple form of culture consisting in trapping swarms in makeshift hives built of materials readily available (tree bark, slit bamboo). These hives are set up within a limited radius around the village, in the fields, and perched in the forks of trees, where they are safe from brush fires, termites and other enemies of the bee. There are several types of hive, but they are all single-storey, with the major disadvantage that the colony is destroyed when the honey is harvested.

The chief aim of Central African bee-keeping is honey production. The honey is not exported, but is entirely locally consumed. Insofar as concerns the wax, a major marketing effort has been made, as witnessed by the remarks of Mr. J. Lepissier, Bee-Keeping Instructor in the C.A.R.:
"For several decades, bee-keeping has played a major role, especially due to wax exports, which bring in foreign currency for the purchase of manufactured goods on foreign markets. However, for some years now, honey and wax production has undergone a marked decline, as shown by the figures for wax exports, which represent virtually the entire production".

This very pure yellow wax, of excellent quality, was in high demand abroad. At present, exports of this product have dropped, as shown by the following table. According to the surveys carried out by the bee-keeping departments of the Stockraising Division, this drop is due to the disorganised state of the market rather than a collapse in prices, since wax at present sells for CFA.F 350/kg at farmgate, as against CFA.F 150 in 1967.

Wax exports:

1945 to 1950: 200 to 350 tonnes/year

1951 to 1955: 200 to 110 tonnes/year

1955 to 1962: 110 to 165 tonnes/year

1977: 63 tonnes

The Central African Republic has a large potential for honey and wax production. The entire country is suitable for bee-keeping, with the most suitable regions being:

- the steppes,
- and, the wooded savannah.

Moreover, there is nothing to prevent the development of bee-keeping. Honey sells at CFA.F 150 per bottle in the countryside, although at Bangui it is rather hard to acquire local honey; imported honey is available in the large food stores, at a price of CFA.F 1,100 per kilo.

Wax is also in very high demand and fetches a good price, although certain bee-keepers claim to have thrown away wax for lack of buyers.

III. THE APICULTURAL POTENTIAL OF THE CENTRAL AFRICAN REPUBLIC

3.1 - Infrastructures

In 1964, an apicultural department was set up in the Stockraising Division.

In January 1968, the FAC provided financing for an apicultural development programme (FAC Agreement N° 19/C/66/L. Project N° 19/ORD/66/-VI/L/S). The aims of the programme were to promote rational bee-keeping techniques in all suitable areas of the Central African Republic, so as to increase the income of the rural population concerned and develop the country's farms by financing a programme of equipment, research and experiment, management and extension work.

The project was accordingly localised, in the following places:

- a) At Bangui: Study Centre for vocational training in bee-keeping: modernisation of methods, specialising of Central African cadres in the stockraising department, and training of instructors to carry out extension work among the bee-keepers.
- b) Outside the Capital: setting up of demonstration hives, and 13 wax purification and honey packaging centres at Crampel, Mbrès, Sarki, Bakala, Bocaranga, Bossembélé, Bambari, Ndélé, Ouadda, Bria, Yalinga and Bangassou.

The project was got under way in January 1969. Of a total amount of CFA.F 50,000,000, only CFA.F 32,229,000 were committed, giving a completion rate of 83%.

- c) Construction at Landjia-Bangui
 - 1 accommodation unit at the Centre, for a nurse;
 - 1 technical building, 200 m², containing office, laboratory and store;
 - 1 shed (woodwork shop);
 - water and electric power connections.

The 13 purification centres were not built, for lack of credits, which were frozen in 1970.

3.2 - Supervision

Field instructors. Since 1970, for want of means of transport, supervision at village level is virtually non-existent. A few courses in bee-keeping are provided at the Bouar Technical College of Stock-raising.

Insofar as concerns research, various surveys were carried out up until 1970, on bee biology, rearing techniques, and hive types traditionally used.

Up until 1970, a fixed-comb type of hive was adopted and manufactured in series in the apicultural section's woodwork shop. During the same period, over 600 hives were distributed among the farmers.

In addition, at the request of the Government of the Central African Republic, the FAC financed, in November 1978, an assignment by an IEMVT Expert to sum up the position and development prospects for bee-keeping. The report, published in February 1979, is a real source document.

3.3 - Bees (cf. Douhet document)

All bees in the Central African Republic belong to the *Apis mellifica* race, *adansonii* strain, or yellow African bee. This bee has a gentle temperament, and in its pure condition is unaggressive except when the weather is stormy. Unfortunately, it becomes very aggressive as soon as a cross is attempted, with a black bee in any case; this is the case at Fouta Djallon, which is the region of contact between *adansonii* and the unicolour or black African bee. The same result is obtained in Brazil by importing *adansonii* queens, where crossing with the Castilian *Apis mellifica*, *mellifica* strain, or black European, has produced a hybrid bee which is so aggressive that the international press has spoken of it as a veritable scourge. Another good example of this is in Senegal, where an endeavour was made to alter the local race; after importing Italian colonies which were placed in quarantine on the island of Gorea, where they died for want of honeydew, Castilian queens were imported from Las Palmas (Canary Islands), and the result is that one can no longer go near the Senegalese bees. The second disadvantage is that a case of foul-brood was detected, which is a European disease hitherto unknown in Africa. The above experiments show that one of the main precautions to be taken is the formal prohibition to introduce foreign bees into Central African territory.

3.4 - Flora

The flora of the Central African Republic is admirably suitable for bee-keeping, due to the moderate temperatures in this tropical country, the regular rainfall, and fairly marked changes in temperature between daytime and nighttime, which stimulates nectar rising. There are numerous plants yielding either nectar or pollen, such as:

- agaves, asters, avocado trees, banana trees, citruses, Caesalpinia-ceae, Combretaceae, cotton plants, eucalypti, silk-cotton trees, green beans, maize, mango trees, Mimoseae palms, etc.

3.5 - Hives

The hives used in the Central African Republic are of the simple type, that is, single-chamber. Their size and the building materials used vary greatly.

There are four main types of hive:

- A hive consisting of a cylinder of bark stripped from a tree. The cylinder is supported by hoops, and the whole is covered with straw laid down lengthwise. This type of hive is frequently encountered in the Kaga-Bandoro and Grimari region. Capacity: 30 litres.
- A hive of cylindrical shape, with a tapered end, consisting of split bamboos or ribs of palm branches attached to creeper hoops. This type of hive is used in the Bossembélé and Bossangoa regions. It has a 35-litre capacity and is more productive than the first type of hive.
- A hive similar to the second but of larger diameter (Bocaranga region).
- An earthenware hive, placed upright in the fork of a tree, on a flat stone, to block up, in particular, the bottom opening. Capacity: approximately 25 litres.

3.6 - The Central African Bee-Keeper

In the C.R.A. every farmer is also a bee-keeper. Some farmers have hundreds of hives scattered all over the place. The bee-keeper's work is divided up as follows:

- October-December: hive making;
- November-December: placing hives in tree forks. This takes a fairly long time in view of the distances to be travelled, but it fits in well with hunting and fishing activities.

The third operation is passive; the bee-keeper simply waits for his hive to become naturally populated. To populate the hives rapidly, some farmers use swarm lures, by coating the entrance to the hive with cassava pulp heavily salted or sugared, or mixed with the sap of *bauhinia reticulata*.

The fourth operation is harvesting. The best harvesting time is May-June.

Usually, harvesting is performed at nighttime, by smoking out the bees. The brood and honeycombs removed by night are taken to the village, where the bee-keeper separates the honey from the wax. Virtually all the honey is used to produce a low-alcohol drink known as hydromel, while the wax is melted down and strained through a locally manufactured stocking-shaped bag hanging from a horizontal timber supported on two upright stakes.

3.6.1 - Number of bee-keepers and hives: Douhet's document gives an idea of these numbers, on the basis of 1967 and 1977 censuses.

The numbers break down as follows, by prefecture.

PREFECTURE	: Number of farmers :		: Number of hives	
	: 1967	: 1977	: 1967	: 1977
Ombella-M'Poko	: 3,900	: -	: 27,200	: 17,353
Lodaye	: 100	: -	: 300	: 6,820
Haute-Sangha	: 500	: 412	: 1,500	: 917
Nana-Mambéré	: 3,600	: 6,796	: 36,300	: 12,993
Ouham-Pendé	: 4,700	: 5,804	: 21,700	: 19,270
Ouham	: 10,000	: 4,363	: 175,900	: 139,517
Kémo-Gribingui and Gribingui-Economique	: 9,900	: 17,754	: 270,900	: 124,719
Ouaka	: 5,400	: 19,520	: 41,900	: 109,700
Basse-Kotto	: 200	: 338	: 800	: 2,600
M'Bomou	: 300	: ?	: 400	: ?
Haute-Kotto	: 600	: 3,180	: 3,000	: 29,634
Vakaga	: 200	: ?	: 1,000	: ?
Bamingui	: 1,200	:	: 24,400	:
TOTAL	: 40,600	: 58,167	: 605,309	: 463,522

The table shows that the greatest number of bee-keepers is in the savanna regions.

IV. MARKETING PRACTICE

4.1 - Produce

4.1.1 - Honey:

The honey harvested by the bee-keepers is not a pure honey, but rather a mixture of honey and juice of crushed larvae. The impurities can easily be removed by decanting, filtering or centrifuging, to the extent that this product, which is of widespread use in the food industry, might be exported.

The Central African Republic's production of honey, including wild honey, is estimated at 6,000 tonnes, worth CFA.F 900 million at present per-kilogramme prices paid to the bee-keeper (present price: CFA.F 150/kg).

Virtually all the honey is sold on the domestic markets, with a small amount exported to Chad. Domestic demand is continually increasing, so that exporting cannot be envisaged at present. Nevertheless, as of now, methods to improve honey quality should be recommended with a view to its use in the food industry (biscuit-making, jams, etc.), and also for export, once the domestic market is saturated.

4.1.2 - Wax:

The Central African wax, commonly called "Congo wax", is a product much appreciated on foreign markets due to its bright yellow colour. While demand for the product has continually remained high, available supplies have declined greatly over the last few years. It is possible that the country's total wax production is still just as great, but the lack of market organisation has resulted in major production losses.

The price of wax at the farmgate has increased from CFA.F 150/kg in 1970 to CFA.F 300/kg, as compared with cotton, which is purchased at CFA.F 50/kg (top quality).

The decline in the quantity of wax exports, as shown by the following table, can be explained as follows. The exporters established at Bangui have no system of direct liaison with the producer (buying agents, wax grouping structures at the provincial level, etc.). The producers, finding no buyers on the spot, are obliged to travel several kilometres on foot to deliver quantities of wax which are very small, being limited by their carrying capacity.

The present price of wax delivered at Bangui is from CFA.F 500 to 550/kg.

Table of wax exports

1974	111 tonnes
1975	48 tonnes
1976	86 tonnes
1977	63 tonnes
1978	80 tonnes

V. THE PROJECT PROPERLY SPEAKING

The basic purpose of the present project is to promote rational bee-keeping, so as to provide the peasants with additional resources and the country with improved-quality export produce (wax). In the previous chapter, we defined the most suitable areas for bee-keeping, that is, the savanna regions where the predominant crop is cotton. According to Ministry of Agriculture statistics, these are regions where the population's income level is fairly low compared with the forest regions. A sustained apicultural development programme will accordingly provide welcome supplementary income.

5.1 - Project implementation zones

The entire territory of the Central African Republic is suitable for bee-keeping. However, for reasons of efficiency, the project should initially be carried out in a fairly definite area, preferably in regions where precipitation does not exceed 1,400 mm. However, an exception is made for the Bangui region, for administrative and material reasons.

The prefectures selected are as follows, listed in order according to the number of farmers:

- OMBELLA-M'POKO: Bangui - Bossembélé - Bogangolo - Damara
- NANA-MAMBERE: Bouar and Baoro
- OUHAM-PENDE: Bocaranga - Bozoum - Paoua
- OUHA : Bossangoa - Bouca - Batangafo - Kabo
- KEMO-GRIBINGUI and GRIBINGUI-ECONOMIQUE: Kaga-Bandoro- Dékoa -
M'Brès - Sibut
- OUAKA: Ippy - Bakala
- BASSE-KOTTO: Alindao - Kembé
- BAMINGUI-BANGORAN: Bamingui - Ndélé

5.2 - Project objectives

The main orientations of this project come within the general policy of social and economic recovery commenced by the Government. The chief aspects of the bee-keeping development project are as follows:

- increase in apicultural production by a campaign to spread and bring into common use rational production methods;
- management and basic instruction for the bee-keepers;
- improvement of product quality by setting up a purification centre;
- organisation of product marketing by setting up regular markets;
- and, training Central African cadres in bee-keeping techniques.

5.2.1 - Increase in apicultural production

a) Campaign to spread and bring into common use modern hives:

As has been emphasized above, the basic purpose of this campaign is to promote rational bee-keeping; for this purpose, the traditional single-storey fixed-comb hives must be replaced by movable frame hives with supers.

There are several disadvantages to the present system:

- The brood-comb and colony are destroyed at harvesting.
- The setting up of hives scattered throughout the brush requires a lot of energy at harvest time, and results in major loss of time.

However, so as not to go against customs which are already well established, and some of which meet real needs, the project will have to be carried out gradually, and the programme of setting up modern hives must accordingly be staggered over several years. The system of two-storey hives, one for breeding and the other for food storage, enables production to be increased twofold.

b) Type of hive to be distributed:

The apiculture department of the Stockraising Division, concerned with encouraging the peasants to increasingly practise bee-keeping, has built and distributed, from its Landjia centre, 600 strawhives of a traditional type, which have been supplied free to peasants in the Ombella-M'Poko, Ouham, Kémo-Gribingui and Gribingui-Economique prefectures.

The type of hive to be distributed is a fixed-frame hive with super, with two stories, 35 x 35 x 35 cm. The roof is formed of a single plank measuring 40 x 40 cm, with a rainwater gutter running around the edge.

The inside dimensions of the super are 35 x 35 x 17 cm.

Insofar as concerns the body of the hive properly speaking, the dimensions are 35 x 35 x 35 cm, with an entrance measuring 0.8 to 1 cm.

The plank is 35 cm wide and 40 cm long.

All these parts are simply placed one on top of another, which enables the body of the hive to be cleaned out in the event of an attack of honeycomb moth.

For harvesting, the super is simply lifted up and replaced by another. The top of the hive body is usually of plywood pierced with holes 2 cm in diameter; the plywood may be replaced by a lattice of the cotton-basket type, propped up by transverse branches (cf. appended sketch).

c) Distribution method:

The hives will initially be produced in the Landjia workshop at Bangui, and subsequently transported to the aforementioned areas. The hives will be distributed by the extension worker to beekeepers selected from the best in the village, and about 3 or 4 hives will be placed under the exclusive responsibility of the extension worker to serve as demonstration hives.

At the school level, hives will be set up, and regular talks organised, along with film and slide shows.

The hive manufacture and distribution table takes into account the manufacturing potential at Landjia, and the peasants' receptiveness. It is felt that, with supervisory staff playing an effective role as of year 2, the bee-keepers will agree to manufacture their hives themselves, to the extent of 10% more per annum.

d) Hive manufacture and distribution table, by prefecture

PREFECTURE	NUMBER OF MODERN HIVES DISTRIBUTED				
	Year 1	Year 2	Year 3	Year 4	Year 5
Ombella-M'Poko	150	160	170	180	190
Nana-Mambéré	50	60	80	100	110
Ouham-Pendé	150	160	170	180	190
Ouham	250	270	280	290	300
Kémo	200	210	220	240	250
Ouaka	150	160	170	180	190
Basse-Kotto	50	70	90	110	120
Bamingui-Bangoran	100	110	120	130	150
TOTAL MANUFACTURED					
BY THE STATION	1,100	1,200	1,300	1,400	1,500
HIVES MANUFACTURED					
BY THE BEE-KEEPERS	-	110	120	130	140
GRAND TOTAL	1,100	1,310	1,420	1,530	1,640

It is felt, moreover, that the supervisory staff could satisfactorily supervise the production of traditional hives, which, according to the apicultural department's estimates, is 900,000 hives, in the following proportions:

50% in year 1, or 450,000 hives
 60% in year 2, or 540,000 hives
 70% in year 3, or 630,000 hives
 90% in year 5 and the following years, or
 810,000 hives.

In the production estimate, the number of 900,000 traditional hives is regarded as constant: the introduction of modern types of hive will only have an effect in the medium- and long-term.

According to the following table, the centre will have to manufacture:

1,100 hives in year 1
 1,200 hives in year 2
 1,300 hives in year 3
 1,400 hives in year 4
 1,500 hives in year 5

The present cost for manufacture of a modern hive is C.F.A.F. 5,000.

- **Production:** Production calculations have been based on the statistics provided by the apicultural department, namely:

- honey (traditional : 10 kg/hive
 (improved : 15 kg/hive

- wax (traditional : 0.5 kg/hive
 (improved : 1 kg/hive

The main factor in improving production is management, since no major alterations are planned.

Present honey production is 6,000 tonnes/year, while wax production was 80 tonnes in 1979.

c) Projected production

The distribution of improved hives will only become general in the long term. In order to increase production, emphasis will be placed chiefly on organisation of marketing and management.

- Production table in tonnes

		<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
1) Honey	(Traditional	4,500	5,400	6,300	7,200	8,100
	(Improved	16.5	36.15	57.45	80.40	105
TOTAL		<u>4,416.5</u>	<u>5,436.15</u>	<u>6,357.45</u>	<u>7,280.40</u>	<u>8,205</u>
2) Wax	(Traditional	225	270	315	360	405
	(Improved	1.1	204	3.83	5.36	7
TOTAL		<u>226</u>	<u>272</u>	<u>319</u>	<u>365</u>	<u>412</u>

According to this production table, the figure of 400 tonnes of wax exports is achieved at the end of year 5. That is, the 1950 production level is regained.

5.2.2. - Management and basic instruction for the bee-keepers

At the present time, the apicultural extension workers are distributed as follows:

1 at Landjia - Bangu

4 at Bossembélé

2 at Damara

2 at Bogangolo

1 at Dékoa

1 at Sibut

1 at M'brès

1 at Touhau

1 at Yaloké

Total: 14 extension workers.

Roughly 9 prefectures have been selected, and 24 sub-prefectures, with a total of approx. 60,000 farmers. Apart from Bangui, which will be a support centre, 2 extension workers are planned per sub-prefecture, or a total of 48 extension workers.

The apicultural extension workers, directed by the head of the stock-raising sector, will be distributed according to a suitable breakdown, into commune groups. They will be provided with a bicycle. Recruiting will be based chiefly on the choice of the inhabitants of the region, so as to facilitate extension work.

Initially, the extension worker will be required to take a census of the bee-keepers and hives in his region, informing them, in a general manner, of modern bee-keeping techniques, and, subsequently, will serve as a middleman between the producer and the buyers, and may attend the honey and wax markets. He will regularly keep the apicultural department informed, by written reports, of progress in introducing new extension-work methods. He will help with manufacture of modern hives by the peasants.

Above the basic extension-work level will be a supervisory team at the central level.

5.2.3 - Marketing organisation

Marketing is the most important aspect of this project. Marketing will be organised at two levels:

a) The producer level:

Harvest time for apicultural produce is between March and June.

At the producer level, then, the project, through its extension workers located on the spot and the administrative authorities in the regions

concerned, will have to organise markets where the produce can easily be bought. To encourage the producers to market their produce all the year round, it is essential that the project have a fund of working capital as of year 1, to be able to cover part of the wax harvest. The marketing aspect of the project concerns chiefly wax; the honey, being entirely locally consumed, poses no problem. Wax bought at the market level will be conveyed to the purification centre by the buyers themselves.

Moreover, a wax marketing trial was undertaken through the Kémo-Gribingui Regional Development Office (Office Régional de Développement: ORD). The trial shows that immediate results can be foreseen if the product gathering network is intensified and the product is delivered either to the Bangui traders or to the importers.

b) At the buyer and exporter level:

An information campaign should be carried out to provide the buyers with a better knowledge of favourable periods for wax producing, and to encourage them to set up structures for liaison between themselves and the producers.

5.2.4 - Improvement of product quality by setting up a wax purification centre

For the time being, a single centre will be built at Bangui, and the wax purchased from the producers by the traders and transported to the centre will be purified, pressed and packed. Purification costs will be payable by the traders. Other centres will be built as production increases.

The series of operations required to obtain a pure wax are as follows:
(Duhet)

- washing,
- melting,
- purification,
- pressing.

5.2.5 - Training cadres in bee-keeping techniques

Courses will be given at the Bouar Technical College of Stockraising and other agricultural establishments, which should enable the apicultural section to have assistants throughout the country, to back up the work of its specialised officers.

At the same time, training courses must be planned for Central African cadres in the main producing countries or countries with advanced technology.

Seminar: Plan a four-month support assignment at the very beginning. This expert assignment will organise a seminar for the Central African apicultural officers.

VI. PROJECT IMPLEMENTATION

6.1 - Staff

- 1 expert, specialised in Bee-keeping, on a four-month support assignment
- 1 national apicultural manager
- 1 liaison officer, stockraising-technician level
- 48 extension workers
- 1 laboratory assistant; veterinary nurse
- 1 secretary
- 1 runner
- 1 storeman
- 1 purification centre manager, stockraising-technician level
- 20 labourers
- 2 carpenters

6.2 - Capital investment

6.2.1 - Buildings

- 1 purification centre at Bangui
- 2 storage sheds

6.2.2 - Equipment:

Vehicules

1 7-tonne vehicle for wax gathering and setting up hives,
inspection vehicle, Land-Rover type,
1 liaison vehicle,
3 motorcycles,
49 bicycles.

6.2.3 - Technical equipment

Equipment for the analysis laboratory at Landjia,
Purification centre equipment,
Pedagogic materials, Landjia centre
Miscellaneous minor equipment.

VII. FINANCIAL AND ECONOMIC ANALYSIS OF THE PROJECT

As shown by the technical study, the present project is chiefly based on management, which is the condition for an increase in production. The initial objective is to attain the production level recorded 30 years ago, namely, 350 tonnes of wax exported.

In addition, emphasis has been placed on wax quality, by setting up a purification centre. Initially, the project will be limited to a single centre at Bangui. In the event of more intense apicultural activity resulting in increased production, the setting up of other centres in the hinterland may be considered. The project's effects will be at two levels: the apicultural department level and the local-body level.

At the level of administrative and financial management of the project, it is desirable that in the medium- and long-term it be integrated into a work body, which might be set up inside the stockraising department, with the primary task of promoting animal production.

7.1 - Fixed expenses

Fixed expenses consist of staff expenditure, capital expenditure and plant maintenance. Insofar as concerns staff, apart from 3 technicians who are counted in the national budget, all the basic supervisory staff will be paid for out of the project's budget. This aspect is very important for the project's success.

Staff expenditure will amount to CFA.F 68,256,000 for the 4 years, including a four-month expert support assignment.

Capital investment covers the purchase of project equipment (vehicles, technical equipment) and the construction of a purification centre.

Capital investment breaks down as follows:

year 1	CFA.F	43,650,000
year 2		1,000,000
year 3		3,900,000
year 4		8,200,000
TOTAL:	CFA.F	56,750,000

The large 7-tonne vehicle will be amortized over 4 years,

The inspection vehicle over 3 years,

The liaison vehicle over 3 years,

The motorcycles and bicycles over 2 years,

while the purification centre will be amortized over 15 years.

7.2 - Operating expenses

7.2.1 - Vehicle operation

The 7-tonne vehicle will distribute the hives and gather wax; the distance travelled annually will be fairly great. For the purposes of our study, we shall apply a rate of CFA.F 100/km, within the

limits of: 20,000 km in year 1
 25,000 km in year 2
 30,000 km in year 3
 30,000 km in year 4.

Inspection vehicle: CFA F 90/km

Liaison vehicle: CFA.F 70/km

Motorcycle: CFA.F 5,000/month

Bicycle: CFA.F 2,000/month

Hive manufacturing costs: the hives are manufactured at Landjia and distributed throughout the provinces.

We allow CFA.F 5,000 for the manufacture of each hive.

Total cost of hive manufacture

year 1: $1,100 \times 5,000 = \text{CFA.F } 5,500,000$

year 2: $1,200 \times 5,000 = \text{CFA.F } 6,000,000$

year 3: $1,300 \times 5,000 = \text{CFA.F } 6,500,000$

year 4: $1,400 \times 5,000 = \text{CFA.F } 7,000,000$

7.2.2 - Wax purchase

The marketing aspect of the project is a necessary condition of its lasting success. The marketing aspect of the project will be designed to encourage the traders to take an interest in buying wax, but also to produce the funds required to pay for supervisory services. During the first two years, production gathering at the department level will not be very great. It will increase in the next years and will be one of the major aspects of the project activities.

Estimate of quantities gathered by the department:

year 1	80 tonnes
year 2	100 tonnes
year 3	150 tonnes
year 4	200 tonnes

At a price of CFA.F 300 per kilo at the farmgate, the cost of these purchases will be:

year 1	CFA.F 24,000,000
year 2	CFA.F 30,000,000
year 3	CFA.F 45,000,000
year 4	CFA.F 60,000,000

In year 1, a working-capital fund will have to be provided to permit gathering of the very first supplies of wax (CFA.F 10 million).

7.2.3 - Operation of the purification centre

The purification centre set up at Bangui receives all the wax to be processed prior to export. The cost of wax purification is estimated at CFA.F 30 per kilo. Assuming that the production supervised by the project is entirely processed by the centre, the total annual cost will be as follows:

year 1:	CFA.F 6,780
year 2:	CFA.F 8,160
year 3:	CFA.F 9,570
year 4:	CFA.F 10,930

7.3 - Benefits of the project

The benefits of the project lie in sales of gathered wax to the exporters and duties levied on processed wax.

7.3.1 - Wax sales to exporters:

The concern of the project is to ensure that it will have lasting effects. During the initial stage, exporting must be left to the local firms: we propose selling wax gathered by the department and processed, at a price of CFA.F 600 per kilo, which will amount to:

year 1:	CFA.F	48,000,000
year 2:	CFA.F	60,000,000
year 3:	CFA.F	90,000,000
year 4:	CFA.F	120,000,000

7.3.2 - Purification duty

For each kilogramme of processed wax, a duty of CFA.F 40 will be levied at the centre, giving:

year 1:	CFA.F	9,040,000
year 2:	CFA.F	10,880,000
year 3:	CFA.F	12,760,000
year 4:	CFA.F	14,600,000

To ensure quality requirements, the stockraising department will have to keep an eye on the certification of export batches.

7.4 - Financing requirements

Marketing activities will become more intense as of year 3, providing the department with sufficient resources to continue the operation over the coming years.

To enable it to get off to a good start, the project will require financing to the amount of CFA.F 190 million over 2 years in the form of a subsidy. Assuming this subsidy is obtained, the receipts brought in will enable expenses to be met as of year 3.

The cash flow will amount to CFA.F 140 million in year 4, which means that the project is highly profitable.

Undertaking of this project will permit:

- an increase in production;
- the creation of jobs (77 jobs);
- and, adequate financial profitability.

TOTAL PROJECT COST (CFA.F 1,000)

Quantity	1	2	3	4	TOTAL
1) Staff					
A)					
Head of Department 1	reminder only	reminder only	reminder only	reminder only	National Budget.
Allowance, Head of Department	480	480	480	480	1,920
Liaison Officer 1	reminder only	reminder only	reminder only	reminder only	
Allowance, Liaison Officer	240	240	240	240	960
Purification Centre Manager	reminder only	reminder only	reminder only	reminder only	.
Allowance, Purification Centre Manager	240	240	240	240	960
B)					
Operative and Support Staff					
Extension worker 48	11,520	11,520	11,520	11,520	46,080
Secretary 1	360	360	360	360	1,440
Runner 1	216	216	216	216	864
Carpenter 2	480	480	480	480	1,920
Storeman 1	204	204	204	204	816
Laboratory ass't. 1	204	204	204	204	816
Labourers 20	3,120	3,120	3,120	3,120	12,480
Total -	17,064	17,064	17,064	17,064	68,256
) Capital Investment					
- Building	15,000	-	-	-	15,000
Building maintenance		450	450	450	1,350
Vehicles:					
- 7-tonne 1	7,000	-	-	-	7,000
- Inspection 1	4,200	-	-	4,200	8,400
- Liaison 1	3,000			3,000	6,000
Motorcycle 3	450		450		900
Bicycle 49	2,450		2,450		4,900
Technical plant	11,000				11,000
Plant maintenance	550	550	550	550	2,200
Total	43,650	1,000	3,900	8,200	36,750

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TOTAL PROJECT COST (CFA.F 1,000)

	1	2	3	4	TOTAL
Brought forward					
Capital investment	43,650	1,000	3,900	8,200	56,750
Staff	17,064	17,064	17,064	17,064	68,256
- Total	60,714	18,064	20,964	25,264	125,006
<u>OPERATING EXPENSES</u>					
. Vehicles:					
- Heavy	2,000	2,500	3,000	3,000	10,500
- Inspection	1,350	1,800	2,250	2,700	8,100
- Liaison	700	1,050	1,750	2,100	5,600
- Motorcycles	60	60	60	60	240
- Bicycles	24	24	24	24	96
. Manufacture of hives	5,500	6,000	6,500	7,000	25,000
. Office supplies	1,000	800	600	600	3,000
. Centre operation	6,780	8,160	9,570	10,930	35,440
. Support missions	8,000	-	-	-	8,000
. Wax purchase	14,000	30,000	45,000	60,000	159,000
Working capital	10,000	-	-	-	-
Contingencies, 10%	4,941	5,039	6,875	8,641	25,496
- Total	54,355	55,433	75,629	95,055	280,472
Grand total (capital and operating expenses)	115,069	73,497	96,593	120,319	405,478

BENEFITS OF THE PROJECT:

Wax sales by the Centre	48,000	60,000	90,000	120,000	318,000
Purification duty	9,040	10,880	12,760	14,600	47,280
- Total	57,040	70,880	102,760	134,600	365,240

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FINANCING REQUIREMENTS (CFA.F 1,000)

		1	2	3	4	TOTAL
<u>EXPENSES</u>						
Capital investment		43,650	1,000	3,900	8,200	
Staff		17,064	17,064	17,064	17,064	
Total		60,714	18,064	20,964	25,264	
Operating expenses		54,355	55,433	75,629	95,055	
Total expenses		115,069	73,497	96,593	120,319	
<u>RECEIPTS</u>						
(1) Wax sales		48,000	60,000	90,000	120,000	
(2) Purification duty		9,040	10,800	12,760	14,600	
Total		57,040	70,880	102,760	134,600	
SUBSIDY		115,069	73,497	-	-	188,566=190,000
	January 1st	0	57,040	127,920	134,087	
Cash flow	December 31	57,040	127,920	134,087	148,368	

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