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Centre de Coopération Internationale en Recherche Agronomique pour le Développement

Département des Productions Fruitières et Horticoles

Cirad-Flhor

BP 5035 – 34032 Montpellier cedex 1 - France

Report of the Mission in Mali

Submitted to the CAE (*Centre Agro-Entreprise*)

Analysis of the fresh mango industry in Mali

Mission Report
June 2nd to June 11th, 1999
Jean-Yves Rey

Jean-Yves REY
Summary

In order to help the CAE (*Centre Agro-Entreprise*) formulate a strategy for the fresh mango industry, the consultant was asked to characterize the current situation of the Malian mango exports, analyze the market conditions in the medium term and, based on the observations, make recommendations on the activities to be undertaken so as to provide effective support to the sub-sector.

As far as production is concerned, we observed that the majority of the orchards contained varieties unfit for export. Among the exportable varieties, several fruits cannot be sent overseas due to the lack of coloring, to injuries or deformations, to internal physiological problems and above all, to sanitary problems like fruit fly infestation.

On the other hand, in the various orchards we visited, there was no mealy bug on the mango trees.

The fruits meant for exports fetch 8 to 10 times more than the price of those destined for the national market. A large part of the non-exportable fruits could be used for transformation.

Nevertheless, a large quantity of exportable fruits is not used, especially in those zones that are relatively a long way from the Côte d'Ivoire border : Yanfolila, Bougouni, Bamako. This is mainly due to the poor export capacity of the Malian operators. Most of them export by air, an irregular activity that depends on the price of the fruits on the destination markets. In 1999, only one of the operators exported by sea. All of them have limited financial means.

The development of maritime exports in Côte d'Ivoire since 1993 led to the fall of mango prices on the destination markets. Though profit margins have sharply decreased, this activity is, overall, a lucrative one.

A revival of Malian exports depends on the producers' adaptation to the needs of the market, as occurred in Côte d'Ivoire. Inversely, in order to secure a return on their investments aimed at improving the production, the planters must sell their mangoes at remunerative prices that only the exporters can offer.

The development of the mango industry must begin with an increase in the export capacity which is the driving force of the industry. Only maritime exports can ensure significant quantities of fruits on a regular basis. In order to render this activity cost-effective, the Malian fruits, once conditioned, need to

arrive in Abidjan at the same price as the Ivorian fruit and in the same fresh condition.

For that, we recommend that the exporters be helped on a financial and logistic basis, for example, by favoring the installation of conditioning stations and refrigerated transport to the port of embarkation. The staff of the existing functional stations could be given necessary training.

As for the producers, support should be extended for grafting in order to improve coloring of fruits and critical sanitary protection such as the establishment of early warning systems for treatment of mealy bug as well as systematic fights against fruit flies.

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Program of the mission

Wednesday, June 2, 1999

- Korhogo – Sikasso

Sikasso :

- Discussions with Mr. Coulibaly, Manager of Mali Yiriden, General Secretary of APEXFEL-MALI South.
- Visit to the orchards in the Waïbera zone, led by Mr. Abdul Karim Sanogo, Mali Yiriden's Head of the Purchasing Department.

Thursday, June 3, 1999

- Visit to the orchards with Mr. A.K. Sanogo :
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 - Fourouna zone
 - Mandela zone

Friday, June 4, 1999

Sikasso :

- Discussions with :
 - Mr. Nagazana Koné, Representative of the Fruits and Vegetables Program in Sikasso. *Centre Régional de Recherche Agronomique*
 - Mr. Sountoura Bakary, General Secretary and Mr. S. Diarra, Technical Advisor, *Chambre d'Agriculture* in Sikasso
 - Mr. Dembele, Director of APROFA
 - Mr. Touman Sidibé, Deputy Chief of Division, *Direction Régionale de l'Appui au Monde Rural* (DRAMR).
 - Mr. Diallo, Regional Director and Mr. Zaccharia Konate, Head of Phytosanitary Division, *Direction Régionale de la Réglementation et du Contrôle* (DRRC).
 - Mr. Tapon et Mr. Moktar Fofana, AOM (exporter).

Saturday, June 5, 1999

- Sikasso – Bougouni – Yanfolila
- Visits to the orchards with Mr. A.K. Sanogo :
 - Visit to the Yanfolila orchards, led by Mr. Sambadian Sidibé, President of *Coopérative des Planteurs et Maraîchers* of Yanfolila.
 - Yanfolila – Kalana – Dadjoungoubala. Visits to orchards in Dadjoungoubala.

- Visit to Mr. Toumani Soumahoro's orchard in Niéssoumana.
- Return and overnight stay at Bougouni

Sunday, June 6, 1999

Bougouni :

- Meeting with Mr. Bamba Tahirou, President of the *Chambre Locale d'Agriculture*
- Visit to orchards, conducted by Mr. Fane, Vice-President of C.A.
 - Beltway of Bougouni
 - Village of Sansola
 - Zone of Sibirila : orchards belonging to the members of a cooperative.
- Bougouni – Bamako

Monday, June 7, 1999

Bamako :

- *Centre Agro-Entreprise*. Meeting with the person in charge. Discussions with :
 - Mr. Nguessan, TAM *Fruits et Légumes*
 - Mr. Traore Souleymane, Head of Promo Fret, Air Afrique.
- Mr. Ousmane Toure, *Direction Nationale de l'Aviation Civile*, (DNAC)
 - Mr. Abou Bengali C & C/COFRUIT (Exporter).

Tuesday, June 8, 1999

- Bamako – Selingue. Visit to the orchards in Sanankoroni and Dalahala organized by Mr. Moktar Fofana (AOM).
- Return to Bamako. Visit of the airport facilities :
 - AOM
 - Phytosanitary services
 - Ex-Djoliba fittings temporarily entrusted to TAM Fruits and Vegetables.

Wednesday, June 9, 1999

Bamako

- Meeting with Mr. Sagory, Director General, Maersk Mali.
- Baguineda. Discussion with Mr. Koutaye Bouye, Assistant Director of the *Projet de Réhabilitation du Périmètre Irrigué* of Baguineda. Orchard visits in Baguineda.
- Orchard visits around Kati :

- Ntoniba zone
- Mpiebougou zone.

Thursday, June 10, 1999

Bamako

- AMELEF. Meeting with Mrs. Toure, President, Mr. Niane, General Secretary and Mr. Latapie Désiré, Interagro.
- Meeting with Mr. Kante Mamadou, *Direction Nationale de l'Appui au Monde Rural* (DNAMR), National Coordinator of RADHORT Project in Mali.
- Discussions with Mr. Mohamed Malinké, Director and President of the APELEF and Mr. Daouda Malinké. Flex-Mali (exporter).
- CAE : Follow-up meeting with Mr. Lambert, Mr. Livingston and Mr. Boukenem.
- Discussions with Mr. Amadou Niane (Sté Schi-Nyuman) and Mr. Latapie (Interagro) – exporters.

Friday, June 11, 1999

- Bamako – Korhogo.

Our sincere thanks are due to Mr. Boukenem Moctar, expert in the fruits and vegetables industry in the CAE and in whose company all the tours and visits were made, for the perfect organization of this mission.

Introduction

In order to help CAE (*Centre Agro-Entreprise*) formulate a strategy for the fresh mango industry, the Consultant was asked to characterize the current situation of the Malian mango exports so as to analyze the market conditions in the medium term and, based on the observations, make recommendations on the activities to be undertaken in order to provide effective support to the sub-sector.

To achieve this, the mission in Mali conducted visits to the orchards in the principal ecological zones where mangoes for export are produced, had meetings with the industry's main participants : planters, exporters, harvesters, transporters, representatives of the Chambers of agriculture and of the principal administrative sectors concerned by the industry.

The results of the field observations and the information provided by the different participants contributed to the formulation of a clear picture about the Malian fresh mango exports industry. In a later section, a few elements of the export industry in Côte d'Ivoire are presented, to explain why Côte d'Ivoire's exports attained an average of 10000 tons per year, while in Mali, they were stagnating at 1100 tons in 1998, even though the latter country had pioneered mango exports to Europe.

Based on these elements, proposals are made to provide assistance to the sub-sector. They consist in reinforcing and improving what seems to be the weak links in the industry : the export capacity and the quality of fruits in the orchards. This last point can be attained only if the exporters are capable of buying these fruits at attractive prices thus motivating the planters to invest in quality, however this requires a priori an improvement in the capacity of exporters to increase export volumes.

1. RESULTS OF THE OBSERVATIONS

I.1. Plantations

a - Varietal composition and state of progress of harvest

APROFA undertook a survey of the orchards, but the results are not yet available. On the other hand, surveys are conducted by the Chambers of Agriculture (Bougouni, for example) or projects. The forms were distributed but have not yet been collected.

According to the information provided and our observations, there is a considerable proportion of Kent varieties in the region of Sikasso, and also varieties of Keitt, Brooks and above all Amelie.

Kent orchards exist around Bougouni, but this variety is not predominant. On the Bougouni-Yanfolila-Kalana axis, Keitt varieties are more numerous than Kent though, compared to the other cultivars – not really fit for export – like Miami Late (“Suruku Kung” = “Hyena’s Head”) or Bewerly (“Diema”= “The White Woman”), often mistaken by the planters for Kent, they are in the minority. Large orchards of Kent are seen between Kalana and the border of Côte d’Ivoire.

Around Bamako, Amelie varieties are largely predominant in Baguineda, Koulikoro and on the route to Haute Vallée. Large plantations of Kent exist in Dara. Apart from that, many other varieties are seen : Keitt, Brooks, Miami Late, Bewerly, and also Irwin, Valencia, Palmer and a lot of Davis Haden, often mistaken for Kent. This is not unusual since all the “Kent” plantations in North Cameroon are in reality composed of Davis Haden.

This varietal composition can be fully explained by historical reasons : for a long time, Amelie had been the only grafted variety, and therefore its name, “The Grafted”. Only a few varieties of Julie (“Muscat Grape”) were used for local consumption. Amelie is therefore in majority in the traditional production zones, mainly around Bamako, and to a lesser degree, in Sikasso.

The first transcontinental exports by OPAM in the late sixties coincided with the entry into production of the Florida varieties introduced at the Centre de Recherches Fruitières (Center for Fruits Research) in Bamako. The bright coloring of these varieties, which the consumers found attractive, incited the research services to promote these cultivars and, in order to achieve this, performance orchards were set up in different sites like Sikasso or Yanfolila. At

that time, it was impossible to know which varieties would be more fit for exports and the performance orchards were set up with around fifteen or so varieties which were *a priori* considered to be the most suitable for exports.

The grafted mangoes in the regions of Yanfolila or Sikasso developed from these performance orchards, in proximity to the Amelie variety. As these cultivars originated in Florida, they are known as “Americans”. The only exception is Miami Late, the distribution of which was never encouraged by Malian research, but which multiplied from grafts that originated in the Kankan region of Guinea where it had been planted in abundance in order to supply a transformation factory which had already stopped functioning even as the trees entered production.

During the next phase, the European importers made a definitive choice from among the varieties pre-selected by research. The development of exports by boat and the popularization of mango in Europe imposed the use of varieties with big fruits and that could be preserved for a long period. From that point on, Kent became the reference. Other varieties exported by boat are Amelie and Keitt and, in a minor proportion, Zill and Palmer.

The appreciation which the trade offers to Kent reflects on the producers and incites them to reconvert their old orchards and to create new plantations of Kent. The proportion of Kent in a region determines the impact of exports in that particular zone.

Therefore, with the exception of the Sikasso region, the essential of Malian production is not directed towards exports.

b – Phyto Sanitary Conditions and Fruit Quality

◆ *Phyto Sanitary Conditions*

During our tour, we did not see the mealy bug *Rastrococcus invadens*. The main sanitary problem is undoubtedly caused by fruit fly which renders 50% of the exportable fruits non-usable.

Malian publications considered *Ceratitis rosa* to be responsible for the damages, but all the flies, on fruits coming from Mali, were identified by Dr. Martin Kehe in 1989 as *Ceratitis cosyra*. This result seems logical since *C. cosyra* is the principal fly found in mangoes coming from all the African countries situated to the south of the Sahara. *C. rosa*, *C. capitata*, *C. annonae* as well as various *Dacus spp* were signaled although their proportion did not ever attain that of *C. cosyra*.

◆ *Physiological aspect and problems*

On Kent, we observed the “soft nose” phenomenon characterized by the presence of a gelatinous pulp or of a black cavity below the “beak”, which causes the pulp to rot during storage. This gelling and putrefaction of the pulp occurs at the place where the root emerges and signals a premature germination. The affected fruits generally have a dark green color. The phenomenon takes place in humid and clayey soil orchards. It can also be linked to the former presence of a cattle pen which produces high doses of nitrogen.

In coastal Guinea, the problem has reached such proportions that it has become difficult to export Kent. In Mali, extreme damages were caused in several orchards, especially in Waïbera.

Another problem with the Malian Kent is the form of the fruits which often shows surface bumps, or is even completely deformed. According to one prominent exporter, these deformations increase with the age of the trees. Nevertheless, the bumps exist even on fruit from young trees. It is difficult for us to comment on this point : could it be due to climatic origins ? But how come mangoes from Burkina do not have as acute a problem ? Are the reasons phyto sanitary ? The bumps could be caused by the bites of acaridans or other insects. Could it be the genetic origin ? Did the trees come from grafts that have had an unfavorable mutation ? Many other such hypotheses could be formulated.

Hail storm caused heavy damages to the fruits in the Sikasso region and especially in Mandela. The Kent variety is particularly sensitive to this natural disaster.

◆ *Fruit Color*

Color of the fruits varies depending on the orchards. The absence of red color is due to various phenomena : aging of the tree, shade, nature of the soil...Thus, fruits produced on lateritic gravels are highly colored contrary to those which come from wet and clayey soils. The differences in coloring are particularly pronounced in the Keitt variety for which we could observe magnificent red fruits especially in the Sikasso region or in Dadjiougoubala, while most of the others had a dull color. The coloring of Keitt diminishes as one moves towards the north in the direction of Bamako where the fruits have a dull color with yellow patches caused by sunstroke. On the other hand, Kent are as colored in Bamako as in the other places while Irwin, Davis Haden or Palmer have a beautiful red color.

c – Importance of production

The year 1999 is characterized by a very good production. During our passage, the Sikasso zone had been harvested to a large extent. On the contrary, in the other zones, trees were heavy with fruits especially as far as the usual highly-productive varieties were concerned : Keitt, Brooks, Davis Haden, Miami Late, Bewerly...Therefore, large quantities of fruits are available for the local market or for transformation.

d –Producer price

The purchasing prices practiced by the Ivorian exporters' agents sharply increased in 1998 to the great joy of the producers. The excellent prices that the mangoes fetched on the European markets forced the exporters in Côte d'Ivoire into very stiff competition for available product.

On the other hand, there was an abundance of production in 1999 and the exporters were impacted by a price collapse for the Amelie variety sent in April. They, therefore, remained prudent when it came to sending Kent variety and a lot of them preferred quality at the expense of quantity, especially by favoring the purchase of highly colored fruits and by practicing strict selection. They agreed upon a fixed purchasing price at the level of the conditioning stations and this was adhered to.

The exporters' agents in Côte d'Ivoire had to reduce their expenses so as not to lose money and they usually made do with gathering fruits in the border zones in order to limit the transport costs. Most of them preferred working in Burkina where the expenses are limited, all the more so since they are afraid of fly infestation on the fruits from Mali.

The prices of exportable varieties were therefore maintained at acceptable levels in the zones close to the borders of Côte d'Ivoire and particularly in the Sikasso region where the exporters' agents from Côte d'Ivoire mingle with those from AOM, a large exporter. But, elsewhere, the prices fell and above all, most fruits did not find any takers, for example in the region of Bougouni or Yanfolila.

There is a large price difference between the exportable fruits and the fruits destined for the local market. In the Sikasso region, the sales unit of the export fruits is the crate in which the mangoes are arranged in two rows. This crate weighing around 17 kg, or containing 20-30 fruits, is sold at 1250 FCFA or 75 FCFA/kg. For the local market, the Kent or the Keitt varieties are sold at 50 FCFA for 6 or 7 fruits. Other varieties like Brooks are worth 5 FCFA for 3 to

5 fruits while the Amelie varieties were last selling at 25 FCFA for 4 fruits. In these zones, no buyer for the local market can enter an orchard until the exportable fruits have been gathered.

In Bougouni, we were informed that some exporters' agents refused to buy Keitt at 800 FCFA/crate, instead were proposing 600 FCFA/crate. Producers who refused the lower offer were not able to sell their product to the exporters' agents.

Around Bamako, the prices of exportable Kent attained 40 FCFA/piece in 1998 (5 fruits for 200 FCFA), but they are usually sold at 25 FCFA/piece (2 fruits for 50 FCFA). At the level of the conditioning stations, the retained prices of fruits are highly fluctuating, depending on the exporters who cited prices varying from 125 to 200 FCFA.

1.2 Harvesters

In the south of Mali, we distinguish fruit harvesters for export from those who harvest for the local market. The former work for Malian exporters or those of Côte d'Ivoire. The exportable fruits are carefully gathered and packed in 15 1 crates made by the Allpack company in Abidjan. This crate serves as the basic unit for the transactions and the price is fixed based on the number of rows.

When an exporter's agent from Côte d'Ivoire leaves for Mali with a 5 ton truck that contains approximately 300 crates, he will have to meet many expenses : fruit purchase, truck rental, petrol, harvest labor.

His profit margin is low and above all depends on the percentage of rejected fruit which is caused mainly by fly bites or surface damages. Varieties like Keitt, which have a fragile skin, cannot stand long journeys by road.

When the exporters' agents go far into the bush, the transport expenses increase along with the duration of the journey, which further results in higher losses and higher truck rental costs. We understand that, given such conditions, the exporters' agents of Côte d'Ivoire have chosen to remain in the border zones and to harvest in Burkina Faso where their transport expenses are a lot less than in Mali.

The AOM company trained their exporters' agents so that the latter learn to harvest only exportable fruits. But the limiting factor for the harvesters is the limited capacity of the Malian exporters.

Although the majority of Malian mangoes are exported under the label “mangoes of Côte d’Ivoire”, most Malian exporters admit that the exporters’ agents in Côte d’Ivoire are a necessity since, today, the Malian exporters do not have sufficient funds to purchase all of the export quality mangoes currently produced. They, however, reproach these exporters’ agents for having raised the prices inconsiderably.

Fruits for the local market are harvested by different teams. The aim is to harvest and transport the fruits at the lowest possible expense. All the fruits remaining on the tree are cut. They are piled up, counted and loaded in bulk into trucks to be transported to Bamako or to the cities in the north like Mopti or Gao. The fruit is sold by piece. The buyers (for the local market), who can gather the fruits only after the exporters’ agents have bought the fruits, wait impatiently for the harvest for export to be over, and they are ready to favor contacts between producers and exporters’ agents so as to be able to harvest their fruits at the earliest.

Around Bamako, harvesting is done by female buyers who take all the fruits. If an exporter needs them, the women select the best fruits and deliver them to the exporter. But these fruits meant for export are not taken care of as required. They are often damaged, with the peduncles torn off. In reality, the fruits to be transported by boat are better cared for than most of tree ripened fruits transported by plane which are generally of prime quality.

1.3 The exporters

a – The context

During the 1999 campaign, only AOM exported by boat. At the end of the first week of June, its exports were at 450 t and it hopes to attain 600 t before the end of the campaign.

The largest “plane exporter”, Flex-Mali (Malinké), had exported 150 tons as of mid-June.

But whatever the means of dispatch chosen and whatever the size of the company, all these exporters have a common problem : lack of financial means.

The intercontinental transport is held postage due, but the exporters have to finance all other expenses, until FOB, from their own funds. Even the cartons have to be pre-paid at the factory in Bamako. When their operating funds are exhausted, they have to wait for payment from previous dispatches in order to continue further shipments.

The commercial banks no longer grant credit for seasonal operating costs and the other industry players refuse any form of credit : the producers do not accept sales with differed payment and the importers content themselves with guaranteeing postage due to the forwarding agents.

b – The equipment

AOM possesses a well-equipped station in Sikasso with a conditioning plant and cold storage rooms. The same company has another smaller plant in Bamako, that comprises a warehouse, big containers transformed into cold storage rooms and a brush-calibrator combination that had been dismantled in order to be set up elsewhere.

In Bamako airport, there is a conditioning facility, formerly used by Djoliba but now repossessed by *Aéroports du Mali*. This facility has recently been leased to TAM *Fruits et Légumes*. This plant has huge conditioning rooms and cold storage rooms, completely disproportionate to the current needs. Even if a conditioning room is never too big, the over-capacity of the cold rooms causes huge energy losses. It is imperative to subdivide the cold storage room so as to adapt it to the demand for storage space.

Elsewhere, we have seen diverse elements used for conditioning or the preservation of fresh products : calibrators of a special type called “Etoile de la Tourangelle”, fixed refrigerated containers...

1.4 The transporters

a – Air transporters

Bamako is the only international airport in Mali today that receives cargo planes. However, according to the *Direction Nationale de l'Aviation Civile* (DNAC), the African Nations Football Cup will stimulate airport development in several cities of the country. A 2500m runway will be constructed in Sikasso, which would allow it to receive Boeing 747s, while the runway in Bamako would be extended to 3200m, allowing fully loaded Boeing 747s to take off.

Several airlines load cargo in Bamako at present. Air Afrique and Air France are partners in this activity. Air Afrique being a transnational airline, the Council of Ministers of the Member States fixes the cargo fare for each product and for each country so as to avoid disparities between the States. This price cannot be then modified. This system neither allows one to favor big volume clients or those who respect their cargo reservations, nor to penalize those who do not respect their bookings. Sabena offers to carry cargo at a price lower than that of Air Afrique – Air France. The minimum weekly capacity offered by these airlines is 55 t/week. This can be increased by reducing the quantities coming from other sources for the planes in stopover.

Apart from the regular flights, the exporters can hire cargo planes, but this requires a substantial down payment. This operation has been successfully conducted for French beans.

At the beginning of each season, the exporters indicate their cargo needs. Then, during the export period, weekly meetings take place under the aegis of DNAC to allow the exporters to express their needs for the coming week. The bookings are made accordingly, but the estimates are not usually fulfilled : the non-realized estimates, during the last five years, represented 50% to 70% of the bookings !

While the air transporters bitterly complain about the non-professionalism of the exporters, the latter reproach the air transporters for mainly two things :

- excessive cargo price, that is, 565 FCFA/kg for bulk and 535 FCFA/kg for the pallets for Air Afrique – Air France to which must be added 15 FCFA/kg as airport tax, 9000 FCFA/kg as fixed tax and 3% of the amount as payments for postage due ;
- impossibility of knowing in advance in which flight the goods are to be loaded ;

The exporters consider however that the available cargo space is sufficient.

TAM *Fruits et Légumes* has just obtained the authorization to hire a cargo plane. This flight will come from Lagos, Nigeria where it will be loaded with various goods bound for Mali. Then it will take fruits and vegetables from Mali which will be unloaded in Ostende, Belgium.

The aforementioned operators are the same as those which charter a plane at present from Yamoussoukro in Côte d'Ivoire. TAM acts as the correspondent

of Ivoire Logistique. Mr. Nguessan, the person in charge of the operation in Mali, considers that the mangoes can be transported from Mali to Rungis at 415 FCFA/kg, including transit and customs clearance. This cargo plane has a capacity of 33 tons.

TAM views itself solely as a service provider, ensuring conditioning, preservation in cold room and transport of products to Europe. However, the other operators are a bit cautious about this operation and are awaiting the initial results before giving a commitment. TAM is therefore going to condition and dispatch its own products during a four-week experimental period. The first dispatch was scheduled for June 12, 1999. Following the mango season, the French beans would be exported during a six month period.

b – Transport by boat

The “boat” fruits are shipped exclusively from the port of Abidjan. Two methods are used : containers or OCAB ships.

The main difficulty involved in maritime shipping is transporting the fruits to the port of embarkation.

- When the fruits are embarked on containers, they are cooled beforehand in a pre-cooling chamber, then put in a container in the conditioning plant. A container holds between 18 and 22 tons depending on its capacity (normal or High Cube) and the use or non-use of pallets and crates adapted to its dimensions.

The main advantages of the container are the following :

- cooling is done at the same place as conditioning and this preserves the fruits better ;
- the possibility of sending the mangoes to their final destination without any break in the cold chain, which is particularly interesting if one seeks to diversify the clientele.

Its main inconveniences are :

- the longer time taken for transport from Abidjan to Europe which is 9 days for the reefers but an average of three weeks for the containers ;

- container transport expenses that are higher than that for reefers : approximately 110 FCFA/kg for containers as against 50 FCFA/kg for OCAB ships ;
- the necessity of bringing the container to the conditioning station which translates into high road transport costs.

To use the reefers, the fruits have to be taken to Abidjan. Given the distance, the use of a refrigerated truck is indispensable. It then has to be accepted by an exporting structure recognized by OCAB (*Organisation Centrale des Producteurs-Exportateurs d'Ananas et de Bananes*) and bookings have to be made, according to the customary procedures, three months in advance. If the bookings are not respected, the exporter has to pay for the cargo he had booked, unless another member compensates for this deficit by exporting more than expected.

There are several internal mechanisms to avoid paying for non-realized bookings :

- Globally in OCAB, a meeting takes place before the arrival of each ship during which the different structures readjust their estimates. However, in order to give away reserved cargo space, another structure must be ready to take it. When the estimates are altered by natural phenomena, everybody sells or everybody buys at the same time.
- Compensation can be made between the different members of an exporting structure.
- Some exporters can balance their dispatches by reallocating volume among the various brands that they export.

The well-known exporters, members of huge exporting structures, therefore find it easier to compensate for the differences than the smaller exporters.

OCAB deals only with OCAB certified cooperatives and each cooperative pays for non respected bookings. Each cooperative follows its own procedures to make its members pay for these differences : some of them let each exporter pay the difference that has not been compensated for, the others fix an average price per pallet for each dispatch and thus split up the difference among the different members.

Each cooperative contains permanent members and also occasional users of the cooperative services who have no decision-making power.

The advantages of OCAB ships are the following :

- excellent logistics : there are two ships per week linking Abidjan and their destination in Europe within 9 days ;
- very low transport charges : at present 61 FCFA/kg net to which must be added 33 FCFA/kg net of transit unloading on arrival ;

Major disadvantages are :

- the ships arrive in Dieppe and Marseille; one cannot chose the destination as one can with containers ;
- the importer has to be certified by the forwarding agents who provide payment guarantee to the transporter.
- Requirement to adhere to OCAB procedures, especially regarding bookings, which is not always easy for exporters who are located far away from Abidjan ;
- time period between conditioning and refrigeration which is sometimes too long.

Apart from OCAB, there are other shipping companies which have reefers, like the *Compagnie Fruitière*, for example. However, the quantity of mangoes from Côte d'Ivoire transported by these ships is very low.

c –Road transport

Road transport takes place between the conditioning station and the port of embarkation which is Abidjan at present.

When there is a long time gap between gathering and cooling, maturation is triggered and the mechanism becomes irreversible, especially if the fruits are exposed to very high temperatures before the cooling stage. Given the distance between Mali and Abidjan and the temperatures in these countries between March and July, refrigerated transport is indispensable.

For transports involving containers, a generator must be available in the truck or a kit that supplies electric current to the cooling system should be fixed on the container by its owner.

Road transport can be carried out in container or refrigerated truck, but in both the cases, the problem of profitability between Abidjan and Mali exists. It is possible to transport products from Abidjan that require refrigeration like bananas or fish. But the loading of these products and their customs clearance provoke loss of time and prevent a satisfactory turn around time. Then, the containers must once again be cleaned and regulated. All dry products cannot be loaded in a container or a refrigerated truck as some of them can damage or pollute the material. Whichever the product transported, slow customs clearance remains a constraint.

The main handicap of Malian exporters, compared to those of Côte d'Ivoire, is the long truck transport time and the presence of a border between the conditioning station and the port. If a fleet of refrigerated trucks exist and a good organization of the return freight allows a reduction in the transport expenses, it will greatly favor the maritime export of mangoes.

1.5 Transformation

An expert in transformation is scheduled to conduct a mission in the coming months and we therefore did not meet the transformers.

Among the exporters of fresh produce, only AOM intends to set up a factory for the production of dried mango pulp used by manufacturers of mango-based juice or foodstuffs. The transformation-export link is beneficial to the planters from whom the user buys the entire harvest.

At the production level, huge quantities of mango are available for transformation. Thanks to a large variety of cultivars and to geographical dispersion, fruits are in abundance from March to July. However, none of the main varieties used in the world, like Alfonso, are present. From among the available varieties, the transformers will chose those that will best suit each of the products he intends to manufacture, taking into account the period during which the chosen varieties are available.

1.6 Other industry players

a – Research

The research services introduced the red mangoes in Mali and favored their diffusion thanks to multi-local orchards.

At present, according to the government researcher of Sikasso, the main donors felt that they had enough results as far as the mango trees are concerned, and the research program has been inactive and is waiting to enter a phase when the results are to be made available to the users and planters.

b – *Chambres d’Agriculture* and APROFA

The General Secretary and the Technical Advisor of the *Chambre d’Agriculture* of Sikasso suggested that we contact APROFA, a project affiliated with the *Chambre d’Agriculture* in charge of providing support to actions connected with the mango industry.

APROFA conducted a survey of the orchards, the results of which are not yet complete but which indicated that, in the Sikasso region, mainly Amelie varieties are seen, while on the big production zones of Yanfolila and Bougouni, exportable varieties are predominant.

APROFA initiated other actions aimed at improving quality : training of exporters’ agents and producers, and training imparted to CMDT in phytosanitary regulations. They also made the producers aware of the Grafting of Amelie in Kent or Keitt.

Support to exporters was also extended in the form of visits to the Arab countries in search of new clients, supply of commercial information and contacts with banks for submitting applications for project financing.

Finally, actions involving transformation included the setting up of a gas (-fired) dryer. Juices, for sale to consumers in Bamako, are made using traditional methods by women.

In Bougouni, the *Chambre Locale d’Agriculture* has undertaken an extensive survey of plantations. Forms were sent to planters for this purpose, but due to the lack of material means, the forms have not yet been collected.

This Chamber had tried collaborating with SAEFEL, an exporter from Côte d’Ivoire who had set up a company in Mali. Campaign prices were fixed according to the location of the orchards. But after a good start to the campaign, things turned bad as purchases done on credit were not repaid. As a result, this Chamber is discouraging its members from selling on credit.

The Chamber is advising Ivorian exporters’ agents to register themselves in order to avoid being victims of harassment, but they prefer to remain in clandestinity.

c- DRRC (*Direction Régionale de la Réglementation et du Contrôle*)

Its senior officers are of the opinion that with the opening of the borders and globalization, the less efficient countries are going to disappear from the list of exporters. The problem of quality is therefore of paramount importance.

DRRC met the Chamber of Commerce, but there was no concrete follow-up. It would like to be more closely associated with phytosanitary control. DRRC issues the various documents needed to export such as the certificate of origin, phytosanitary certificate and the certificate of verification. According to them, the customs office can issue the certificate of control.

The persons in charge deplore the existence of a single conditioning station in Sikasso and the lack of professionalism of several industry players, in particular the exporters' agents who export fruits in any which way to Côte d'Ivoire. The managerial staff of DRRC would like to strengthen relations with foreign organizations.

They neither have an officially approved food standards nor a well-equipped quarantine service.

There exists a defined norm for mango exports (Order 575 SEAEF of June 29, 1962). A more recent iteration was established but it did not form part of a decree. It would have to be updated before submission to the higher authorities for approval.

At Bamako airport, the phytosanitary inspection service has been present since 1995. The persons in charge informed us that they were in favor of continuous control which can be conducted in the conditioning station, especially when the products are brought to the airport to be palletized.

In May 1999, 450 kg of goods were refused. In April, refusals were to the order of 600-700 kg. Permissions for reconditioning are given, except when larvae of insect are seen in the quarantine or in the event of general over-maturity of the entire batch.

The exported mangoes were found to suffer from the following problems : the presence of fly larvae, torn off peduncles, sap loss, over-maturity.

The person in charge of the service wants to take on the role of an educator. If he finds that a new exporter is not working well, he refuses the

product and sends for the exporter in order to show him the defects, which would in turn allow the latter to correct his work and improve the quality of the dispatches. But he regrets having to deal only with promoters rather than with exporters, as the role of the agents is to control the dispatches and not to do the work of the exporters.

2 . Export of mangoes from Côte d'Ivoire

The export of mangoes from Côte d'Ivoire began in 1981 and only a few tons were dispatched during this year. During the '80s, exports were made by air. Exports by boat began in 1989, and in 1992, maritime transport gained the upper hand over transport by air.

In 1993, exports were on the order of 3000 tons and they tripled in 1997. After a poor production in 1998, the 1999 dispatches are expected to exceed those of 1997.

2.1 Some reasons for success :

The reasons for this success are manifold :

➤ Geographic reasons

Presence of a zone that favors mango production and of a maritime coast

➤ Economic reasons

Strong fruit and horticultural economy directed towards export : export of more than 350,000 tons of bananas and pineapples, of papayas, of floral productions, etc.

➤ Logistical reasons

The main logistical advantage resides in the regular presence of ships adapted to refrigerated transport of fruits : reefers of which at least 2 OCAB ships per week ; container ships (Maersk, Delmas, CMB...) ; freight aircrafts. But, apart from transport, this fruit economy allows to have at one's disposal the various inputs indispensable to production and export at affordable prices : agricultural products and materials, pallets, crates, corner iron, straps, ...

➤ Socio-political reasons

The government of Côte d'Ivoire let the industry develop and did not try to stifle its growth through taxation or excessive levying of taxes.

➤ Professionalism of the industry players

The producers adapted themselves to the needs of the market by converting the orchards into varieties sought after by the buyers.

The new mango exporters were mainly operators of the banana – pineapple industry. Those who weren't, used to a large extent, the services of banana-pineapple exporters who were well acquainted with the complexities of fruit exportation.

➤ High-quality efforts

From 1995 onwards, the professionals of the industry have participated in drafting a new official norm and OCAB drafted terms and conditions introducing further criteria for quality, valid within the organization. Maritime transporters like OCAB or MAERSK also contributed to improving the quality by insisting on controls before departure, so as to avoid damages on arrival which would affect reimbursement of the transport expenses. These coercive measures above all ensured the elimination of the worst batches.

In the face of lowered prices due to the increase in the quantities exported, some exporters considered that improving the quality was the best way to maintain high prices and they deployed considerable effort to attain this objective. The requirement that operators be equipped with a conditioning station was aimed at eliminating temporary exporters who often left their bills unpaid thereby harming the entire industry.

➤ Financial means in proportion to ambitions

The current exporters have practically every means of conducting an export campaign without being blocked by financial problems. Outstanding payments to producers are rare and they are due to exporters' agents rather than to exporters.

2.2 Mode of financing

The Ivorian exporters have different financial sources :

- Some of them work with their own funds. The initial sum invested increases every year through reinvestment of a part of the annual profits.

- Others are financed by their importers who can provide loans to cover whole or part of the campaign.

When the importer has a lot of confidence in his supplier, he advances a portion of the money corresponding to the expenses involved in the campaign preparation, especially support to producers (loans, phytosanitary treatment, prospecting), the fixed charges of the conditioning station (renting the offices, security, electricity...) and the various purchases needed for the initial dispatches (harvest crates, pallets, loops and straps, crimper...).

The second advance corresponds to the freight charges of the first batch of pallets. If the net price per kilogram of FOB - Abidjan fruit is 250 FCFA/kg, or 200,000 FCFA/pallet, the importer can release an installment of 20 million corresponding to 100 pallets. When the exporter has dispatched 50 pallets, the importer releases the next installment so that the former can continue to export while waiting for the deposit to be credited to his account.

The next installments are released as and when dispatches are made and the refunds are collected from the sales accounts according to the modalities fixed in advance.

The risk run by the financier mainly involves the pre-campaigning advance and the financing of the first installment.

If the importer does not have full confidence in his supplier, he can reduce the risks involved by asking him to finance the pre-campaign and the initial dispatches on his own and then, he advances money depending on the number of pallets that have already been exported. This form of financing corresponds to a security for goods in transit or to an advance on sales account and guarantees that dispatches are not disrupted due to lack of funds on the part of the sender.

Each installment being guaranteed by previous dispatches, the only risks involved are related to possible damages that would result in expenses much higher than revenues. That is why, controls before embarkation are demanded by an outside organization (Veritas in Côte d'Ivoire).

The payment for intercontinental transport is guaranteed by the importer who has to be certified by the transporter or the forwarding agent, failing which he deposits a sum as guarantee. Crates are paid for in different ways – in cash, by drafts valid for 60 days or by credit – depending upon the clients.

- In order to benefit from commercial bank loans, the exporters have to depend on the banker's confidence in them, earned through less speculative activities than the export of perishable foodstuffs or that would allow mortgaging of real-estate property.
- Some of the exporting companies are the branches of foreign firms specializing in fruit and vegetables trade. These structures which work on behalf of the importer can be assimilated with those that work with their own funds.

The implication of European importers in the export of mangoes corresponds with their desire to ensure constant supplies that complete the range of tropical products offered to their customers. Thanks to fruits from different geographical origins, they can offer a regular supply thus preventing their main clients from contacting the rival importers.

This financial dependence inconveniences the exporters. Having to sign exclusivity contracts in exchange for advance of funds, they can neither contest the selling prices of their products nor allow the importers to compete among themselves.

2.3. Influence of exports on the behavior of orchards in Côte d'Ivoire

Until 1992, production exceeded the needs of the exporters. Exports began to grow fast in 1993, but they developed mainly after the devaluation of the African franc CFA in 1994, and it was from this year onwards that the demand of the exporters greatly exceeded the supply.

When the export of mangoes began, the producers intensified the care of the orchards : fencing, plowing, weeding... Then, as demand was centered around Kent, they started over-grafting the least preferred varieties with this cultivar. Export by boat accelerated the movement by eliminating the varieties which cannot be preserved for a long time. Apart from Amelie, Kent, Keitt, today there remains only some varieties of Palmer and a few Zill, along with a few rare ones preserved for domestic consumption.

Simultaneously, new plantations were set up, 90% of them with Kent and the rest with Keitt. This movement continues at present.

Moreover, the intense development of ravagers rendered necessary the protection of the orchards from wild animals.

The producers of Côte d'Ivoire adapted themselves to the demands made by the exporters and developed the orchards to conform to these demands. The production of exportable fruits is on a constant rise and this movement is expected to continue in the coming years.

The export curve is like a switchback, but tends to increase by 1000 to 2000 pallets every two years. As a result, although the 1999 exports attained a record level, we are once again witnessing a balancing of demand and supply and this results in increasing demands made by the exporters especially regarding the color of the fruits.

The year 1998 had shown a large deficit and the prices in Europe attained the highest levels since the beginning of the decade. This sudden rise was reflected in the purchasing prices from the producers. Inversely, 1999 saw a fall in the price of Amelie in April, which incited the producers to be a bit cautious over Kent which had been bought from producers at 20% less than in the previous year. The producers of Mali, who had maintained the 1998 prices without realizing that it had been an exceptional year, did not find any takers for the fruits.

2.4 Export tendencies in the coming years

One can assume that in the coming years, the quantities exported are going to be on the rise, as the result of a number of young orchards that have entered production, and as new plantations continue to enter the scene.

The importers always demand more quantities since, apart from the immediate profits that they can earn from this activity, each one tries to increase his share of the market.

Excepting in the year 1998, there has been a decrease in the selling prices and an increase in the producer prices. This had been made possible by extremely high profit margins at the beginning of the decade which had progressively decreased as a result of the reduction in market prices. If the price fall continues, the exporters are going to reduce their costs, and the farm gate price of fruits will decrease given that it is an important overall cost component. This tendency was visible in 1999 when the exporters came together to prevent overbidding and became more demanding, refusing the non-colored fruits.

However, we can remain optimistic given the fact that European consumption per capita is very limited. The market can therefore continue to grow in a noteworthy manner without the prices falling below a certain level. On

the European markets, the prices of mangoes from Côte d'Ivoire which had fallen sharply between 1991 and 1995, have, moreover, a tendency to become stabilized and maintain satisfactory levels for the operators exporting high-quality products.

The fall of market prices below the cost price is due mainly to marketing errors committed by the exporters who send excessive quantities of fruits that the market does not require any more. For example, 1000 pallets of Amelie per week were sent in April while the importers had already started receiving Kent by plane and the warehouses were filled with Amelie of the previous shipment that they had not succeeded in commercializing!

Some of them tried maritime exports to the Middle East. These attempts failed due to the long transport time. Moreover, the proposed prices were hardly remunerative and did not justify such risk-taking.

The occasional dispatches to South Africa are generally not very well paid. However, the consumers are less demanding than for the European market on criteria such as variety or fruit color.

The fact that the duration of the European export season tends to be extended creates attractive opportunities for Mali. Dispatches from Côte d'Ivoire continued until mid-June. Such an extension of the campaign corresponds to a desire on the part of the importers to impose the mangoes from West Africa on the European market for as long as possible, for a number of them have a stake in the industry, albeit at different levels, and such is not the case for the other origins.

3. Constraints and assets of Mali

Compared to Côte d'Ivoire, Mali suffers from two main constraints :

- It is a continental country and does not have a maritime shoreline
- It does not have a strong fruit economy focussed on exports.

The other handicaps of the industry, related to quality of production or to poor export capacity, are not irremediable and can be rectified.

The peak production period for each variety is even later when the orchards are situated more to the north. If we consider the big producing zone that stretches across Côte d'Ivoire, Mali and Burkina Faso, the earliest-fruited regions are situated in the extreme south : Tafire and Dikodougou. Then, there are the outskirts of Korhogo and Ferke and Sinematiali. Production in Sikasso takes place 3 weeks after Korhogo and then, even later, there is Bougouni and then Bamako.

NB : Sporadic, off-season and peak season production are not to be confused. The more extended the orchards are, the older the trees, and more the off-season fruits obtained, especially in urban areas.

This delay which, at the beginning of the campaign, is an inconvenience to Mali, becomes an asset later on, once the great wave of Kent from Côte d'Ivoire has passed and the market has stabilized. Therefore, Malian exports must be complementary to exports from Côte d'Ivoire and, in order to develop, must take advantage of the possibilities offered by the latter, while awaiting further solutions.

Malian exporters can therefore take the following actions :

- Seize every occasion to conduct dispatches by air
- Dispatch early-ripening fruits by sea or air
- Dispatch produce regularly, although in small quantities, by sea during the period when dispatches are made from Côte d'Ivoire, except if there is a risk that excessive quantities may cause a fall in prices.
- Intensify exports after the Ivorian production has reduced and this normally occurs after May 15.

In order to compete, the mangoes conditioned in Mali ought to arrive at the port at the same price as the other origins. The reduction in various expenses like the purchasing price of mangoes must allow for a compensation of additional expenditure linked to transport. This aspect is highly important in

order to ensure the competitiveness of the industry, all the more so given that the Malian mangoes are handicapped by qualitative problems, like the fly attacks which greatly discourage the exporters and their agents.

4. Some proposals for the growth of the mango industry in Mali

4.1 General outlook

a – The current production situation (A reminder)

- Only a small proportion of the production is exportable due to:
 - inappropriate varieties
 - fruit fly infestation of exportable varieties
 - fruits that do not have the required qualities (deformed, lacking colors, “soft nose”)
 - orchards that are not easily accessible.

- All the exportable fruits are not exported due to :
 - difficulty in reaching the orchards
 - lack of material and financial means on the part of the exporters

- Fruits meant for export are sold at prices 8 to 10 times more than those for local consumption
- The producers are ready to make additional efforts to better sell their fruits

There are some exportable fruits that are not exported, especially around Bougouni or Bamako, but the quantities are smaller than the producers' representatives imagine. Generally, most of the fruits that are not exported are not fit for export.

B . Current situation of the exporters

- The other industry participants reproach the lack of professionalism of some of the exporters.

- The lack of financial means is the main obstacle to their activities.

- In 1998, exports by air were higher than those by sea.

- The buyers of Côte d'Ivoire limit themselves to the border zones.

➤ They prefer exhausting the other solutions before going to Mali.

c . Plane or boat

Air transport can procure substantial income to the exporters. Moreover, this mode of transport ought to progress in the years to come thanks to the development of cargo planes at moderate costs. On the other hand, since the last few years, OCAB has declared an opening date for the marketing campaign for Kent by boat and this leaves a time gap of fifteen or so days for dispatches by air.

But exports by air are usually done on a very irregular basis. They involve luxury products whose quantities are limited or dispatches destined to be placed in a temporary slot, like the period between the first maritime dispatches and the arrival of the boat.

A campaign cannot be built on intermittent activities. In order to rely on sure and regular supplies, fruits must be booked in advance with the producers. Later, it is difficult to abandon them under the pretext that the prices have fallen or that dispatches by air are not profitable.

To produce a good-quality product, adequate equipment and highly qualified harvesting and conditioning teams must be available. When the prices are attractive, one must be able to produce good quantities without letting the quality suffer. It becomes indispensable to write off the capital cost of the equipment and to employ full-time staff so that they do not scatter when there is no job to be done.

Therefore, to ensure supplies, pay off the material and employ full-time staff, work must be done continuously, but this is not possible if the dispatches are intermittent.

Thanks to lesser expenses involved, maritime transport allows the dispatch of fruits even when the prices are relatively low. The quantity of “boat” fruits that the market can absorb are much higher than the “plane” fruits. Only certain periods are to be avoided if the quantities embarked are excessive. But generally speaking, maritime exports permit more regular dispatches than exports by air.

If an exporter has good-quality supplies, high-performance materials and qualified staff to conduct maritime exports, then he is in an advantageous position to benefit from the favorable niche available for exports by air.

Maritime exports require a lot more technical skill than dispatches by air. In practice, exporters by sea are in a better position to conduct exports by air.

4.2 General proposal : reinforcing the weak links of the industry

Since the weakest link is export, the emergence of competent exporters provided with adequate means must be encouraged.

The development of the demand for exportable fruits will incite the planters to improve their production. This evolution can be accelerated by establishing privileged links between exporters and producers and the provision of technical assistance from exporters, or projects. Actions aimed at improving production however will be effective only if there is a guarantee that the purchase price will remain reasonable.

Transformation can increase the value of some of the available fruits but at prices lower than that of the fruits meant for export.

4.3 Support to exporters

a . Financial support

Since financial problems are the main restricting factors, they must be solved first. However, if the exporters have the bankers' trust in them, their liquidity problem would be solved.

Therefore, procedures that guarantee loan reimbursements must be implemented. The lender must ensure the following :

- the loan is really used for export of mangoes
- the goods are in sound condition and no efforts are spared to avoid damages
- the fruits are dispatched to the right consignee
- the financial returns are used to reimburse the debts.

The first point can be solved by advancing money only after a certain number of pallets has been dispatched by the exporter. This means that he must have a certain amount of capital in the beginning but his working capital is constantly provided for as and when the dispatches are made. Some of the expenses, like for the crates, can be paid directly to the supplier by the financier.

Quality control should be done by an independent organization. 'Veritas' control is already compulsory for goods dispatched by sea from Côte d'Ivoire. This control does not guarantee a superior quality but limits damages by eliminating the main faults, in conformity with the terms and conditions of OCAB. Such a control on dispatches by air would certainly help to improve the overall quality.

The importers should be requested to guarantee reimbursement from the sales accounts of the exporters. After having paid for the various expenses for which they provided an advance (transport, transit, etc.), they will remit the sum meant for the exporter to an account maintained by the creditor. Obviously, these importers have to be solid and well-established companies.

In order to prevent the fruits from being dispatched to other wholesale merchants, the list of importers chosen by each exporter will be given to the different transporters.

No method is perfect and there are always some unpaid bills. Nevertheless, the aim is to permit healthy companies to develop without always being blocked by insufficient funds. Those who do not play the game well will be quickly eliminated.

b . Logistic support

❖ *Conditioning stations*

Well-equipped plants are essential to producing export quality fruits. The fruit bath, the polishing brush and the conveyor belt are as important as the calibrator.

We observed that it is very difficult for several exporters to use the conditioning station as everyone needs to work at the same time. The big conditioning stations working for several exporters produce an appalling quality since the packers do not work correctly. Paid per tonnage, they do not wait for a sufficiently long time between the various procedures and take none of the basic precautions that would only take them longer, without procuring them a better pay. If an exporter's agent tips them, they slip the damaged fruits into the crates belonging to the exporters who did not pay them anything.

The search for quality requires that the fruits are conditioned by the employees of the exporter who fixes his own criteria for sorting the fruits, and controls the work done.

We advise that individual units, small in size but fully equipped, be set up rather than big shared stations.

❖ *Land transport*

The “boat” fruits must be transported to Abidjan under refrigeration. The development of exports by reefers necessitates the setting up of a fleet of refrigerated trucks and the search for freight in the north-south direction, in order to reduce mango transport costs.

❖ *Cold storage rooms*

In the case of exports by boat, the cold storage rooms are useful only if the journey takes place in a refrigerated vehicle. The cold room allows pre-cooling and thus the vehicle’s arrival can be awaited calmly. As for the “plane” fruits, cooling slows down the physiological evolution of the fruits and stabilizes them at the required maturity level, provided, however, that they are not kept for 3 days on the tarmac after being taken out of the refrigerator !

Contrary to the conditioning installations, the cold storage rooms can be used by several exporters.

❖ *Correspondents and material for communication*

If transport by reefers develops, the exporters who use this mode of transport ought to be able to rely on correspondents in Abidjan to :

- give them all information about the frequency of the ships or the general freight situation.
- act as their representative at freight meetings or at organizations for control in the event of a problem
- monitor the loading of their goods on arrival
- eventually take charge of their purchases made on the premises (crates, pallets,) and of the return freight of refrigerated trucks.

The exporters should be able to communicate with their correspondents in Abidjan or in Bamako as often as necessary, so as to be able to take timely actions on all the information received.

c . Staff training

Fifteen years ago, one could learn on the job by progressively correcting the most flagrant errors. Today, taking into account the strong rise in medium-

quality mangoes imported into Europe and the lowering of the prices as a result of increase in commercialized tonnage, one cannot afford to have damaged fruits. Every dispatch must be of an irreproachable quality. A dubious dispatch compromises the success of every campaign.

Therefore, from the very start, one must possess a team composed of qualified staff occupying the key posts. Training programs can help to improve the competence of an efficient team, but right from the beginning, one must recruit staff capable of fulfilling the different tasks allotted to them. These experts work and at the same time train new arrivals who work under their supervision. A meticulous and permanent control of the work done by every employee is conducted by a competent managerial staff.

Qualification involves not only conditioning but encompasses the entire range of activities from the initial contact with the producer to FOB, passing through technical assistance to farmers, harvesting, crating, transporting to the stations, conditioning, transporting of the packed fruits, as well as financial administration, harvest estimations, export estimates or the budget preparation.

4.4 Support to producers : knowing, protecting and improving production

a . Knowing production

The inventory method that seems to be the most reliable is the one that consists of distributing inventory forms to the producers and synthesizing them. But on-the-spot control of the declarations is indispensable, especially for those varieties meant for export. In practice, it means verifying that Kent is really Kent and not Miami Late, Bewerly or Davis Haden. There are also some confusions between Kent and Keitt in certain zones.

Apart from getting to know the orchards, this on-the-spot verification helps to keep the producers informed and to avoid the errors committed by their ignorance.

b . Phytosanitary protection

❖ *Protection against mealy bug*

Rastrococcus invadens, the mealy bug of the mango tree, originated from Asia and was introduced accidentally in the south of Benin. It has progressively invaded every mango tree in the south of this country and in Togo.

The local natural enemies proved themselves inefficient in controlling this ravager and IITA (International Institute on Tropical Agriculture) introduced cochyneal parasites in its region of origin. These parasiticides controlled the ravagers well and can be thought of as being under control in the zones that had been invaded first.

But the ravager progressively spread its tentacles, towards the north of Benin and Togo, towards the west, to Ghana and from there, spread to Côte d'Ivoire. It attained the northern zone which produces export mangoes in 1995 and studies showed that parasiticides were present but were a lot less efficient than in the coastal regions in ensuring control of the mealy bug.

There were substantial damages. The mealy bug secretes a thick honeydew that covers the leaves which is in turn invaded by a mushroom. The leaves are covered by a black crust due to these fungi. The mango trees that are infected by the mealy bug do not flower and those that did before being infected, produce flowers damaged by honeydew burns and the fungus.

The secretions irritate the skin and one cannot rest in the shade of the infected trees any more so they lose their social function as shade trees.

Studies conducted by N'guetta Kouame in Côte d'Ivoire showed that infection began right in the center of cities and especially around railway stations. Then the mealy bug infects other mango trees of the city, and from there, infects the outlying orchards. Man and vehicles play an important role in spreading this insect.

Research conducted at present in Côte d'Ivoire aim at better defining the reasons that limit the efficiency of the parasiticides introduced to control the ravager. The same thing seems to be happening in Benin and Togo. The mealy bug is also present in the region of Dakar in Senegal.

Today, the use of pesticides seem necessary but poses a lot of problems.

- The mealy bugs are difficult to eliminate and powerful insecticides have to be used.
- The foliage has to be moistened so that the products adhere to the leaves to be efficient.
- Some of the mango trees are tall and the treatments require special equipment.
- The mealy bug is polyphagous and attacks a number of fruit or ornamental species like the frangipani trees.
- The treated trees are quickly re-contaminated by infected trees.
- The materials, products and labor for treatment is expensive and for it to be cost-effective, the fruits have to bring in sufficient profit.
- The presence of residues in fruits and the incorrect use of insecticides have to be feared. These treatments are difficult to administer in urban zones due to the risks encountered by the inhabitants and animals.

We cannot predict what will be the behavior of the mealy bug and its parasites in Mali, but if natural conditions allow it to proliferate with as much intensity as in the north of Côte d'Ivoire, the consequences will be a lot more tragic in Mali as a result of the economic context of the production of mangoes. Because the fruits are generally sold for less than Ivorian mangoes due to the quality differential, required phytosanitary treatments would be extremely onerous for Malian producers.

Therefore, no efforts must be spared to delay, to the maximum, its entrance and its extension into Mali.

It is imperative to set up an early warning system and a task force to fight against mealy bug. A video film that could be made with help from the research organization of Côte d'Ivoire (CNRA) and IITA of Benin would help provide information to the concerned economic players, whether they are operators of the mango industry (producers, harvesters, exporters), agents of the developmental organizations or all those who work in the rural zones.

The early warning will then be transmitted as quickly as possible, for example by using the network of managers of the CMDT. After verification, the concerned zone will be thoroughly treated, taking into account its human environment, before the ravager can spread. The task force must be provided with adequate material : tractor, long-range (crop) duster, pesticides. When contamination takes place in an urban zone, this fight gets complicated as

precautions need to be taken to avoid intoxicating the inhabitants and the animals.

It is certainly not easy to sensitize people to a problem that does not exist. But mealy bug is like fire : it has to be fought within the first few minutes itself, before it can spread further.

❖ *Protection against fruit flies*

The fruit flies lay their eggs below the epidermis of the mango. As long as the fruit is immature, various composites prevent the development of the eggs. But once the fruit starts maturing, the rate of these composites reduce and the eggs can hatch. The larvae, known as maggot or maddock, develop by digging holes and causing the fruits to rot. Various mushrooms and bacteria, parasites or saprophytes, take advantage of this primary attack and enter the fruit, developing thereby new rot and contaminating the surrounding fruits.

The flies are dangerous in two ways :

- they cause the fruits to rot and thereby depreciate the value of the goods
- they are quarantine insects whose entry is totally forbidden into the European Union, the United States and a lot of other countries, for they consider that these flies represent a danger to the cultures of their countries. If national phytosanitary services find a single contaminated fruit, they require the destruction of the entire shipment.

The United States demand a hot water treatment held under the control of an American agent before allowing the mangoes to be imported to their territory.

In the conditioning stations, it is not always easy to identify the infected fruits, for the fly bite is the size of a needle. The most recent bites are the least noticeable and are distinguished by a flow of sap that disappears during mechanical washing and brushing.

There are two main ways of combating the fruit fly : in the fields and post-harvest treatments.

- Chemical treatment in the orchards is rendered complex by the fact that the most dangerous contamination takes place at the approach of maturity, that is, a period during which no chemical treatment can be done without finding some residues of pesticides in the fruits.

The systematic method of treatment employed by CIRAD FLHOR in the Réunion Island is the spot treatment .

- Trapping of males using pheromones helps to know the level of infection of the sample area.
- When the critical level is reached, the treatment starts.
- This treatment combines an insecticide and a foodstuff which attracts the fly. It is practiced only on those parts of the tree that do not have any fruits.
- The flies are attracted by the foodstuff and are killed by the insecticide.

The advantages of this technique are numerous :

- Every farmer can make use of this technique as the treatment can be done with a small sprayer carried on the back. Large quantities of water are not required.
- Around 1 m² per tree has to be treated and this can be done at the right height for a man so that the worker does not receive any fall-out from the product.
- It respects the environment by preserving the medium of generalized treatments that provoke a rupture of the biological equilibrium.
- It respects the consumer and avoids spraying the pesticides on the fruits.

Some organizations are at present conducting research on the pheromones that would attract the females. It would then be an ideal technique since the fight can be done exclusively by the trapping method.

- Post-harvest treatments are based on heat which is chosen so as to kill the eggs and the larvae of flies while at the same time sparing the mangoes. The exposure time is much longer than in the fungicidal fight for the entire pulp of fruits must attain the lethal temperature that varies depending on the species of flies.

Various heating techniques are used, like hot air or steam, but the most commonly employed method uses hot water. The disadvantage of this technique is its complexity : the fruits are kept in cages and immersed in hot water baths for several hours. They are then gradually cooled for the same period of time, and polished, which gives them a presentable appearance and protects their epidermis from any new fungicidal infections.

In this area, new techniques are also being studied, like the micro-wave treatment that has already been implemented by CIRAD FLHOR to destroy the larvae of flies in dates.

We have cited these techniques in order to present, in an exhaustive way, the various possibilities of fighting infections, but they are difficult to apply at the moment given the complexity of implementing them, unless some external requirements make them compulsory.

c . Over-grafting

The aim of over grafting is to replace one grafted variety by another. The main branches of the tree are cut, except the grafting branch and the re-growths are grafted with the new variety. This technique is already used in Mali and can be developed in zones that do not practice it as yet. After a few demonstrations, the producers then largely adopt the method, provided they find it necessary. They, therefore, have to ensure beforehand that the new variety brings in more profit than the old one.

D . Improving coloring

Although this aspect looks secondary at first sight, it is, in fact, very important especially during the years when the production is average to plentiful.

The exposure of the fruits to the sun alone cannot explain the absence of color, for we were able to observe some bouquets well-exposed to the sun but whose fruits were entirely green. One must be able to link the color to the type of the soil and, if possible, correlate it with the chemical composition of the plant and the fruit, and, if need be, improve it by bringing in needed soil nutrients.

5 . CAE's possible fields of intervention

CAE's intervention will be ineffective if the various industry players do not feel involved, do not play the game or do not have the competence required to take advantage of the actions taken for their benefit. CAE can only provide assistance where there is a will to progress, but it is up to the economic players to demonstrate that will.

5.1 Possible interventions in favor of exporters

a. Financial support

A CAE-managed fund could be introduced. Reimbursements would be made by settling the sales accounts of the concerned exporters directly into this fund. Depending on the reliability of the exporters, which can be determined by objective criteria like the reimbursements of earlier credits or the amount of investments made, the credits will be given before the campaign, in the beginning of the campaign or after the first dispatches.

b. Logistic support

❖ *Conditioning stations*

CAE could support the installation of conditioning stations adapted to the possibilities of each exporter. Installations like " La Tourangelle" are largely sufficient for annual tonnage of less than 500 pallets. Above that point, one must either have other types of processing machines, or multiply the calibrators which represent the limiting factor of the conditioning chain, as the cleaning brush has a greater output. However, the cost of this material has greatly increased in the course of the last few years and its competitiveness is not guaranteed.

It is better to have several stations in different sites (Sikasso, Bougouni, Bamako) rather than one big station.

CAE could intervene so that the equipment is acquired faster : prospecting to compare the types of equipment available, orders, loans for investment.

❖ *Refrigerated road transport*

CAE could facilitate the acquisition of suitable vehicles by transporters or exporters.

A coordinating committee would be set up, bringing together mango exporters, transporters, traders, forwarding agents and customs officers, in order to organize the transport of the return freight.

❖ *Cold storage rooms*

If the cold storage rooms in the airport are well-equipped and if their recent buyer, as well as AOM in Sikasso, accept to keep their installations at the disposition of the interested parties, construction of new cold storage rooms does not seem to be a priority.

c. Training

Training sessions are useful only if the participants already have a reasonable level of competence in their respective fields.

The training courses organized in Côte d'Ivoire mobilized the efforts of various research organizations (CNRA/North Côte d'Ivoire, CIRAD), control organizations (Veritas) and of experts in control of fraud, pesticides, protection of plants. These conferences were followed by practical demonstrations conducted by technicians. The films that were made during these occasions could be used as didactic material.

The main difficulty is organizing these demonstration/training sessions at a period when there are mangoes as participants are already very occupied with the export campaign.

d . Search for new opportunities

It would be very interesting for the exporters to find new markets, but several conditions have to be met :

- the correspondents must be reliable and creditworthy.
- the possible additional transport expenses must be largely compensated for by a higher selling price.

5.2 Possible Producer level interventions

a . Production inventories

Regarding the ongoing orchard census, CAE could finish the work by concentrating on the export varieties. Former research officers like Mr. Bouare,

who is well-acquainted with the varieties, could contribute to refining the tasks undertaken.

b . Support to sanitary protection

❖ *Fight against mealy bug*

CAE should consider contributing to the establishment of an early warning system and a treatment task force as suggested before and should take charge of procuring the necessary material and products.

❖ *Fight against fruit flies*

This should be undertaken by a collaboration of producers and exporters. But first of all, the technique of systematic spot treatment in local conditions has to be implemented. These tests, conducted first locally and then put into widespread use, would be useful as demonstration tests for producers.

They could be held by final-year students or VSN, under the control of the experts from CIRAD FLHOR.

c . Over-grafting

This activity does not need any particular tests. But if a need is felt as the result of an increase in the value of export varieties, then demonstrations can be held along with training tours for the planters.

d . Improving fruit color

Although IER does not conduct any research on mango trees at present and the number of researchers has greatly reduced, a convention could be passed with this organization in order to conduct a research program aimed at improving the color of mangoes meant for export.

The same could be done for internal physiological problems : the research would aim at correlating the frequency of the phenomenon according to the characteristics of the environment.

TABLE OF THE MAIN ABBREVIATIONS

AMELEF	Association Malienne des Exportateurs de Fruits et Légumes (Malian Association of Fruit and Vegetable Exporters)
APEFEL	Association des Professionnels pour l'Exportation des Fruits Et Légumes (Association of Professionals for the Export of Fruits and Vegetables)
CAE	Center Agro-Entreprise (Agribusiness Center)
CIRAD	Center International de Recherche Agronomique pour le Développement (International Center of Agronomic Research for Development)
DNAC	Direction Nationale de l'Aviation Civile (National Civil Aviation Department)
DNAMR	Direction Nationale de l'Appui au Monde Rural (National Department for Support to the Rural World)
DRAMR	Direction Régionale de l'Appui au Monde Rural (Regional Department for Support to the Rural World)
DRRC	Direction Régionale de la Réglementation et du Contrôle (Regional Department for Regulations and Control)
IER	Institut d'Economie Rurale (Rural Economy Institute)
OCAB	Organisation Centrale des Producteurs-Exportateurs de Bananas et Ananas. (Central Organization of producers and exporters of Bananas and Pineapples). (Côte d'Ivoire)
AOM	Agrumes et Oléagineux du Mali (Citrus and Oleaginous fruits of Mali)