“Currently, there is considerable interest in Tobago as an organic producer of cocoa beans. This seems quite feasible due to the natural environment friendly cultivation associated with the crop without the use of pesticides and fertilizers.”

INTRODUCTION

EUROCHAMTT’s 3 year initiative to associate the Tobago brand of tourism with ‘good food’, has prompted the rehabilitation of abandoned cocoa and coconut estates throughout the country. It is hoped that the resuscitation of these two crops, can pioneer a new sustainable business cluster model for the people of Tobago; comprising an interdependent triad of distinctive cuisine, tourism and locally grown produce.

COCOA

The national production level of cocoa in Trinidad and Tobago is around 1000 metric tonnes (MT) per annum of which Tobago’s contribution to this output is under 30 MT. These production levels are best described as very inadequate given the current international demand for fine flavour cocoa produced by Trinidad and Tobago.

“Historically Tobago is known for a unique Trinitario flavour. This is due to the predominantly Trinitario stock of trees and the good fermentation and drying practiced in Tobago in the past.”

A contributing factor to this situation is the low cocoa production levels obtained from farmers’ fields. On an average this is less than 300 kg/ha. A wide gap exists between these levels and achievable or potential levels which
is over 1000 kg/ha. Practicing good cocoa agronomy can considerably narrow this gap. This entails an analysis and examination of soils, varieties, planting density, care of young trees, shade management, pruning system and fertilizer use.

**Which cocoa varieties are recommended for Tobago?**

Historically, Tobago is known for a unique quality Trinitario flavour. This is due to the predominantly Trinitario stock of trees and the good fermentation and drying practiced in Tobago in the past. The Trinidad Selected Hybrids (TSH) varieties are highly recommended for use in Tobago. This group includes seven existing commercial types: TSH730, 919, 1076, 1095, 1102, 1188, and 1220. The general features of the TSH varieties are as follows: (1) bean size of over 1.0 g; (2) low pod index (12 to 18); (3) potential yield of 1000 – 2500 kg/ha; (4) early bearing (2 – 3 yrs); (5) high tolerance to Witches Broom Disease; (6) good resistance to Blackpod Disease (under adequate management); (7) resistance to Ceratocystis Wilt Disease; (8) possess Trinitario fine flavour status; (9) highly adaptable to local conditions.

**Can I grow organic cocoa beans?**

Currently, there is considerable interest in Tobago as an organic producer of cocoa beans. This seems quite feasible due to the natural environment friendly cultivation associated with the crop without the use of pesticides and fertilizers. Organic cocoa can be niche marketed and fits very well within the eco-tourism thrust. However, good organic production includes the use of traditional varieties (ICS clones), traditional methods of fermenting and drying and eco-friendly cultural practices.

**What are the general practices recommended to increase yield?**

Besides the selection of a suitable variety, the following good agronomic practices should also be considered in a package of integrated crop management to provide a combined effect for sustaining high cocoa yields.

1. Attention to key factors during the establishment stages of the crop: windbreaks, uniform lining and planting, field accessibility and the use of camber beds
2. Effective fertilization
3. Shade management
4. Pruning
5. Weed management systems
6. Effective drainage network especially on soil types with restricted internal drainage. Irrigation systems will assist during periods of water deficit and in the early establishment stages. An effective control programme is particularly useful for the management of Black Pod disease. The cultural practices mentioned before provide a strong control factor in the spread and development of diseases. These practices can also be integrated with fungicide sprays to even further decrease losses. Intercrops must be managed separately without affecting the main cocoa crop.

10. An intervention in the parrot bird pest problem.

LET’S REHABILITATE!

Rehabilitation can POTENTIALLY resuscitate a productive cocoa plantation, affected by negative conditions such as, (1) abandonment and neglect; (2) severe attack of pests and diseases; (3) improper crop management (such as lack of regular pruning and shade management, etc.) and (4) poorly selected cocoa varieties.

Why should we rehabilitate cocoa fields?

• Increase yields (of both cocoa and companion trees)
• Reconstruct crown shape and size of the tree
• Reduce incidence of pests and diseases
• Increase planting density of cocoa in the plot
• Introduce new cocoa varieties
• Regulate shade canopy (e.g. reduce shading, introduce new fruit and timber tree species)
What are the steps in the rehabilitation cycle?

1. Check the merits and suitability of the existing site in terms of soil type, capability, climate and accessibility.

2. Decide and prepare a field plan to be implemented. Ensure resources of tools, equipment, labour, plants, fertilisers and pesticides are available.

3. Clear abandoned fields of undergrowth/lastro, wild wood tree and excess permanent shade trees. Extract valuable lumber trees (labour, power saws, arboricides are required). Wind breaks are established as required.

4. Identify existing cocoa trees with potential based on age, variety, condition and present growth habit.

5. Prune trees by lowering their height to less than 15 feet and reshaping their crowns. Sometimes coppicing or stumping is required to produce new chupons for regrowth of a new tree.

6. Fertilise the pruned trees with an NPK mixture (16.8.24) and spray with a copper fungicide for moss and Blackpod disease.

7. Restock and infill the field to replace missing and rogued trees and fill empty gaps/areas. Ensure shade is provided for young cocoa trees. Use desirable cocoa varieties such as the Trinidad Selected Hybrids (TSH). These clones are recommended because of their tremendous yield potential of over 1000 kg per hectare.

8. Improve drainage by clearing and excavating existing drains and dig new ones where required.

9. Regulate overhead shade to achieve 30% shading for mature cocoa trees.

10. Ensure the leaf litter layer is kept intact and uniform and allowed to grow in thickness.

11. Establish companion cropping with fruit species, timber, food crops (bananas and plantains), anthuriums or foliage.

12. Control diseases such as Blackpod and Witches’ Broom diseases and pests such as parrots, wood peckers and squirrels.

13. Carry out routine maintenance practices on both the cocoa and companion crops such as weed control and sanitary pruning to ensure good field sanitation.

14. Harvest all produce in a timely manner, observing food safety practices.

15. Keep and maintain farm records for future planning and budgeting.
Establishment of a New Cocoa Field Using the Under-Planting Method

A new cocoa field can be established in an existing old field using the under-planting method of establishment. The old trees provide shade for the newly planted trees and pods are also harvested from them. These old trees are eventually phased out after a period of 4 to 6 years.

1. **Shade reduction:**
   - Shade (50 to 75%) for the young cocoa trees will be provided by the existing old cocoa trees.
   - Remove all excess permanent shade trees.
   - Establish bananas or plantains in areas where shade is not adequate from either the old cocoa trees or the permanent shade trees.

2. **Management of old cocoa trees:**
   - Old cocoa trees must be well maintained and they will provide significant yields during the first 4 yrs. of the young trees.
   - Prune old trees to be balanced, lower height, and remove low and leaning branches sometimes hanging over drains, obstructing access and preventing proper circulation of air through the field.
   - Spray pruned trees with a copper fungicide e.g. Kocide (30g per tree using a mist blower) to control Black Pod disease and moss.
   - Destroy ants and termites.
   - Fertilize old trees with 2lbs 16-8-24 NPK in May (1 lb.) and Oct (1 lb.).

3. **Lining up of new field:**
   - Use desired spacing (10 x 10; 9 x 9; 8 x 8 or 6 x 6ft)
   - Establish new rows 2 to 3 ft. away on the side of the existing old tree.
   - Picket all planting spots.

4. **Drainage:**
   - Open all existing drains including main ones, recommended dimensions are width: 12 to 16ins and depth of 8 to 14ins.
   - Dig new drains to facilitate rows which had shifted closer to the existing drain.
   - Reform camber beds as necessary.

5. **Removal of an unwanted shade tree e.g. Immortelle using an arboricide**
   - Use an arboricide eg Weed Master (Dicamba plus 2,4D).
   - Auger 2 holes per wing, on 4 to 5 wings closer to the tree trunk.
   - Holes should be ½ in diameter and 6 in depth and at an angle.
   - Mix solution of 150 ml Weed Master and water in ratio of 1:2.
   - Apply 50 ml of solution per hole.
What good practices are recommended for the care and management of young cocoa trees?

The care and maintenance of young cocoa trees during the first three years after planting is very important for success in establishing cocoa estates. On average, 30 to 60 percent of trees can die during the early years after establishment. The following causes either result in death of trees or in serious retardation of growth:

- Using poor quality planting material
- Improper method of planting
- Inadequate shade management
- Pest damage from cocoa beetle and bachac
- Excessive moisture
- Drought conditions
- Poor weed management
- Inadequate nutrition

As a result, the following practices are recommended to ensure high survival rates and adequate growth of young trees:

1. **Round weeding**
   Round weeding is essential for reducing the competition from weeds for moisture, nutrients, light and space. It will facilitate fertilizing, moulding and mulching in the early years. The stakes that were used in lining should remain to help in identifying the location of young trees. Over the first three years after planting, trees should be round weeded at least three times per year using a brushing cutlass. This operation should remove all vegetation in the area corresponding to the drip circle and should be done in a direction away from the main stem. By age 3 yrs., this will be 3 to 4 ft. away from the base of the plant. The use of hand held brush cutters and herbicide sprays should be avoided in round weeding. Weed control is then practiced over the entire field preferably using a rotation of different methods (manual, chemical, and brush cutting).

2. **Vine Control**
   Vines eg. Cobolian will seriously interfere with growth by strangling young trees. Control is best achieved by manual removal or spot spraying with a 2-4D/Amine based herbicide, ensuring that no herbicide drift occurs.

3. **Fertilising**
   During the first 3 to 4 yrs., the plant has a high requirement for nitrogen and phosphorous to develop stems/branches and roots respectively. A soil test is recommended to guide use of fertilizers. However as a general recommendation the following type and rates of fertilizers can be used. Top dress or sprinkle the fertilizers evenly, in a circular band 6 inches from the trunk (for trees under 2 yrs.) and 2 feet from the trunk (for trees 2 to 4 yrs old) extending to the edge of the tree’s crown or drip circle. During the first year, moulding of the trees can be done immediately after fertilizing. Ensure that weeds are always removed before fertilizing.
4. **Mulching**

   Mulching is an important practice to suppress weed growth, to conserve soil moisture, maintain and improve soil texture and fertility and to reduce soil temperature. Mulch young trees after weeding, especially towards the end of the rainy season. Use decomposing matter from pruned branches, cutlassed weeds, banana stalks, leaves and stems and other plant material. Try and develop a source of mulch to use on young trees over the first 3 yrs, after which the canopies of the trees will join. The surface roots of cocoa grow in contact with the mulch and obtain nutrients, and midges used in pollinating cocoa, live and breed in the mulch.

5. **Shade management**

   Newly planted cocoa should be established in fields in which both temporary and permanent shade trees were planted one year before. This will ensure that the young trees will receive between 60 to 75% shading from temporary shade trees such as bananas, plantains, cassava, pigeon peas or pawpaw. When underplanting in fields with old cocoa, shade is provided by manipulating the growth of the old trees. After cocoa is about 3 yrs old, temporary shade is removed, but gradual thinning of this shade can start after the first year. Thinning of shade should always be done at the start of the rainy season.

6. **Cocoa beetle and bachac control**

   The cocoa beetle is a serious insect pest of young cocoa trees. The adult beetle which is black in color feeds on stem and branch tissue causing scarring to these areas. This is an early symptom for detecting the presence of beetles. The young or larval stage girdles the trunk of the trees, which usually results in death. Trees without proper shading are more susceptible to attack and the activity of beetles increase under dry conditions. Medium to heavy infestations will require control from spraying with insecticides such as Ethrine, Fastac, Decis or Karat. Bachac nests should be identified and destroyed. The insecticide sprays used for beetles will also assist in bachac control.

7. **Management of rootstocks**

   If grafted cocoa plants are used, then it is necessary to remove all growth from below the union of the scion and rootstock. This must be done with a sharp blade and flush to the main stem or trunk.

8. **Irrigation**

   Young trees require adequate moisture year round. If irrigation is not possible in the dry season, then good moisture conservation practices is required. This includes adequate shade, mulching, windbreaks and hedges, removing unwanted chupons and reducing weeds. Cocoa should be planted at the start of the rainy season in May/June to ensure good root establishment before the onset of the dry season.

9. **Formation Pruning**
Pruning is required to be done 2 to 3 yrs after planting to develop the required shape of the tree. This depends on the type of planting material used namely, clonal cuttings, grafted or seedlings. However, all spindly, deformed, weak and diseased branches should be removed together with all unneeded/unwanted basal and other chupons or suckers, particularly at the start and end of the rainy season.

**Are some types of cocoa beans worth more than others?**

Yes. The key to a high quality bean for export depends on the variety, good husbandry practices, harvest and post-harvest handling that the farmer employs. All pre- and post-harvest practices affect the final flavour development of the bean.

Cocoa quality also has much to do with flavour, purity or wholesomeness, consistency, yield of edible material and cocoa butter characteristics. These are the key criteria affecting a manufacturer’s assessment of “value” of a particular parcel of beans and the price he/she is willing to pay for it.

There are two general industry classifications of cocoa basic/bulk/ordinary (used for cocoa butter and high volume chocolate lines) and fine or flavour (fine chocolates, fine cocoa powders.)

**What are some of the recommended good practices for harvesting and storing cocoa?**

- For optimal processing, harvest only ripe, disease-free and undamaged pods.
- Cut pods from the tree with a special knife fixed on to a long bamboo pole, taking care not to damage the pods or the tree and flower cushion. The tool should be sharp and clean to avoid spread of disease.
- Harvest enough pods to yield sufficient beans for fermentation.
- These pods should be opened as soon as possible (1-3) days to avoid losses from disease.
- Store your beans away from strong odours. Air ventilation, fumigation and good phytosanitary practices should be observed for optimum storage conditions.
- Any bean problems can be assessed through careful scrutiny of the bean appearance, smell and test as well as the cut test.

**What are some of the market safety demands I need to satisfy to ensure I can get my product sold?**

In light increased awareness of food safety issues, markets now require Minimum residue levels (MRL’s) of:

- Heavy metal
- Pesticide
- Mycotoxins
- Polycyclic aromatic hydrocarbons
- Free fatty acids
Can I do anything with the cocoa husks? What are the cocoa value added industries available to farmers?

The idea of adding value to cocoa and its by-products in cocoa producing countries has often met with much debate.

There are potentially lucrative local markets for a wide range of value added products made from otherwise discarded primary cocoa processing by-products and lower grade fermented and dried cocoa beans. Some argue that these markets can be explored and developed by cocoa farmers themselves at the cottage industry level and there is long term potential for an established secondary cocoa processing industry. This parallel processing can utilise both lower grade beans and dedicated local first grade cocoa bean production to create a range of value added products for local and regional consumption. Success stories of such ventures exist in Brazil, Nigeria, Ghana, Côte d’Ivoire and similar products are being developed in St. Lucia.

The main by-products of cocoa are cocoa meal (fragments of bean), cocoa bean shells, cocoa pod husks and mucilage. Locally nothing is done to add value to these by products from primary processing but a range of value added uses exist which include:

- its use in animal feed materials in small quantities.
- the manufacture of fertilisers
- a compost breeding ground for midges which are the chief pollinators of cocoa. Increased midge populations will lead to an increase in pollination efficiency and ultimately pod yield.

In addition, pulp juice can be used to make jams, wines, health drinks.

Unfermented cotyledon has limited food use but can be ground and pressed or passed through an expeller to extract cocoa butter. Cocoa butter has a range of commercial uses in the food, cosmetic and pharmaceutical industries. It is the most valuable product that can be extracted from the cocoa bean and accounts for up to 55% of mass of the bean.

And of course, the fermented cotyledon offers the widest range of value added uses for the cocoa bean. The dried, fermented cocoa bean is the main ingredient used in the manufacture of chocolate, unsweetened chocolate, cocoa powder, cocoa liqueur and cocoa butter. While unsweetened chocolate is an acquired taste, local drinking chocolate has local appeal and has the potential to be marketed as an indigenous product to the tourist market in Tobago especially.
The links between cocoa and tourism

In a 2012 New York Times feature article, the adventures of a “foodie” tourist as he explored the indulgent Caribbean chocolate trail from Trinidad to Tobago to St. Lucia and Martinique, only serves to highlight the potential of this crop to create new exciting opportunities for many Tobagonians.

What is the projected future of cocoa in Tobago?

Globally, cocoa production and chocolate consumption is expanding. In addition, the new “health benefits” of eating dark chocolate is fuelling this expansion and creating new markets and opportunities.

From our work in the industry, the demand for cocoa FROM Trinidad and Tobago is higher than it’s ever been with a corresponding increase in price. This demand for the exclusive, high quality cocoa that Trinidad and Tobago produces is one of the suggested branding ideas that led the EUROCHAMTT to facilitate this workshop for the farmers of Tobago.

In all, several opportunities exists for farmers to be successful in this venture

1. Support and funding is available
2. Large plantings and rehabilitation have been done recently, so the experience and expertise is already in place.
3. There is a guaranteed market for cocoa produced by this country
4. Individuals so inclined can band together into small companies to acquire funding through ADB and NEDCO to purchase abandoned cocoa estates and new lands.
5. Estates can be transformed into eco-tourism parks and developed with the help of the relevant Ministries.
6. There is a variety of value added markets that exist for different components of the bean, which can be exploited by the farmer for maximum profits.
COCONUT

When one considers the idea of branding in the Caribbean, no image comes to mind more than a stretch of pristine beach surrounded by gentle swaying coconut trees. It is no wonder that EUROCHAMTT has selected coconut as another crop in its drive to promote a distinctive brand for the island of Tobago.

In the Caribbean, the three major growers of coconut are Guyana, Jamaica and Trinidad and Tobago. In 2009 Guyana, pursuing an aggressive scheme for the revitalisation of the coconut industry under the Coconut Revitalisation Plan, has enjoyed an upsurge in their export market.

In the domestic market, there are many possibilities for augmenting the income of coconut farmers and can be done by adopting simple technologies. These value added ventures become more successful, when farmers with small holdings form co-operatives at the community level.

“In 2009 Guyana, pursuing an aggressive scheme for the revitalisation of the coconut industry under the Coconut Revitalisation Plan, has enjoyed an upsurge in their export market”
Suggested value added products from coconuts include:

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Product</th>
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</thead>
<tbody>
<tr>
<td>1. Coconut meat</td>
<td>• Desiccated coconut</td>
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<tr>
<td></td>
<td>• coco-flour</td>
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<tr>
<td></td>
<td>• virgin coconut oil</td>
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<tr>
<td>2. Coconut milk</td>
<td>• Coco-yoghurt</td>
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<td></td>
<td>• Nata-de-coco</td>
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<tr>
<td>3. Coconut leaf</td>
<td>• Broom</td>
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<td></td>
<td>• Toothpick</td>
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<tr>
<td>4. Coconut water from dry nuts</td>
<td>• Vinegar</td>
</tr>
<tr>
<td></td>
<td>• Wine</td>
</tr>
<tr>
<td></td>
<td>• Nata-de-coco</td>
</tr>
<tr>
<td>5. Tender coconut water</td>
<td>• Bottled/packaged coconut water</td>
</tr>
<tr>
<td>6. Jelly and tender water</td>
<td>• Health drink</td>
</tr>
<tr>
<td>7. Coconut oil</td>
<td>• Beauty products such as soaps, body oil, hair oil, perfumed with locally extracted fragrances.</td>
</tr>
<tr>
<td>8. Coconut husk and shell</td>
<td>• Growth medium for orchids and anthuriums</td>
</tr>
<tr>
<td>9. Logs</td>
<td>• Handicraft</td>
</tr>
<tr>
<td></td>
<td>• Coc-wood</td>
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</tbody>
</table>
Your facilitator Mr. E. Ramkhelawan, has made several handouts for you to use to supplement his topics as outlined below.

**COCONUT REHABILITATION**

1. **Introduction**
   a. History of the coconut industry in Trinidad and Tobago.
   b. Government’s current involvement in coconut rehabilitation.

2. **Factors to consider when rehabilitating coconuts**

3. **Climatic and soil requirements**

4. **Cultivars/Planting material**
   a. Selection of mother palms
   b. Collection of seednuts
   c. Nursery for seednut germination
   d. Selection of seedlings

5. **Establishment of coconut plantation**
   a. Site selection
   b. Land preparation for field transplanting
   c. Lining up and spacing
   d. Planting hole preparation
   e. Transplanting
   f. Under planting
   g. Weed management
   h. Irrigation
   i. Intercropping, mixed cropping, multi-storeyed cropping and mixed farming
   j. Crop nutrition and fertilization
   k. Pest and disease management
   l. Harvesting
   m. Good practices for production of high quality water from tender nuts

6. **Cost of production for one acre of coconut**
   a. Cost and returns from one acre of coconuts (for water)

7. **Value added product options**
   a. Factors to consider in the selection of coconut bi-product(s) as a business option

8. **Food safety and certification**

9. **Challenges and critical success factors.**
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