A HISTORICAL BACKGROUND OF THE COCOA RESEARCH UNIT, University of the West Indies, Republic of Trinidad and Tobago

J.A.Spence *

The Imperial College of Tropical Agriculture (ICTA) was established in 1921. Research in Cocoa at ICTA was initiated in 1930. The Colonial Office of the British Government was advised by the Lovat Committee to form a chain of Agricultural Research Stations to serve specific regions in the tropics. The emphasis was to be on long range programmes not usually undertaken by Department of Agriculture establishments. Prof. Cheesman, then Professor of Botany at ICTA prepared a proposal for biological research in cocoa which outlined priority needs for increase in yield and improvement of quality. Cocoa was then Trinidad's largest export crop. Overwhelming support was given to the programme by cocoa planters, government officials and cocoa traders in Trinidad. In 1929 the Colonial Office of the British Government approved the proposal and in 1930 a five-year scheme was launched. This has subsequently evolved into the Cocoa Research Unit (or CRU).

In 1929, contributions to administer the scheme were invited from other Governments and also from the Chocolate manufacturers in Great Britain. The following governments and companies promised financial assistance:

Government of Trinidad and Tobago
Government of Grenada
Government of Ceylon (Sri Lanka)
Government of Gold Coast (Ghana)
Government of Nigeria
Messrs Cadbury Bros Ltd
Messrs J S Fry & Sons Ltd
Messrs Rowntree & Co.

With an additional contribution from the Colonial Office the budget of £4655.00 per annum was utilized for the recruitment of three research officers, a Geneticist (F J Pound), a plant physiologist (E E Pyke) and a Soil Chemist (J A McDonald). The staff worked under the general guidance of Prof. Cheesman and Prof. Hardy. Pound's work culminated in the selection of 100 clones - Imperial College Selections (ICS 1-100) from among the cocoa populations of Trinidad. These were distributed world-wide. Meanwhile Pyke developed the first technique for rooting of cocoa cuttings which made possible the cultivation of clonal cocoa. McDonald carried out soil surveys and fertilizer trials and did some pioneering work on leaf analysis as a method of diagnosing the nutrient balance in the cocoa tree.

---

* Present Address: Head, Cocoa Research Unit, University of West Indies, St Augustine, Trinidad, West Indies

In 1935, Poul ... Trinidad Department of Agriculture as Cocoa Agronomist. One of the maj ... contributors to Cocoa research was his exploration in Ecuador (1938) and the Amazon valley (1943) to collect wild cocoa types. The resulting germplasm collection is now in the International Cocoa Genebank, Trinidad which is managed by CRU. This material has subsequently played an invaluable part in all major breeding programmes for cocoa.

In the early 1940's, Prof. Cope carried out a selection programme in Grenada which resulted in the establishment of the GS clones.

After the war, a new and bigger scheme for cocoa research was financed jointly by the British Government (under the Colonial Development and Welfare Act) and the Cocoa, Chocolate and Confectionery Alliance Ltd, representing the manufacturers in the United Kingdom.

Recruitment of eleven Senior Research Staff was completed in 1950. Five major areas of work were carried out under the new scheme, namely:

1. Selection, breeding and propagation of cocoa
2. Soils and nutritional factors in relation to cocoa growing
3. Other environmental factors in relation to cocoa growing
4. Pests and diseases of cocoa
5. Preparation and quality of cocoa.

In the early 1950's a large scale development programme to encourage cocoa planting based on work done in the 1930's was launched by the Cocoa Board in Trinidad and Tobago. The main innovation in the scheme was to rehabilitate the Cocoa Industry using rooted cuttings of the ICS clones produced in large scale propagating facilities. Similar programmes were initiated in Grenada, St Vincent and St Lucia. A two year expedition (called the Anglo-Colombian collecting expedition) was mounted in Colombia to survey and collect new cocoa material.

In the mid-1950's, the emphasis in the plant improvement programme shifted from collection and selection to breeding. Using Amazon and ICS material as parents, SCA 6 and 12 crossed with ICS clones gave yields up to 3400 kg/ha at River Estate. The progenies also proved to be resistance to Witches' Broom Disease in Trinidad.

Major studies were made in nutritional aspects (deficiency symptoms), new propagation techniques, shade/nutrition interactions, manorial and cultural practices, screening technique for Witches' Broom resistance, wilt disease, physiological/ecological studies on the incidence of thrips, beetle and mealy bugs on cocoa, as well as on chemical changes and the significance of aeration and temperature during fermentation in relation to final chocolate flavour.

The Regional Research Centre (RRC) for the British Territories in the Caribbean came into being on 1st September 1955. The nucleus of the Centre had been formed from the staff of the three Research Schemes for bananas, cocoa and soils, which were wound up at that time. In the agreed five-year research programme effective from 1st September 1956 it is stated that "Research on Cocoa at RRC has two main practical objectives:

(i) the elaboration of techniques for removing factors that limit optimum yield

and

(ii) evolution of high yielding trees bearing beans of desirable flavour".

It was recognized that the research on cocoa within the RRC was not to be only confined to Caribbean problems but as far as local circumstances allow, was world-wide in its range.

In 1960, ICTA was incorporated into the University of the West Indies to become its Agricultural Faculty. The responsibility for the RRC had lain with the Council of Ministries of a number of West Indian Governments. During the 1960's, the West Indian Governments altered the priorities of research from export crops to food crops which resulted in a reduction of funds for research on cocoa. Due to the reduction in the contribution for research on cocoa at that time, the number of research staff was reduced and reorganized into the Cocoa Research Unit from 1st January 1963 with D B Murray as Head of the Unit.

During this period the American Cocoa Research Institute (ACRI) began to contribute to the budget of the Unit which resulted in the appointment of a Plant Breeder, W S Chalmers, for a co-operative programme with Ecuador. An important aspect of Chalmers' work was the collection of wild cocoa from the Amazon area of Ecuador to expand the germplasm collection in Trinidad.

The Unit struggled through a very critical decade (the 1970's) during which period the majority of the staff members left the institution, due to the uncertainty of long-term financial support from donors. The American Cocoa Research Institute withdrew its financial support to the Cocoa Research Unit and for some years the Unit was left with assured support only from the Governments of Trinidad and Tobago and Jamaica, and the UK Cocoa, Chocolate and Confectionery Alliance (CCCA now known as BCCCA). Fortunately most generous financial support from the EDF was made under the Lome Convention. The EDF approved financial assistance in 1981 when the Cocoa Research Unit received a grant of 950,000 EUA.

The EDF has supported the preservation and expansion of the germplasm bank (now called the International Cocoa Genebank, Trinidad or ICG,T), for collection of additional material and resiting existing material, and the dispatch of primary genetic material to various countries. There is no restriction on the international availability of any material in ICG,T once the material has passed through quarantine. There are presently some 20 scientists and postgraduate students working at the Cocoa Research Unit on a wide range of subjects associated with the collection, conservation, characterisation and cataloguing

of primary germplasm. The present work programme is described in CRU Annual Report 1987-90 just published.* The work of the Unit over the period 1930-1980 is reviewed in 'Fifty Years of Cocoa Research in Trinidad and Tobago by A.F.Posnette'.*

Some opportunities for MSc or PhD studentships exist for students from ACP Cocoa Producers through EDF funding or from elsewhere for students of other nationalities. Those interested should contact the Head, CRU.*

The present work programme of CRU is targeted especially to work on genetic resources of cocoa and is best summarised in the 'CRU Mission Statement'. This has just been reviewed and agreed and is as follows:

1. To **conserve** on one site as a field genebank (to be known as ICG,T) all primary germplasm existing in Trinidad.

2. To **enlarge** existing collection of primary germplasm by:

   - The acquisition (through exchange if appropriate) of material previously collected in the Caribbean and in Latin America;

   - The conduct of expeditions to collect new material from the wild;

   - Maintenance of a cocoa quarantine facility in Barbados.

3. To **characterize** fully all the primary germplasm of ICG,T. This will include measurement of:

   - Heritable morphological characters (including leaf, flower, pod and bean characteristics);

   - Reproducible isozyme markers (using an appropriate number of enzyme systems);

   - Relevant economic information (shell percentage, fat content, fat quality and flavour characteristics) of dry beans;

   - Repeatable RAPD/PCR characteristics;

   - Levels of tolerance to **Phytophthora** and **Crinipellis** pathogens.

4. To **catalogue** all the data collected on the primary germplasm in ICG,T and incorporate it into the International Cocoa Germplasm Database (or ICGD).

---

* Copies of these documents are available free of charge from the Head, CRU, University of West Indies, St Augustine, Trinidad, West Indies
Telephone: 1.809.662.4996; Fax: 1.809.663.9686; Telex: 24250 UWIWG.
Details of studentships are available from the same source

5. To **encourage** and **arrange** unrestricted international distribution through quarantine of primary germplasm from ICG,T on request. The material should be dispatched with as much information as possible on the above-mentioned characters. Further to develop and use tissue culture and/or micropropagation techniques for international distribution of germplasm under aseptic conditions.

6. To **produce** populations with enhanced levels of those genes which are of importance to plant breeders.

7. To **develop** and **adapt** appropriate scientific methodology to achieve the above mentioned objectives.

8. To **train** scientists from cocoa producing countries by offering a variety of research projects on cocoa to higher degree standard and to encourage the publication of the results of such work in the refereed scientific literature.

9. To **offer facilities** for visiting scientists to work on cocoa subjects of relevance to the world cocoa economy. Research may be on topics not covered by the 'Mission Statement' but should ideally utilize the wide range of primary germplasm at CRU and thus increase the knowledge of this material.

10. To **support** and **enhance** the cocoa research effort of Government of the Republic of Trinidad and Tobago (GORTT), in particular to identify the form of a 'model * cocoa plant' capable of significantly higher yields in an appropriate 'orchard' system and furthermore to **develop** a strategy for enhancing pollination to ensure the realisation of the full yield potential of the model plant.

11. To **collaborate** with institutions and universities world wide which have an interest in cocoa research.

The Cocoa Research Unit in Trinidad has played a crucial role in cocoa research throughout the world. Located near the centre of origin of cocoa, the Amazon Basin, the Unit has collected a range of genotypes which it has begun to analyse and plans to make available to cocoa producers, new material with greater disease, pest and drought resistance and also earlier bearing. Historically, the genetic base of cocoa grown in Africa and elsewhere has been very narrow, and with various pests and diseases a major problem in maintaining production. National research programmes have depended upon the introduction of new genetic material from Central and Southern America which has very often been screened, tested and developed in Trinidad.

---

* In terms of plant size, shape, habit of branching, flowering and photosynthetic potential in relation to appropriate levels of moisture, temperature and light intensity