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## Collection of *Coffea abeokutae* Cramer and *Coffea liberica* Bull in South Western Nigeria

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**ABSTRACT:** Between April 1997 and February 1998 an expedition was undertaken by staff members of Coffee Programme (CRIN) in eleven selected areas in the South Western part of Nigeria to collect *Coffea abeokutae* Cramer and *C. liberica* Bull endangered by genetic erosion. Three accessions of *C. abeokutae* and six accessions of *C. liberica* were collected in Ikereku-Akinyele, Oyo State and Iyamoye, Kogi State. *C. abeokutae* was distinguished by its conical shape, usually one, erect primary branch, leaves lanceolate, shiny, leathery and green; while *C. liberica* was characterised by its large tree, big leaves and yellowish to reddish fruit colour. *C. liberica* was further classified into three types based on the position of primary branches, size of leaves and colour of ripenned fruit. Plants of the two *Coffea* species were raised by berries and stem cuttings for ex-situ conservation in the institute's germplasm. The efforts to collect and maintain other *Coffea* species threatened with extinction should be continued for an expanded coffee germplasm in CRIN.

**Keywords:** *Coffea abeokutae*; *Coffea liberica*; Collection; Nigeria.

### Introduction

The economically important *Coffea* species planted by farmers in Nigeria are *Coffea arabica* and *C. canephora* (Williams, 1989). However, before these two species were introduced to the Nigerian farmers in the early part of this century, *C. liberica* and *C. abeokutae* were the local cultivars (Sands, 1968). Though majority of the *Coffea* species are native to the tropical and subtropical regions of Africa and Asia (Chevalier, 1947); *C. abeokutae* is native to Nigeria (Wellman, 1961). Cocoa Research Institute of Nigeria (CRIN) which has the mandate for coffee research in this country has in her germplasm *C. arabica*, *C. canephora*, *C. excelsa* and *C. stenophylla*. Both *C. liberica* and *C. abeokutae* are absent.

According to Allard (1960) meaningful crop improvement in short and long term is achieved only with germplasm of broad genetic variability. Thus, collection of local cultivars such as *C. liberica* and *C. abeokutae* become desirable. A collecting mission for these two *Coffea* species was therefore undertaken between April 1997 and February 1998 to identify locations where *C. liberica* and *C. abeokutae* exist in Nigeria and collect both berries and stem cuttings to raise representative plants for the institute's germplasm.

The objective of the mission therefore was to increase the genetic diversity of coffee germplasm in CRIN and to preserve the two *Coffea* species that are already under threat of extinction in Nigeria. Hence, this paper reported on the collecting of *C. abeokutae* and *C. liberica* for the institute's germplasm and the distinguishing characteristics among the accessions collected.

## Materials and Methods

### *Collection Sites*

The exploration and collecting mission dealt essentially with the South Western part of Nigeria. The routes of the collecting mission are indicated in Figure 1. The expedition sites were Ilaro, Imasayi and Ayetoro (Ogun State); Ikereku and Elekuru (Oyo State); Olle, Kabba, Ighun and Iyamoye (Kogi State); Issuada (Ondo State) and Uhonmora (Edo State). The collection sites can be divided into two different groups possessing comparable environmental or socio-economic attributed.

Group A: This is characterised by derived savannah Western relicts forest. The sites contain Savannah soils derived from sedimentary rocks (Sands, 1968). The sites under this group were Ilaro, Imasayi, Ayetoro, Olle, Kabba, Issuada and Uhonmora.

Group B: This is a rain forest ecology. The forest soil is derived from metamorphic and igneous rocks (Sands, 1968). The sites under this group were Ikereku-Akinyele, Elekuru-Akinyele and Iyamoye.

At the farm (collection) site where the coffee plants of interest was found. The plant characters studied were the plant height (m), plant shape, branching habit, number of primary branches, colour of young emerging leaves, leaf length, leaf breadth, leaf number, adult leaf colour, leaf shape, leaf apex, leaf base, leaf texture, berry size, berry shape, berry colour, number of bearing nodes per branch, number of berries per node and size of berry crown. The procedure for the measurement of these characters was based on adapted IPGRI standard coffee descriptors (IPGRI, 1996). The description of Wellman (1961) was used to separate the *C. abeokutae* from *C. liberica*. Information provided by Sands (1968) was used to further classify the *C. liberica* into Type 1, 2 and 3.

Then the mother plant in its original site on the farm and samples of stem cuttings collected were labelled to indicate: (i) alphabet codes for *C. liberica* and *C. abeokutae* which were "H" and "(W: Williams)" respectively; (ii) serial number (iii) year of collection and (iv) state where collected. Coffee berries were also collected from the individual plant.

The stem cuttings collected were about 70cm long, tied and dipped in bucket filled with water. The stem cuttings were kept in this position in transit for about 24 hours until it was set in the polythene pots filled with forest top soil following the method of Omolaja and Obatolu (1998). The berries were sown in seed tray as outlined by Omolaja and Obatolu (1997). After 45 day of sowing the beans and setting of the stem cuttings, the number of germinated seed and the number of successfully set cuttings were counted.

## Results and Discussion

### *Conditions in the collecting area*

In Nigeria, the local cultivars of coffee (*C. liberica* and *C. abeokutae*) which were in large variability in the early 1960s now have almost completely disappeared. Poor market outlet and frequent drop in coffee prices on the world market badly affected the farmers (Anonymous, 1995).

The farmers abandoned their coffee farms and many diverted their effort towards the cultivation of cocoa, palm tree and arable crops etc. for their survival. While the coffee farms were left to be overgrown with bush; termites attacked and killed many coffee trees. The coffee growing area of Ilaro province fall within the grassland ecology (Phillips, 1975). Besides the fact that indiscriminate bush burning is prevalent in this area, the proximity of this place to Lagos where food is in high demand has made land for coffee cultivation to give way to arable crop production. Hence signs of coffee genetic erosions observed in Ilaro was mainly as a consequence of changing socio-economic factors. Pignone *et al.*, (1997) while collecting in Southern Sardinia similarly noticed that genetic erosion of some crops was as a consequence

of changing socio-economic factor. Coffee genetic erosion was also serious in the grassland ecology of Ayetoro and Imasayi where neither coffee farmer nor coffee shrub was noticed during the expedition.

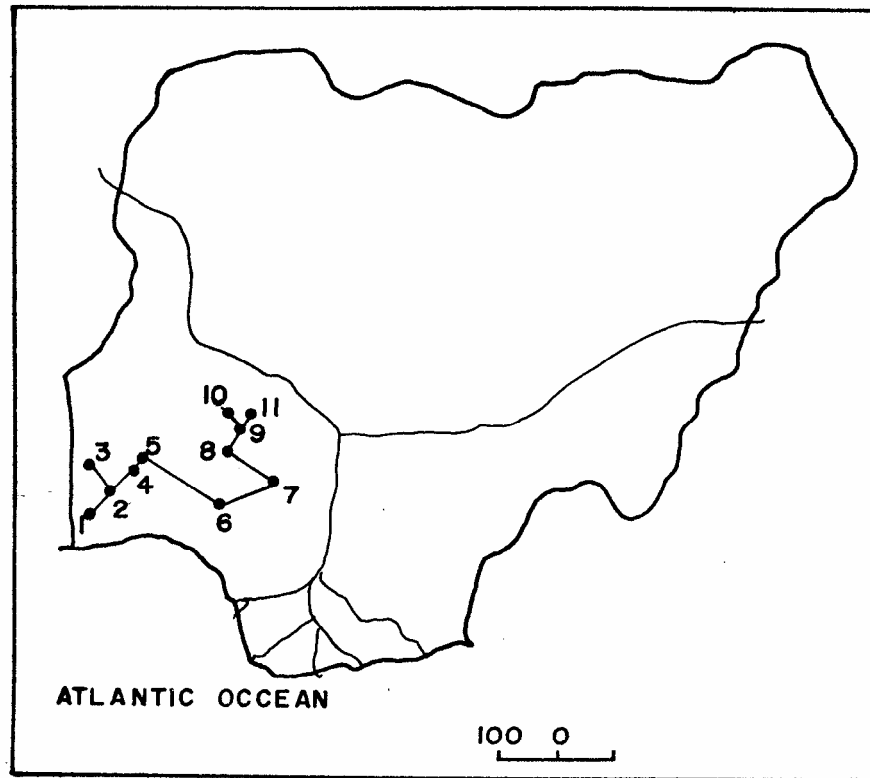


Fig. 1: Map of Nigeria and the itinerary followed during the collection of *Coffea abeokutae* and *C. liberica*.

1. Ilaro; 2. Imasayi; 3. Ayetoro; 4. Elekuru; 5. Ikereku; 6. Issuada-Owo
7. Uhonmora; 8. Iyamoye; 9. Kabba; 10. Oile; 11. Ighun.

Though earlier record by Sands (1968) showed that the local cultivars of coffee were growing in the selected eleven sites, the expedition only found these cultivars in two sites.

This probably revealed that these indigenous coffee cultivar are evidently threatened with extinction. *C. liberica* and *C. abeokutae* were collected on the farm in the forest ecology of Ikereku - Akinyele (Oyo State) and Iyamoye (Kogi State (Table 1). Sands (1968) reported that coffee shrubs does best in the rainforest belt. Soil and rainfall are the major environmental factors limiting coffee development outside the rainforest belt. Most of the farmers encountered at Ikereku attributed the loss of their coffee farms to termites attack.

Table 1: Number of samples and number of *Coffea* species collected during the expedition in different ecological areas.

Collection sites	State	No. of samples	No. of species
Group A (Grassland Ecology)			
Ilaro	Ogun	-	-
Imasayi	Ogun	-	-
Ayetoro	Ogun	-	-
Ighun	Kogi	-	-
Olle	Kogi	-	-
Kabba	Kogi	-	-
Issuada	Ondo	-	-
Uhonmora	Edo	-	-
Group B (Forest Ecology)			
Ikereku-Akinyele	Oyo	20	2
Elekuru-Akinyele	Oyo	-	-
Iyamoye	Kogi	45	2

#### *Description of collected Coffea species*

The status of the plant samples at the time of collection was landrace. The accessions of *Coffea* species collected are shown in Table 2. The "W" accessions had some common plant characters. The height was about 7 - 8m. The plant shape was conical, usually one, erect primary branch. The colour of young emerging leaves was brown.

Adult leaf length ranges between 18 - 23cm while the leaf breadth was about 10cm. The adult leaf colour was deep green. The leaf shape was lanceolate with acute apex. The leaf base was narrow and the leaf texture was shiny and leathery. The bearing nodes were very short and many per branch. The coffee berry shape was oblong. Matured berry (unripened was green, ripened berry was red). Ten berries weighed about 16g. The berries per node were few. The berry crown was very small. The green berries turned black after four days. According to Wellman (1961) coffee types with the above mentioned characteristics could be considered to be *C. abeokutae*.

The general plant characters peculiar to the "H" accessions are thus indicated. The plant height was about 5 - 6m, and the trees were large. The primary branches were non-erect and ranges between two and three. The colour of young emerging leaves was light green. The adult leaf length ranges between 26 - 30cm while the leaf breadth was between 12 - 16cm. The adult leaf was broad and green. The leaf shape

was ovate with acute apex. The leaf base was wide, while the leaf texture was glossy (shiny). The bearing nodes were either close or distant.

Table 2: Number of seed germinated and number of successfully set cutting in nine accessions of *Coffea* species collected.

Accession	No. of seeds collected and sown	No. of seeds germinated	No. of stem cuttings collected and set	No. of stem cuttings that successfully set
<i>C. liberica</i>				
HO198KG	20	12	15	1
HO298KG	20	1	15	1
HO398KG	20	1	15	9
HO798OY	20	1	15	8
HO898OY	20	18	15	5
HO990Y	20	1	15	2
<i>C. abeokutae</i>				
WO498KG	20	3	15	3
WO598KG	20	3	15	7
WO698OY	20	1	15	6

H: *C. liberica*; Williams (W): *C. abeokutae*; KG: Kogi State and OY: Oyo State.

The coffee berry shape was roundish. Matured berry (unripened) was green. Ripened berry was yellowish to reddish colour. Ten berries weighed about 16g. The berries per node was between four and thirteen. The berry crown was prominent. The green berry retained its colour after four days of standing on the table. Some of these description agreed with the distinct characteristic of *C. liberica* as outlined by Wellman (1961). Phenetic differences were observed among the *C. liberica*. The descriptions of Sands (1968) was used to classify the *C. liberica* into Type 1, 2 and 3. Accessions HO298KG, HO798OY and HO898OY were classified under Type 1. All the general descriptions outlined under *C. liberica* were applicable to this Type except that the bearing nodes on the branches were distant and the berry colour was yellow with red patches. Type 2 included accession HO98OY, which was distinguished by its closely arranged bearing nodes on the branches, though berry colour was also yellow with red patches. Type 3 included accessions HO198KG and HO398KG, with distant bearing nodes and yellow berry colour. The observation above agreed with earlier report that *C. liberica* is polymorphic (Carvalho *et al.*, 1969).

### Conclusion

This expedition showed that the local cultivars such as *C. liberica* and *C. abeokutae* are threatened with extinction in Nigeria since out of the eleven selected sites, the cultivars was found in only two sites. Considering the importance of germplasm with broad genetic variability in crop improvement programmes. It is suggested that efforts should continue at the collection of other *Coffea* species of local origin such as *C. oyemensis*; and more locations should be explored for the collection of *Coffea* species threatened with extinction in Nigeria.

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