## GENETIC RESOURCES OF (Elacis oleifera (H.B.K.) Cortés; IN THE BRAZILIAN AMAZON

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### 1. Introduction

Since the late fifties, Brazilian governmental institutions in conjuction with primary sectors, have supported programs for the collection of genetic resources of *Elaeis oleifera* and its use in breeding programs for the production of hybrids from this American species and the African species , *Elaeis guineensis* Jacq. (CONDURU et al. 1983).

Brazil today has the first population of these inter-specific hybrids in the would, stablished in Belém in areas formerly belonging to IAN and IPEAN, presently renamed as CPATU-EMBRAPA (NASCIMENTO *et al.*1981). In view of the increasing interest in enhancing the genetic variability in the National collections of *Elaeis oleifera* germplasm, various expeditions for the collec tion of genetic material of this species were organized in the Brazilian Amazon, mainly after 1980, the year when the Oil Palm National Research Program of EMBRAPA was created (OOI *et al* 1981, ANDRADE 1982, PACHECO 1982 , SANTOS 1983 & BARCELOS *et al.*1984).

The purpose of this paper is to show the distribution and occurrence of *E.oleifera* genetic resources, presenting data indicating the existence in the Brazilian Amazon of excellent material bearing characteristics that furnishes promising results for the breeding program to produce hybrids for commercial usage.

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### 2. Occurrence and Distribution of Elaeis oleifera in Brazil

Native of South and Central America, the species Elaeis oleifera may be found in palm groves of Costa Rica, Panama, Nicaragua, Colombia, Venezuela, Surinam and Brazil (MEUNIER 1975, ESCOBAR 1981, RAJANAIDU 1982).

In Brazil, E. oleifera occurs in various localities of the Amazon, having been found until now in groves located in the State of Amazonas and Territory of Roraima (ANDRADE 1982, PACHECO 1982), as shown in Fig. 1.

In general, the species occurs in populations localized close to the margins of large rivers and their tributaries set in areas of firm land that are not subject to periodical flooding. In this case, the species is mainly associated with a highly fertile soil of antropogenic origin known as "indian black soil" This situation is observed in almost all the surveyed populations in primary and secundary forests or clear cut areas in the mid- Amazonas river, Madeira river and its tributaries as well as in part of the Solimões river. On the other hand, in the area of the BR-174 highway that links Manaus (AM) to Caracarai (RR) and in some localities of the Solimões and Negro rivers, the characteristic populations are found in flooded areas following smallcreeks that penetrate the forest, Known as "igarapes".

Occasionally, E. oleigera is found growing in highly fertile soils situated at the edge of great rivers and subject to periodical flooding as occurs with some of the several populations found in the Solimões river and Manaus areas.

In view of this but mainly due to the strong association between the occurence of E. oleifera and "indian black soil, it has been suggested that the majority of the populations surveyed in the Brazilian Amazon have been formed from seeds introduced through migratory movements of indian populations that employed the E. oleifera seeds for the production of cooking oil and beverages. For these reasons, they cannot be considered of native occurrence. This fact may be further emphasized by the observation that the species distribution is more intense in the State of Amazonas, gradually decreasing as one moves to west in the immediate area of the town of Parintins, on the mid-Amazonas river this species is no longer found. In addition, the uniformity of the material found at

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the majority of the localities visited, suggests that this species is not native of this region. But Its natural occurrence could be a consequence of the dissemination starting from populations localized close to the Brazilian border and characterized by growing in permanently or periodically flooded

areas and following "igarapes" of areas normally situated in the primary forest. The Conter in centers of dispusion could also be in the brazilian territory will the dispersion taking place by The local indian populations. This replains better the hight variability for specific canacteristics found in few populations. 3. Characteristics of Collected Material

### 3.1. Vegetative Development

Some important differences were observed concerning the vegetative development of the surveyed oil palms. The most significant may be the fact that the height of palm trees belonging to populations visited along the BR-174 highway in the north of Amazonas State is consistently inferior to that observed for E. oleifera populations of other regions when subjected to the same environmental conditions. Vigorous palm trees with excellent production of leaves and bunches are found in areas of secondary jungle and mainly in those areas deforested for agricultural purposes. This is in contrast with trees found under forest which then show few elongated fronds and low bunch production, possibly due to the shading they are subjected to. According to data collected during the 1982 survey, conducted conjointly by the Empresa Brasileira de Pesquisa Agropecuaria - EMBRAPA and the Institut de Recherche pour les Huiles et Oléagineux - IRHO, of 299 leaf measurements, the length of the foliar rachis varied from 3.93 to 6.47 meters and the length of the petiole between 0.63 to 2.76 meters, which permit fronds with more than 9 meters of length in the extreme cases observed. Independent of the habitat were they may be growing, it is always possible to find plants with the characteristic prostated trunks of E. oleifera (See Table 1).

bunch and fruit quality 3.2. Characteristics

# Under item we discuss only characteristics with a greater relative weight in breeding programs.

A great variation has been observed in the bunch weight. Among 205 bunches collected in 1982, the weight varied between 0,9 and 18 kg with an average of 6,7 kg. (Table 1). Barcelos *et al* 1984 observed a variation of 0,66 kg to 13,26 kg among 64 samples. Very small bunches can be found along the BR-174 highway and in some localities of the mid-Amazonds' river. Significant differences for this characteristic were not seen for bunches sampled in the other regions surveyed.

Extremely low values have been observed for the percentage of bunch stalk (penduncle)material collected in Brazil. Ooi *et al* (1981) emphasized this characteristic, pointing out that in some bunches this was as low as 6%. This was confirmed later by Andrade (1982) ,Pacheco 1982 and Barcelos & Santos (1984) who found even lower values. The variation observed in the bunches sampled between 1932-84 was in the range of 1,8% and 26,81% (Table 1).

The of the most noteworthy characteristics at the material collected variation observed for the percentage, in weight, of normal fruits, with values that for which varied between 11,2% and 90,5% (Table 2). Similarly, the values measured for the percentage of parthenocarpic fruit fluctuated between 0,0% and 45,7% (Table 2). Bunches collected at many localities did not present parthe nocarpic fruit. This fact together with the pattern of formation of fruits in the bunches which showed their bases and those of the spikelets with a majority ( of normal fruit, led to the observation that there was a rich insect fauna that visits female flowers, being responsible, in part, for the good conformation of the bunches of some of the populations visited (LUCCHINI *et al* 1984).

Ooi et al 1981 pointed out some advantageous generalities in 19 bunches collected in 3 different regions of the Brazilian Amazon, important for plant preeding. The results of subsequent surveys confirmed that some samples collected in Brazil has characteristics never before seen in other regions of America.

The values observed for the average weight (g) of normal fruit varied between 3,4 and 14,7 with an average of 8,3, considering 253 bunches collected between 1982 and 1984 in different parts of the State of Amazonas.

Another notable fact was that of the 245 bunches analysed during the 1982 survey, 45 presented values for the percentage of mesocarp in the fruit superior to 50% while the average was 46% (Table 2). The values found for these characteristics were in some cases superior to 60%, according to Ooi *et al* 1981, who found values equal to 60,1% and 62% among 19 samples analysed. In 1984 Barcelos *et al* observed that among 64 samples, the average for this characteristic was 45,54%.

Concerning the percentage of shell on the fruit, in some samples the values were very low. The variation was between 10,8% and 56,9% for 175 samples (Table 2).

Another characteristic of obvious importance for breeding in this species is the percentage of oil in the dry pulp. The samples collected in 1982 in diff<u>e</u> rent regions of the State of Amazonas revealed promising values although they were extremely variable. The range of variation for this characteristic was 16,1 to 57,2% among 171 analyses performed (Table 2).

The percentage of insaturation verified in 167 samples of oil analysed varied between 60,0% and 77,7%, with an average of 70,1% which is in agreement with results obtained by other authors studying materials collected in other countries (MAC FARLANE et al 1975).

#### 4. Conclusions

### PROSPECTIONS

The surveys for the collection of E. oleifera germplasm organized regularly by EMBRAPA have contributed significantly to a better definition of the areas of occurrence of this species, permitting a greater elucidation of the distribution of these natural populations in the Brazilian territory.

Results of the analysis performed with genetic material of Elaeis oleifera, collected in palm groves from the Brazilian Amazon, put in evidence the excellent qualities of this germoplasm in the majority of characteristics important for breeding purposes. Results of breeding programs for the production of "Inybrid commercial material between this species and dende (Elaeis guineensis) are highly promising. At present 17 lines of E.oleifera are planted at the CNPSD's Urubu River experimental Field Station, 140 Km from Manaus. There are more than 192 lines (about 7000 individuals) in nursery that will be taken out for planting in the field in 1985 where they will be conserved. and evaluated, and

### 5. References

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TABLE 01 - Plant size and bunch quality characteristics of Elaeis oleifera collected in palm groves of Brazilian Amazon.

	frond		bunch				
	rachis length (m)	petiolo length (m)	weight (Kg)	stalk (%)	normal fruits %	Parth. fruits %	
Mean	3.9	1.5	6.7	10.6	57.9	9.5	
Range	1.9 - 6.5	0.6 - 2.8	0.9 - 18.0	1.8 - 26.8	11.2 - 90.5	0.0 - 45.7	
Number of observations	299	299	205	252	235	157	

	weigth (g)	mesocarp %	shell %	oil/mesocarp %	unsaturarion °e
Mean	8.3	46.0	41.1	42.8	70.1
Range	3.4 - 14.7	14.6 - 62.3	10.8 - 56.9	16.1 - 57.2	60.0 - 77.7
Number of observations	253	245	175	171	167

TABLE 02 - Fruit quality characteristics of Elaeis oleifera collected in the Brazilian Amazon.



AREA OF OCCURENCE

FIG. 1 - CONFIRMED OCCURENCE OF Elaeis oleifera IN BRAZIL