

## SHORT COMMUNICATIONS

## Oil Palm Genetic Resources—Introduction, Utilization and Future Needs

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Oil palm is native of West Africa and exists in wild, semi-wild and cultivated forms mainly in equatorial tropics like Africa, South East Asia and South and Central America. The cultivated species of oil palm is *Elaeis guineensis* Jacq. which is also found in wild palm groves in West African (Ghana, Nigeria, Ivory Coast, Benin, Togo, Sierra Leone) and Central African (Congo region, Gabon, Zaire, Uganda) countries where its wild relatives are found. *Elaeis oleifera*, native of South and Central America, is another species found scattered in wild palm groves in South and Central American countries like Brazil, Ecuador, El-Salvador, Amazonian belt etc. This species is under-utilized and considered to have tolerance to biotic and abiotic stresses, high oil quality, compact canopy and dwarfness.

## Present Status of Oil Palm Genetic Resources in India

The success of any crop improvement programme necessitates the sound footing (assemblage)/presence of wider spectrum of genetic variability (germplasm) in the species. This is all more important especially

Table 1. Oil palm germplasm collection at Palode and Pedavegi

S. No.	Source	Number of accessions
1	NIFOR Nigeria	1
2	Ivory Coast	1
3	Republic of Zaire	1
4	Indonesia	2
5	Cameroon	18
6	Malaysia	3
7	Costa Rica	9
8	Surinam	1
9	Tanzania	11
10	Zambia	9
11	Guinea Bissau	24
12	Palode	5
13	Sampaje	1
14	Tadepalligudem	1
15	Andaman	4
16	Pune	2
17	Kodungallore	1
18	<i>Elaeis oleifera</i>	
	a) Malaysia	1
	b) Costa Rica	1
	Total	96

in respect to crops like oil palm, where narrow genetic base has been felt as major constraint in research and development of oil palm (Anonymous, 1997). In India, oil palm was first introduced as an ornamental palm at the National Botanical Garden, Howrah in the later part of 19<sup>th</sup> century (Rethinam, 1998). With a view to ameliorating this situation, efforts were made in India right from 1981 to amass the genetic variability available in the genus for their exploitation. Accordingly, materials from different sources were collected. Most of the collections made were secondary in nature and were not from the natural habitat. They were tenera having limited potential use in oil palm improvement programmes.

Systematic research work on oil palm started in 1960 when the Kerala State Department of Agriculture had undertaken a 40 ha plantation at Thodupuzha (Nampoothiri and Pillai, 1998) using Deli dura materials introduced from Malaysia and Tenera x Tenera population from Nigeria. Later, some more introductions of dura genotypes received from Nigeria, Malaysia, Cote de Ivoire, Papua New Guinea and Zaire were planted at Little Andaman in 1976 and 1983. The germplasm collection available in India has been tabulated and presented in Table 1 and 2.

Since oil palm is being grown on a wide variety of soil and climatic conditions. In India the crop is being grown under non-traditional climatic conditions like high temperature and low humidity, which necessitates need for introducing some stress tolerant materials

Table 2. Distribution of cold and drought tolerant oil palm germplasm

S.No.	Place	Cameroon	Tanzania	Zambia	Guinea Bissau
1	Palode (Kerala)	1	4	3	6
2	PCKL (Kerala)	8	9	5	23
3	Pedavegi (A.P.)	15	7	7	13
4	Adilabad (A.P.)	13	2	3	4
5	Nellore (A.P.)	0	4	4	6
6	Mulde (Maharashtra)	0	8	7	3
7	Mohitnagar (W.B.)	10	0	0	0
		47	34	29	55

having high water use efficiency/ tolerant to drought and cold. Accordingly during 1994-95 a large number of such accessions were collected from Cameroon, Tanzania, Zambia and Guinea Bissau. These materials are presently being evaluated under different agro-climatic locations of Andhra Pradesh, Maharashtra, Kerala and West Bengal.

Two accessions of *Elaeis oleifera* were also introduced from Malaysia and Costa Rica. The performance of all these accessions are being evaluated, to suitably introgress desired breeding traits on yield, dwarfness and better oil quality. Further, in evaluation of collections made in 1981 from NIFOR, Nigeria, Ivory Coast, Palode and Zaire, 20 best performing tenera hybrids have so far been identified and have been planned to be selfed for future use in crop improvement programmes.

Apart from this, three oil palm seed gardens have been developed in India at Taraka (Karnataka), Rajahmundry and Lakshmipuram (both in Andhra Pradesh) where the material pertaining to second selection cycle of selected dura genotypes (*inter se* crossed/ selfed) and tenera x tenera progenies have been planted.

#### Limitations of Indian Oil Palm Breeding Programme

The major bottleneck oil palm breeders are facing in genetic improvement is its very narrow genetic base as a whole on one hand and availability of a few oil

palm germplasm in India on the other. Looking at the importance of oil palm in terms of nutritional food security (as palm oil is rich in vitamin A and E), the main concern of the hour is production of high yielding varieties with better oil quality, tolerance to stresses and dwarfness.

Though efforts had been made in recent past for collecting germplasm from different sources, most of the collections made were not from the natural habitat and were teneras having limited potential direct use in breeding programmes. The existing collections in India are very narrow and require substantial enrichment. It is therefore necessary to continue collection from primary collections of *Elaeis guineensis* from Africa and *Elaeis oleifera* from Central and South America to utilize them for introgression and inter-specific hybridization and subsequent improvement of oil palm.

#### Requirement of Oil Palm Genetic Resources

The present day oil palm breeding programmes are mainly aimed at identification of high yielding Dura palms (thick shelled type) and suitable pisifera (shell-less type) so that high yielding tenera hybrids (thin shelled type) could be produced. The specific requirement of oil palm germplasm for Indian breeding programmes along with donor country is listed in Table 3.

**Table 3. Requirements for oil palm germplasm and their donor countries**

Desired traits	Name of species	Name of country
Drought tolerance, Dwarf with compact canopy, High oil extraction ratio, superior oil quality, Big kernel, long bunch stalk	<i>Elaeis guineensis</i> , <i>Elaeis oleifera</i>	SEAsia—Malaysia, Indonesia, Papua New Guinea, Thailand
High yield, drought tolerance, short stature, High oil extraction ratio	<i>Elaeis guineensis</i>	West Africa—Ghana, Nigeria, Ivory Coast, Benin, Togo, Sierra Leone Central Africa—Congo region, Gabon, Zaire, Uganda; South Africa—Angola, Mozambique
Dwarfness, compact canopy, superior oil quality, long bunch stalk	<i>Elaeis oleifera</i>	South America—Brazil, Ecuador, Peru, Colombia, Surinam, Panama, Amazonian belt Central America—Costa Rica, Nicaragua and Honduras

#### References

- Anonymous (1997) Report of the meeting on R&D priorities for oil palm in Asia organized from 5-8 August, 1997 by Food and Agriculture Organization of the United Nations at Regional Office for Asia and the Pacific, Bangkok (Thailand). RAP. Publication: 1997/18.
- Balick MJ (1979) Amazonian oil palms of promise: a survey. *Economic Botany*. **33**(1): 11-28.
- Nampoothiri KUK and RSN Pillai (1998). Crop improvement in oil palm—present status and future strategies. In: P Rethinam and K Suresh (Ed.) *Oil Palm Research and Development*. Proceedings of the National Seminar on “Opportunities and challenges for the oil palm development in the twenty first century” from 19-21 January, 1998 at Vijaywada (Andhra Pradesh).
- Rethinam P (1998) Oil palm research and development in India. In *Oil Palm Research and Development* (Edited by P Rethinam and K Suresh). Proceedings of the National Seminar on “Opportunities and challenges for the oil palm development in the twenty first century” from 19-21 January 1998 at Vijaywada (Andhra Pradesh).