International Journal of Oil Palm, **2** (1): 41 - 43, June 2001

RESEARCH NOTE

Rescue of *inter se* Embryos in *Elaeis guineensis* Jacq. var. *Pisifera*

The demand for vegetable oil grows rapidly all over the world. Oil Palm, the highest oil-yielding crop, contributes 33 per cent of world's oil and fat export trade. It is recommended that oil palm be cultivated as an irrigated crop in India in an area of about 0.796 million hectares. Large quantities of seeds are to be produced to meet this requirement. Of the three oil palm "varieties" viz., *dura, tenera and pisifera,* the *tenera,* the hybrid between the other two varieties, is used for commercial plantation. The oil palm varieties are differentiated based on shell thickness. The *dura* is thick shelled; *pisifera* is shell less and *tenera* is thin shelled. The commercial production of *tenera* seeds involves establishment of plantations with selected *dura* and *pisifera* parents which, on crossing produce high yielding hybrids. The male parent *pisifera* is characterized by its varying degrees of female sterility ranging from fertile to sterile and super sterile (Obasola, 1973; Obasola *et al.,* 1976) *Pisifera* seed is very much prone to desiccation and microbial infection. Female sterile *pisifera* is a more desirable pollen source for the production of high quality *teneras* (Sparnaaji, 1963,1969; Hartley, 1967). Obviously, the reproduction of such *pisifera* palms in nature is very difficult.

In the conventional oil palm breeding programmes, the *pisifera* palms are produced by selfing the *teneras*: Progenies will have all the three fruit types in the ratio of 1 (*dura*) : 2 (*tenera*) : 1 (*pisifera*). Indeed it is a time consuming process and in order to select the *pisifera*, all the progenies are to be planted and observed till they produce fruits. Besides long duration, a large area of the farm and resources are also necessary to complete the process. An alternative is to rescue the self-fertilized embryos of *pisifera* before losing the viability. *Inter se* mating is necessary as oil palm is highly cross-pollinated and *pisifera* embryos fertilized in nature may not be true to type. This is the first report on rescue of inter se embryos of *pisifera*.

The *Pisifera* palm (No. 18 P x 214 P) at Central Plantation Crops Research Institute, Research Centre, Palode (now National Research Centre for Oil Palm, Regional Station) was *inter se* pollinated during December 1997. The fruits after 12 weeks were harvested and brought to CPCRI, Kasaragod in an icebox. The ovules from each fruit were excised with the help of a small knife and collected in a beaker containing distilled water. They were then surface sterilized with 0.1% mercuric chloride containing two drops of Tween-20 for 10 minutes. This was followed by several washes with sterile distilled water in a laminar flow hood. Surface sterilized ovules were inoculated into solid Eeuwens Y3 medium (Eeuwens, 1976) with sucrose 30 g/l, charcoal 1g/l with growth hormones like NAA and BAP 0.05 mg/l each. The cultures were incubated in dark at 27.2°C with 80-85% RH. Germinated embryos were transferred to an illuminated room with a photoperiod of 16 hrs. Rooting hormone IBA 10 ppm was used for proper development of roots.

From a total of 1200 fruits, only 427 contained ovules and the rest were with aborted embryos. After 15 days of inoculation of the ovules in retrieval medium, 191 embryos germinated (45%) (Fig.1). Out of 191 germinated embryos, 23 embryos grew fast (Fig. 2) and developed into complete plantlets with well developed shoot and root system (Fig.3). The growth of remaining 168 embryos was very poor and produced one to two leaves only. They were subsequently discarded because of poor growth.

The 23 plantlets in the tubes were gradually transferred to pots containing sterile sand and soil in equal proportions. The individual plantlets were covered with a polythene bag to provide humidity for *ex vitro* establishment. Subsequently the humidity was reduced by providing holes to the polybags and later the polythene bag was removed (Fig.4). The hardened plantlets were transferred to net house for further hardening. Embryo culture of fertile *pisifera* has been reported by Latif *et al.* (1993). They reported that MS medium when supplemented with NAA alone or in combination with Kinetin promoted shoot and root development. The low per cent recovery of plants in the present study is mainly due to the use of *inter se* embryos. In an earlier experiment, when embryos from open-pollinated fruits from the same *pisifera* palm were rescued, 28% plants were obtained (Anonymous, 1996,1997.) Investigations

Fig. 1&2: Germination of embryos after 15 days and 45 days of inoculation respectively.
Fig. 3: Plantlets with shoot and root system
Fig. 4: Established plantlets in polybags.

to rescue a high per cent of self-fertilized *pisifera* embryos need to be undertaken.

REFERENCES

Anonymous. 1996. *Annual Report 1995-96.* Central Plantation Crops Research Institute, Kasaragod, India, p.37.

Anonymous. 1997. *Annual Report 1996-97.* Central Plantation Crops Research Institute, Kasaragod, India, p.43.

Eeuwens, C.J. 1976. Mineral requirements for growth and callus initiation of tissue explant excised from mature tissues. *in vitro*, **24:** 173-178.

Hartley, C.W.S. 1967. *The oil palm*, Longmans, London.

Latif, S., Ginting, G. and Hutomo, T. 1993. Increasing plantlet production of fertile *pisifera* through embryo culture . *Bulletin - Pusat - Penelitian - Kelapa - Sawit* **1**(2) : 151-161.

Obasola, C.O. 1973.. Breeding for short stemmed palms in Nigeria *J. W. Afr. Inst. Oil Palm. Res.* **5** (18) : 43-60.

Obasola, C.O., Obesesan, I.O. and Opute, F.I. 1976. Breeding of short stemmed oil palm in Nigeria. *Int. Agric. Oil palm conference*, Kuala Lumpur,. 1976.

Sparnaaji, L.D. 1963. Breeding and inheritance in the oil palm Part. 1 .The design of breeding programme . *J.W. Afr.Inst. Oil Palm Res.*, **4**:126.

Sparnaaiji, L.D. 1969. Oil palm. In: *Outlines of perennial crop breeding in the tropics*, Landbouwhogeschool, Wageningen, Misc. paper 4.

Anitha Karun, R.S.N. Pillai*,
E.Radha and Anuradha Upadhyay

Central Plantation Crops Research Institute,
Kasaragod 671 124, India
* National Research Centre for Oil Palm,
Regional Station, Palode, Pacha 695 562,
Thiruvananthapuram, Kerala, India.