Research Findings

Seasonal changes in oil formation and fatty acid composition

Oil content and fatty acid composition in three oil palm hybrids viz., Malaysia, Deli x Ghana and Deli x Nigeria were analyzed in two seasons, rainy and summer. Seasonal variation in fruit weights (4.9 – 13.6 g), oil content (69.3 – 81 %) and moisture (30.2 – 43.9 %) were observed. Saturated fatty acids like myristic (0.67 – 1.32 %) and palmitic (41.9 – 49.6 %) showed high levels during summer season, while stearic (3.67 – 4.86 %) increased during rainy season. Unsaturated fatty acids like oleic (36.5 – 44.1 %), linoleic (5.58 – 8.57 %) and linelonic (0.22 – 0.56 %) were also increased during summer season and decreased during rainy season. The study confirms that oil content and fatty acid composition is strongly influenced by temperature and rainfall during rainy and summer seasons.

Effect of fruit ripening on fatty acid composition

Changes in fatty acid composition, oil content and moisture content were analyzed in four adult oil palm tenera hybrids viz., Malaysia, Palode, Deli x Ghana and Deli x Nigeria grown under irrigated conditions. During different developmental stages from anthesis to maturity during the 12, 14, 16, 18, 20 weeks after anthesis (WAA) analysis was carried out. Fruit weight increased from 12th to 20th week (5.1-10.6 g) in all the hybrids. Oil content increased from 22 to 79 oil/dry mesocarp % while moisture content decreased (34.3%) from 12th to 20th week. Six fatty acid profiles viz., myristic (0.5-4.3 %), palmitic (34.1-50.9 %), stearic (2.8-6.4 %), oleic (3.0-6.4 %), linoleic (7.8-11.5 %) and linenolic (0.3-3.3 %) identified by standardizing the GC parameters. The method standardized was rapid with a total analysis time of 7 minutes and environmentally friendly, and accuracy was good for raw-material quality control.

Phenological growth stages

The different phenological stages of Oil Palm hybrids were coded using the Biologische Bundesantalt, Bundessortenamt and Chemische Industrie General Scale. The duration between unfolding of 70 per cent spear leaf to bunch maturity in the hybrids ranged from 447.9 to 485.2 days.
and the duration from anthesis to maturity ranged from 145.8 to 153.7 days. Wide variation in the degree days from spear leaf development to bunch maturity were also observed among the hybrids ranging from 6320.2 to 6937.3. Among the hybrids, United plantations hybrid possessed the shortest duration and lowest degree days from spear development to bunch maturity. The study would help in estimating thermal time required for the completion of different phenological stages, which could be used for yield forecasting models and studying climatic analogues in oil palm.

Water imbibition behavior in oil palm hybrid seed

The water imbibition behaviour was investigated in dormant and heat treated hybrid seeds of Oil palm (DxP). Results indicated that a duration of 40 days for the heating treatment intended breaking oil palm seed dormancy is as good as 50 or 60 days duration in softening of dormancy barrier (which is responsible for water entry into embryo) as per seed weight gains of treated seeds (Fig – 1).

Effect of chipping and de-operculum dormancy breaking technique

Seeds of *E. oleifera* were subjected to various treatments to find a substitute for heating treatment which is routinely employed for dormancy breaking. The results revealed that mechanical chipping and de-operculum registered high germination and showed early and uniform germination.

**Nut chipping machine**

Designed and fabricated nut chipping machine (lab scale) to facilitate the chipping of physical barriers/structures responsible for dormancy in oil palm. Chipping (opening) the seed without damaging the embryo was successfully demonstrated in D×P hybrid seeds and obtained maximum germination while adopting ‘chipping and de-operculum dormancy breaking’ protocol developed recently.

**Differential response of Dura and pisifera pollen to storage**

Pollen from Dura palms was found to be viable at room temperature (RT) for one month and in second month the viability percent dropped drastically reaching zero by fifth month. Pisifera, on the other hand, could retain good viability for two months at RT and then declined to lose viability completely after 9 months of storage (Fig. 2).

**Fig. 1.** Rate of water imbibition (%) in oil palm hybrid (D X P) seed as influenced by the duration (days) of heating treatment.

**Fig. 2.** Viability of Dura and Pisifera pollen to storage

**Fig. 3.** Effect of chipping and de-operculum dormancy breaking technique in *Elaeis oleifera* seeds
Three training programmes were organised on different aspects of oil palm production to 21 officers. Five training programmes were offered on Oil Palm cultivation to 235 farmers.

<table>
<thead>
<tr>
<th>Title of the programme</th>
<th>Date</th>
<th>Number of participants</th>
<th>Officers / Farmers represented from</th>
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<tbody>
<tr>
<td>Soil and Leaf Nutrient Analysis in Oil Palm</td>
<td>January 22-24, 2014</td>
<td>4</td>
<td>Chhattisgarh, Kerala and Odisha</td>
</tr>
<tr>
<td>Oil Palm cultivation and the prospects of Oil Palm Industry</td>
<td>February 18-20, 2014</td>
<td>13</td>
<td>Nagaland</td>
</tr>
<tr>
<td>Orientation on Oil Palm cultivation</td>
<td>February 21, 2014</td>
<td>4</td>
<td>Chatsisgarh, Karnataka &amp; Andhra Pradesh</td>
</tr>
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</table>

**Oil Palm Innovators Meet**

Oil Palm Farm Innovators meet was organised at Lachapuram, Khammam District, Andhra Pradesh on 11.03.2014, where in 160 participants consisting of oil palm growers, staff of Department of Horticulture, Oil Palm processors and scientists participated. Deliberations were held for sustainable oil palm production. On this occasion tools developed by DOPR were demonstrated i.e. Ablation tool for ablation of inflorescences production. On this occasion tools developed by DOPR were participated. Deliberations were held for sustainable oil palm Department of Horticulture, Oil Palm processors and scientists.

160 participants consisting of oil palm growers, staff of Dept of Hort, Govt. of A. P., Oil Palm Processors and scientists from DOPR participated in this event. Dr. Anupam Barik, Addl. Commissioner (TMOP) presided over the function and in his presidential address emphasized the importance of oil palm in fulfilling the consumption needs of the population for edible oils in coming years. Dr. S. Arulraj, Director, DOPR welcomed the guests and made a presentation about the Oil Palm Planting material in the technical session. Dr. R. K. Mathur, Principal Scientist & Nodal Officer (Seeds) gave an overview of the demand and supply of oil palm germinated seeds in the last five years from all the oil palm seed gardens.

**RESEARCH PUBLICATIONS**


**Technical publications**


Murugesan, P., Sunil Kumar, K., Sujathakumari, N., Naveen Kumar, P., Ravichandran, G. and Mathur, R.K. (2014). DOPR Research Centre in a nut shell. Published by Director, DOPR, Pedavegi, Andhra Pradesh, p8


**Training courses attended:**

Mr. Nasir Hussain and Ms. Ramya Menon, Assistants, attended Special Training Programme for newly recruited Assistants (DR) of ICAR conducted by ISTM, New Delhi during 30.12.2013 to 10.1.2014

**Foreign Deputation**

Dr. D. Ramajayam, Senior Scientist, attended NAIP sponsored training in the area of Marker Assisted Selection (NRM) at West Virginia State University, USA during 03.01.2014 to 15.03.2014

Dr. R. K. Mathur, Principal Scientist, attended a Study Visit to Palm Elit Seed Garden in Krabi, Thailand on 25-27 February 2014

**Extension activities**

Dr. B. Narasimha Rao delivered a Radio talk on “Vesavilo Oil Palm thotalalo neeti yajamanyam” AIR, Vijayawada on 25th March, 2014.

Dr. K. L. Mary Rani delivered a Radio talk on “Mobile Message Services on Oil Palm Cultivation”, AIR, Vijayawada on 26th March, 2014

Dr. P. Kalidas delivered a Radio talk on ‘Recent out breaks of Pest problems in oil palm and their management’ All India Radio (AIR), Vijayawada on 18th March, 2014.

Dr. P. Murugesan organised and participated in video documentary of oil palm cultivation programme – Njattuvela and covered R & D activities of DOPR RC Palode on 7th March 2014 and programme telecasted on 22nd and 23rd March 2014 in Media One Channel for the benefit of farmers.

Dr. P. Murugesan participated in an exhibition in connection with the Agricultural Mela held at TRRI, Aduthurai, Trichi on 10th January, 2014.

**Participation in Exhibitions**

DOPR has put up a stall in the agricultural exhibition “Krishi Vasant” organized at CICR, Nagpur on February 9-13, 2014. Live exhibits, posters on oil palm production technologies were arranged in the stall. On 9.2.2014, Dr. S. Ayyappan, Secretary DARE and DG, ICAR visited the stall. Farmers’/visitors’ belong to Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Jammu & Kashmir, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand and Punjab visited the stall. Queries raised by the visitors were clarified regarding palm oil and oil palm cultivation practices. Nearly 2.0 lakh people visited the stall during the five days of exhibition.