Indian Soc. Coastal Agric. Res. 41(1): 88-91 (2023) https://doi.org/10.54894/JISCAR.41.1.2023.120701

Short Communication

Evaluation of Hybrid Oil Palm Genotypes for Their Performance in Konkan Coastal Region of Maharashtra

Received: 28.01.2022 Accepted: 06.07.2023

Oil palm (*Elaeis guineensis*) which is native to West Africa is one of the most important oil crops in the tropics besides also being a source of various non-food products including animal feed (Murphy *et al.*, 2021). Globally, Indonesia followed by Malaysia are the leading producers together constituting 84.4% of the total global oil palm production (Sumathi *et al.*, 2016; Murphy *et al.*, 2021; Gawankar *et al.*, 2022). Oil palm is one of the most valuable cash crops and is cultivated across the tropical regions of Asia, Africa and America (Rakesh *et al.*, 2020: Murphy *et al.*, 2021). It has been estimated that the palm industry at the global level is valued at approximately 60 billion US$ and provides direct employment to 6 million people (Kadandale *et al.*, 2019). India is the largest exporter of palm oil in the world and during 2021, the total value of exports of palm oil stood at 9.6 billion US$ (Statista, 2022) and its consumption reached over eight million metric tons in the fiscal year 2022 (Statista, 2023). Oil palm plays a significant role in bridging the gap between the supply and demand of edible oil in the Indian market. This has led to significant attention from policymakers, researchers, and farmers to recognize the potential of cultivating oil palm to meet the country's edible oil needs (Gawankar *et al.*, 2022).

In India, approximately one million hectares of land have been recognized as potentially suitable areas for its cultivation and specifically, within Maharashtra, an area of around 10,000 hectares has been identified as having the potential for oil palm cultivation (Chadha, 2006). With the continuing increase in global demand for palm oil, it is important to explore the potential of this region to contribute to domestic production. The selection of palm oil hybrids plays a pivotal role in determining the success and economic viability of oil palm cultivation (Mastana Reddy *et. al.*, 2009; Sanjeevraddi *et al.*, 2016). Therefore, a study was taken up to evaluate the performance of different palm oil hybrids in the Konkan coastal region of Maharashtra.

The experiment was conducted under the AICRP on Palms (Oil Palm), College of Horticulture, Dr. B.S. Konkan Krishi Krishi Vidyapeeth, Mulde, Dist. Sindhudurg, Maharashtra, India. The site falls under the agro-climatic zone - 12 *i.e.*, Western Coastal Plains and Ghat region and represents the Konkan region of Maharashtra. The climate is hot and humid during the summers with a very wet monsoon season while the winters are cool and drier. The mean annual rainfall in Mulde is 3314 mm with maximum rainfall occurring in the monsoon months from June to September. The annual mean maximum temperature is 33.1°C while the minimum temperature is 21.8°C (Jedhe *et al.*, 2018). The experiment was laid in a randomized block design with ten different tenera hybrid cross combinations obtained from ICAR-Indian Institute of Oil Palm Research (IIOPR), Regional Station, Palod, Kerala, India. The treatments were replicated three times and nine palms per replication was considered an experimental unit. The palms were planted at a spacing of 9 m × 9 m in October 2011. All experimental palms were managed as per the recommended package of practices. After the monsoon season (October onwards), the palms were irrigated daily with two micro sprinklers in the basin, each having a discharge of 19 L hr^{-1}. Daily irrigation was provided at 80% of the crop ET.

The data on plant height, girth, number of leaves, number of male and female inflorescence, total number of inflorescence and sex ratio recorded during the year 2019 was considered for interpretation of the results.

The sex ratio was calculated by using the following formula given below,

$$Sex\ ratio = \frac{Number\ of\ female\ inflorescences}{Total\ number\ of\ inflorescences}$$

The fresh fruit bunch (FFB) yield, number of bunches palm^{-1} yr^{-1} and average bunch weight were recorded from the year 2018 to 2020 and their pooled mean of the three years was calculated. The data on the growth and yield parameters were subjected to analysis of variance (ANOVA) as per the method given by Panse and Sukhatme (1985).

The data on growth and sex ratio are presented in Table 1. The data revealed that at the age of nine years, significant differences were observed among the different genotypes concerning plant height, number of male and female inflorescence, total number of inflorescence and sex ratio. However, the plant girth and number of leaves were not significantly different among the palm hybrids. The genotype NRCOP-38 exhibited the lowest plant height (2.95 m) while the genotype NRCOP-33 recorded a maximum plant height (3.87 m) which was at par with NRCOP-40. Among the genotypes, the maximum palm girth (2.80 m) was observed in the genotype NRCOP-36 but it was at par with other genotypes.

The average number of leaves produced in a year was highest in genotype NRCOP-39 (29.76) followed by 29.66 in genotype NRCOP-31. The lowest number of leaves (26.91) was recorded in genotype NRCOP-38. However, the variations in the number of leaves among the different genotypes were statistically non-significant (Table 1).

In the present study, it was observed that among the genotypes evaluated, genotype NRCOP-31 had a higher number of female inflorescences compared to the male resulting in a significantly highest sex ratio (0.70). This was followed by NRCOP-38 with a sex ratio of 0.61. Conversely, the sex ratios in the genotypes NRCOP-33, NRCOP-35, NRCOP-36 and NRCOP-39 were the lowest (0.55). The variations in the sex ratios of the oil palm genotypes might have arisen due to the variations in their hormonal composition linked to sex expression (Gawankar *et al.*, 2002; Gawankar *et al.*, 2022).

The pooled data presented in Table 2 revealed that the average number of bunches palm^{-1} year^{-1} (9.07) was significantly the highest in NRCOP-31 among the genotypes, except for NRCOP-38 (7.81), NRCOP-32 (7.72) and NRCOP-40 (7.37) which produced an equivalent number of bunches annually.

The data on average bunch weight pooled over the years is presented in Table 2. A critical analysis of the data highlighted that it varied significantly among the different genotypes. Genotype NRCOP-35 recorded the highest bunch weight (14.59 kg) whereas, the genotypes NRCOP-34 and NRCOP-31 recorded 14.13 and 14.02 kg bunch weight, respectively. The genotypes NRCOP-33 (13.93 kg), NRCOP-39 (13.82 kg), NRCOP-36 (13.66 kg), NRCOP-32 (13.59 kg) and NRCOP-37 (13.49 kg) also registered at par average bunch weight. In contrast, the lowest bunch weight of 12.53 kg was recorded in the

Table 1. *Growth performances of different oil plam hybrids (2019)*

SL. No.	Genotypes	Height (m)	Girth (m)	No. of leaves	No. of inflorescence			Sex ratio
					Male	Female	Total	
1.	NRCOP-31	3.15	2.48	29.66	4.34	10.28	14.63	0.70
2.	NRCOP-32	3.43	2.44	28.96	4.84	7.29	12.13	0.60
3.	NRCOP-33	3.87	2.67	27.96	5.44	6.64	12.08	0.55
4.	NRCOP-34	2.97	2.52	27.13	5.07	6.50	11.57	0.56
5.	NRCOP-35	3.31	2.57	27.29	5.33	6.41	11.74	0.55
6.	NRCOP-36	3.06	2.80	28.68	6.04	7.51	13.56	0.55
7.	NRCOP-37	3.39	2.57	27.51	5.66	8.64	14.30	0.60
8.	NRCOP-38	2.95	2.66	26.91	5.11	8.13	13.24	0.61
9.	NRCOP-39	3.13	2.71	29.76	5.72	7.11	12.83	0.55
10.	NRCOP-40	3.58	2.55	28.14	5.19	6.83	12.02	0.57
	SE ±	0.12	0.07	1.44	0.27	0.61	0.66	0.02
	CD at 5%	0.36	NS	NS	0.77	1.77	1.92	0.06

Table 2: *Yield performance of different oil palm hybrids during 2018-2020 (Pooled data)*

SL. No.	Genotypes	Average no. of bunches palm^{-1} yr^{-1}	Average bunch weight (kg)	Average FFB yield (t ha^{-1})
1.	NRCOP-31	9.07	14.02	16.96
2.	NRCOP-32	7.72	13.59	14.10
3.	NRCOP-33	6.81	13.93	10.72
4.	NRCOP-34	5.95	14.13	11.37
5.	NRCOP-35	6.32	14.59	11.36
6.	NRCOP-36	6.45	13.66	12.79
7.	NRCOP-37	8.49	13.49	15.16
8.	NRCOP-38	7.81	13.15	14.40
9.	NRCOP-39	6.80	13.82	12.52
10.	NRCOP-40	7.37	12.53	10.86
	SEm+	0.61	0.47	1.35
	CD at 5%	1.76	1.36	3.90

genotype NRCOP-40.

A perusal of the data on average fresh fruit bunch (FBB) yield of the ten hybrid oil palm genotypes pooled over the years 2018-2020 (Table 2) revealed that the genotype NRCOP-31 recorded significantly highest yield of 16.96 t ha^{-1}, which was at par with NRCOP-37 (15.16 t ha^{-1}) and NRCOP-38 (14.40 t ha^{-1}) and significantly superior over the rest of the genotypes. The lowest yield was recorded by the genotype NRCOP-33 *i.e*., 10.42 t ha^{-1}. The yield potential of a variety is influenced by the sex ratio and the higher sex ratio in NRCOP-31 might have contributed to increased fruit set, leading to a greater number of fruit bunches and higher bunch weight. These factors may have ultimately resulted in enhanced yield (Gawankar *et al.*, 2022).

The study revealed that the hybrid cross combination NRCOP-31 consistently exhibited superior fresh fruit bunch yields over the study period suggesting its suitability for adaptation in the environmental conditions of Mulde. However, further studies will be required to assess the sustained yield performance of this hybrid across the Konkan region of Maharashtra.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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