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## Pre bearing performance of Malaysian oil palm (*Elaeis guineensis*) accessions in coastal ecosystem of Andhra Pradesh

**Bhavana YV, Kalpna Motha, Kalyana Babu B, Dr. M Paratpara Rao, Ravi Kiran T and Shekar V**

#### Abstract

The present investigation was carried out to evaluate mean performance of Malaysian oil palm (*Elaeis guineensis*) accessions during pre-bearing period. The experiment was conducted at ICAR-Indian Institute of Oil palm Research, Pedavegi during 2022-23. Total fifty two oil palm accessions were evaluated in Augmented Block Design. Significant variation was observed among all the accessions with respect to growth, yield and yield attributing characters. Mean performance of accessions for yield and yield attributing characters revealed that accessions EC869481, EC869410, EC869401, EC869476, EC869458 showed significantly superior performance in respect of yield over the best performing check IC0610030. So, these accessions further can be utilized in crop improvement programme or can be recommended for commercial cultivation in Andhra Pradesh.

**Keywords:** Oil palm, introduction, mean performance, morphological characters, accessions

#### Introduction

Oil palm (*Elaeis guineensis*) is also called as African oil palm or Macaw fat which belongs to the kingdom plantae, family Arecaceae, order Spadiciflorae. Andhra Pradesh stands first in area and production of oil palm in the country with 1.62 lakh ha area and 14.09 lakh MT of production. Locally grown indigenous accessions are low in productivity and give poor returns to the farmers. A germplasm collection with good variability for the desirable characters is the basic requirement of any crop improvement. Hence the accessions were introduced from Malaysia in order to evaluate the growth and yield related traits and also to select the promising accessions for high oil yield in coastal ecosystem of Andhra Pradesh.

#### Materials and Methods

The experiment was conducted at ICAR- Indian Institute of Oil palm Research that is situated at (16° 81' N latitude and 81° 13' E longitudes) at an elevation of 13.41 m above the mean sea level. The soil is red sandy loam with good drainage and moderate water holding capacity. The physical composition of the soil was: sand-70%, silt -20% and clay- 10%. The soil pH was 6.56 and the E.C. was 0.3 d sm<sup>-1</sup>. The available nitrogen content was 181.9 kg ha<sup>-1</sup>, available phosphorous content was 53.9 kg ha<sup>-1</sup> and available potassium content was 310.2 kg ha<sup>-1</sup>, while the soil organic carbon was 0.67%.

#### Climatic conditions

The mean maximum temperature varies from 23-42 °C and the minimum temperature ranges from 10-12 °C. The area receives an average rainfall of 560-1150 mm, a large part of which is received during the period from June- September and sometimes scanty showers during October-December.

Forty eight accessions were planted using an augmented design in 2018 that consisted of four augmented blocks, each block with four check varieties under irrigated conditions. By visually observing five plants from each row, the observations for eight traits viz., plant height (cm), plant girth (cm), number of leaves on crown, number of bunches per palm per year, average bunch weight (kg), fresh fruit bunch yield (kg/palm/year), fresh fruit bunch yield (t/ha), oil to bunch ratio (%) were recorded. Analysis of variance is done partitioning the variation into blocks, treatments, checks, accessions and checks Vs accessions.

## Results and Discussion

The result of analysis of variance for Augmented Block Design was carried out for eight characters revealed that adequate amounts of genetic variability were present in the experimental materials for all the growth and yield related characters (Table 1). Hence, provide an opportunity to improve the character through selection. The block effects were significant for all the characters. The check accessions showed significant differences for all the characters indicating that checks themselves were diverse. The per se performance depicted the exact quantified data about the potential of all the accessions studied. The list of adjusted mean value of forty eight accessions with four checks for all the characters under study is given in Table 2.

- 1. Palm height (cm):** The accessions differed significantly with respect to plant height which varied from 415.00 to 631.36 cm with an average value of 554.19 cm. As per result, the accession EC869405 (631.36cm) followed by twelve other accessions recorded higher plant height than the best performing check IC0610027 (568.10 cm). The least palm height of 415 cm was recorded in the accession EC869488.
- 2. Palm girth (cm):** Plant girth in fifty two accessions ranged from 415.00 to 631.36 cm with an average value of 286.05 cm. Maximum plant girth was recorded in EC869486 (317.85 cm) followed by eleven accessions compared to best check IC0610033 (290.70 cm) whereas minimum plant girth was recorded in EC869408 (236.11 cm).
- 3. Number of leaves on crown:** The number of leaves on crown showed significant variation which ranged from 32.32 to 36.87 with an average of 34.82. Ten accessions had higher number of leaves compared to the best check IC0610027 (35.93). Maximum number of leaves on crown was recorded in EC869454 (36.87) whereas minimum number of leaves on crown was recorded in EC869485 (32.32).
- 4. Number of bunches per palm per year:** Number of bunches per palm per year varied from 6.97 to 15.06 with the mean of 10.64. Maximum number of bunches per palm (15.06) was recorded in EC869481, followed by EC869419 (14.58), EC869410 (13.38), EC869458(13.36), EC869401 (13.03), EC869418 (12.63), EC869467 (12.11), EC869416 (12.09), EC869408 (12.08), EC869426 (11.99) compared to the best check IC0610030 (11.1), while EC869407 recorded the minimum number of bunches per palm (6.41).

- 5. Average bunch weight (kg):** Significant variation was noticed for the average bunch weight among different accessions which varied from 1.30 to 7.30 Kg with a mean of 4.58. Among the accessions evaluated, four accessions viz., EC869481 (7.03 kg), EC869488 (6.93 kg), EC869487 (6.66 kg), EC869467 (6.15 kg) recorded significantly higher average bunch weight compared to the best check, IC0610030 (6.08 Kg). Least average bunch weight was recorded in the accessions EC869407 (1.64 kg).
- 6. Fresh fruit bunch yield (kg/palm/ year):** The FFB yield showed significant variation among the accessions. The FFB yield among the accessions ranged from 15.25 to 79.37 kg. Among the accessions evaluated, nine accessions recorded significantly higher yield compared to the best check IC0610030 (67.48 kg). The highest yield was recorded in the accession EC869481 (79.37 kg), while least yield was recorded in the accession EC869407 (15.29 Kg) as shown in figure 1.
- 7. Fresh fruit bunch yield (t/ha):** A significant variation was noticed for the FFB yield among different accessions which varied from 2.18 to 11.53 ton per hectare with an average of 7.02 ton per hectare. Total of nine accessions recorded significantly higher yield compared to the best check IC0610030 (9.65 t/ ha). Maximum yield was recorded in accession EC869481 (11.35 t/ha), while minimum yield was recorded in the accession EC869407 (2.18 t/ha).
- 8. Oil to bunch ratio (%):** Among the accessions, significant variation was observed in oil to bunch ratio ranged from 5.23 to 22.97%. with an average of 11.66%. The highest oil to bunch ratio was recorded in accession EC869481 (22.97%) followed by eight accessions recorded high oil to bunch ratio compared to the best check IC0610030 (14.16%). Least oil to bunch ratio was recorded in the accession EC869407 (5.23%).

This data reflects that some of the accessions were performing better in terms of yield traits in pre bearing period and also further these accessions have inherent production potential. These results are in agreement with findings of Kushari *et al.* (1993) [4], Mohd *et al.* (2000) [6], Cedillo *et al.* (2008) [1], Murugesan *et al.* (2009) [7], Junaidah *et al.* (2011) [3] Diana *et al.* (2013) [2], Tanya *et al.* (2013) [10], Murugesan and Shareef, (2014) [8] and Noh *et al.* (2014) [9], Latha *et al.* (2016) [5] in oil palm.

**Table 1:** Analysis of variance for different characters in fifty two oil palm accessions

Source of Variation	DF	Palm height (cm)	Plant girth(cm)	Number of leaves on crown	Number of bunches/palm/year	Average bunch weight (Kg)	FFB yield (Kg/palm/year)	FFB yield (t/ha)	Oil to bunch ratio (%)
Blocks	3	1,805.07*	211.23*	0.42*	0.83*	0.31*	5.64*	0.11*	0.62*
Treatment	51	2,973.94**	649.82*	1.49*	4.25**	2.66**	427.41**	9.47**	15.94**
Checks	3	812.331*	194.18*	2.01*	6.39*	1.30*	525.98**	10.76**	12.12**
Accessions	47	3,160.99**	691.94*	1.49*	4.18*	2.02**	378.04**	7.65**	15.90**
Checks vs accessions	1	667.07*	37.34*	0.03*	0.84*	35.91**	2,452.07**	89.43**	29.03**
Error	9	885.197	552.22	2.16	1.53	0.19	27.71	0.56	1.18

\*\* - Significance at 1% level of probability;

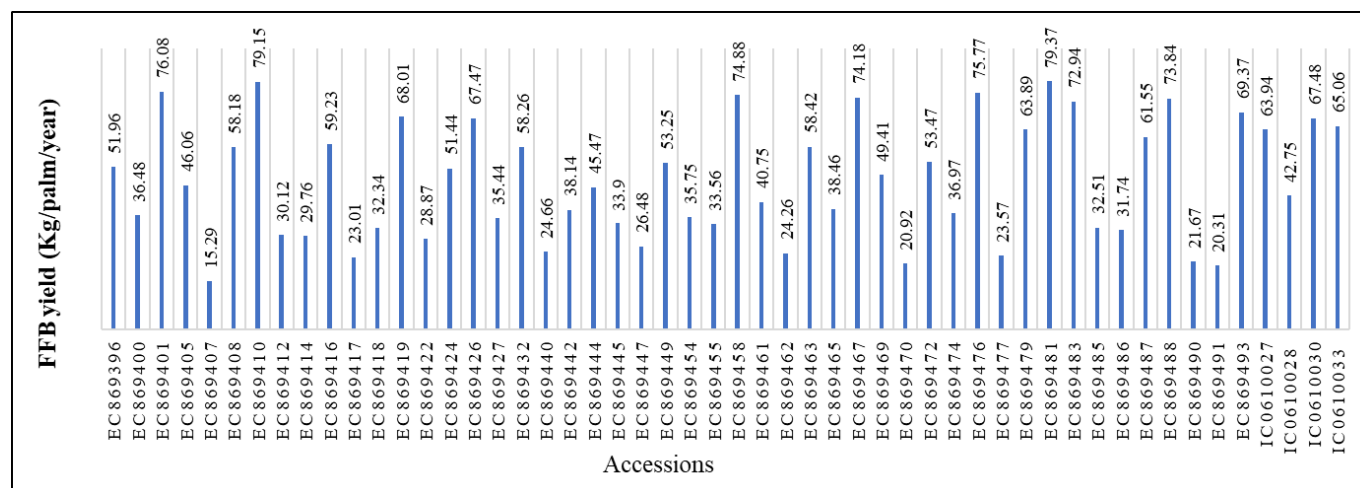
\* - Significance at 5% level of probability.

**Table 2:** Mean performance of oil palm accessions for morphological parameters

S. No.	Accessions	HT (cm)	GR(cm)	NL	BN	ABW (kg)	FFB (kg)	FFB (t/ha)	O/B (%)	FF
1	EC869396	560.96	267.52	33.33	11.03	4.73	51.96	7.42	12.91	Dura
2	EC869400	535.80	266.46	32.93	8.03	4.69	36.48	5.21	10.38	Dura
3	EC869401	580.94	301.30	34.13	13.03	5.84	76.08	10.88	15.34	Dura
4	EC869405	631.36	269.93	33.73	10.21	4.55	46.06	6.58	10.66	Dura
5	EC869407	521.54	255.01	34.33	6.41	1.64	15.29	2.18	5.23	Dura
6	EC869408	535.80	236.11	34.73	12.08	4.81	58.18	8.31	11.93	Dura
7	EC869410	590.62	296.38	33.53	13.38	4.73	79.15	11.31	14.90	Dura
8	EC869412	580.94	277.19	34.09	9.97	3.00	30.12	4.30	9.91	Tenera
9	EC869414	501.39	276.53	33.93	10.55	2.77	29.76	4.25	8.30	Dura
10	EC869416	595.72	261.10	34.85	12.09	4.89	59.23	8.46	11.63	Tenera
11	EC869417	576.35	311.70	35.73	10.56	2.27	23.01	3.28	7.26	Dura
12	EC869418	565.32	287.03	35.33	12.63	2.46	32.34	4.62	10.80	Dura
13	EC869419	498.67	298.13	36.07	14.58	4.90	68.01	9.72	13.10	Tenera
14	EC869422	502.02	273.24	33.67	8.79	3.34	28.87	4.13	8.20	Dura
15	EC869424	498.01	218.85	34.62	11.19	4.63	51.44	7.36	10.41	Dura
16	EC869426	527.55	258.95	35.42	11.99	5.63	67.47	9.65	19.75	Tenera
17	EC869427	542.78	248.35	36.07	9.06	3.93	35.44	5.07	7.77	Dura
18	EC869432	552.49	280.47	33.67	9.94	5.79	58.26	8.33	13.36	Dura
19	EC869440	517.13	269.14	34.67	9.26	2.76	24.66	3.53	5.65	Dura
20	EC869442	502.90	259.05	34.47	8.79	4.32	38.14	5.46	9.55	Dura
21	EC869444	557.07	294.52	36.07	10.59	4.33	45.47	6.50	10.96	Dura
22	EC869445	537.45	265.27	34.27	11.79	3.01	33.90	4.85	9.46	Dura
23	EC869447	547.80	273.61	33.47	9.39	2.91	26.48	3.79	6.26	Dura
24	EC869449	477.67	308.48	36.67	10.99	4.86	53.25	7.62	11.86	Dura
25	EC869454	513.56	285.36	36.87	8.71	4.11	35.75	5.10	10.56	Tenera
26	EC869455	598.82	273.48	36.27	9.51	3.55	33.56	4.79	10.12	Dura
27	EC869458	473.67	282.43	37.07	13.36	5.65	74.88	10.70	21.43	Tenera
28	EC869461	558.74	278.74	35.87	11.11	3.70	40.75	5.82	9.07	Dura
29	EC869462	598.30	278.96	34.27	9.32	2.63	24.26	3.46	8.78	Dura
30	EC869463	608.86	288.20	36.67	9.91	5.90	58.42	8.35	12.99	Tenera
31	EC869465	598.97	272.72	36.27	10.11	3.83	38.46	5.49	14.38	Tenera
32	EC869467	568.48	240.18	34.67	12.11	6.15	74.18	10.60	9.82	Dura
33	EC869469	553.34	243.54	34.07	9.51	5.20	49.41	7.06	9.22	Dura
34	EC869470	548.55	248.98	37.07	6.97	3.23	20.92	2.98	6.92	Dura
35	EC869472	588.87	301.69	33.27	10.21	5.25	53.47	7.64	12.56	Tenera
36	EC869474	588.01	288.16	34.47	11.51	3.26	36.97	5.28	8.44	Dura
37	EC869476	459.48	237.97	36.32	13.26	5.66	75.77	10.83	15.95	Tenera
38	EC869477	530.01	286.82	36.72	7.46	3.07	23.57	3.37	10.32	Tenera
39	EC869479	594.75	307.31	33.52	11.06	5.74	63.89	9.13	11.57	Tenera
40	EC869481	534.91	293.58	35.12	15.06	7.03	79.37	11.35	22.97	Tenera
41	EC869483	495.36	258.72	35.92	11.46	6.34	72.94	10.43	15.33	Dura
42	EC869485	465.03	298.53	32.32	9.26	3.43	32.51	4.65	7.57	Dura
43	EC869486	510.12	317.85	36.32	10.66	2.88	31.74	4.54	8.47	Dura
44	EC869487	495.16	277.22	32.92	9.26	6.66	61.55	8.80	13.00	Dura
45	EC869488	415.00	279.26	34.12	10.66	6.93	73.84	10.56	15.69	Tenera
46	EC869490	454.70	296.04	33.12	6.96	3.03	21.67	3.10	5.65	Dura
47	EC869491	544.43	308.52	34.52	11.46	2.11	20.31	2.90	6.44	Dura
48	EC869493	544.81	262.88	33.12	9.15	5.38	69.37	9.20	10.05	Dura
49	IC0610027 (C1)	568.10	274.66	35.9	11.56	5.58	63.94	9.14	13.20	Dura
50	IC0610028 (C2)	550.34	287.08	34.83	9.08	4.71	42.75	6.11	10.28	Dura
51	IC0610030(C3)	537.99	286.44	34.15	11.10	6.08	67.48	9.65	14.16	Tenera
52	IC0610033 (C4)	537.96	290.70	34.79	10.78	6.07	65.06	9.30	13.67	Tenera
	Mean	554.19	286.05	34.82	10.64	4.58	49.09	7.02	11.66	11.66
	S.Em	4.13	3.26	0.2	0.17	0.06	0.73	0.1	0.15	0.15
	C. D at 5%									
	Between varieties within block	95.18	75.17	4.70	3.95	3.95	1.41	16.84	2.40	3.48
	Between varieties across the block	106.41	84.05	5.25	4.42	4.42	1.57	18.82	2.68	3.89
	Between varieties and checks	84.13	66.44	4.15	3.49	3.49	1.24	14.88	2.12	3.08
	Between checks	47.59	37.58	2.35	1.97	1.97	0.70	8.42	1.20	1.74

HT- Palm height(cm) GR- Palm girth (cm) NL- Number of leaves on crown BN- Number of bunches/palm/year BW- Average bunch weight (Kg) FFB (Kg)- Fresh fruit bunch yield/palm/year

FFB (t/ha)- Fresh fruit bunch yield O/B- Oil to bunch ratio (%) FF- Fruit form



**Fig 1:** Fresh fruit bunch yield (kg/palm/year) in different oil palm accessions

## Conclusion

The findings of present investigation concluded that the significant variation were observed in growth and yield attributes of oil palm accession in pre bearing period. The accessions EC869481 (Tenera), EC869410 (Dura), EC869401 (Dura), EC869476 (Tenera), EC869458 (Tenera) showed significantly superior performance in respect of yield over the best performing check IC0610030. These superior performing accessions also excelled in various component traits. Hence, these accessions offer a good scope of selection of better accessions for desired traits.

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