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The Influence of Different Genotypes on Growth and Yield of Oil Palm (*Eleais guineensis* Jacq.)

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Study on effect of different genotypes on growth and yield of oil palm (*Eleais guineensis* Jacq.). It had 7 genotypes (CP, Cirad, Nigeria black, Compact, Nong-pet, Surattani 2 and Yumgambi) that growth and yields were record. It is conducted at Thung Song district, Nakorn Sri Thammarat province. 6 years old of oil palm tree and planting 9x9x9 meter. Complete Randomized Design (CRD) was performed. The result revealed that Nigeria black gave the highest respond on average of Leaf area at 3.44 m^2 and Cirad gave the highest average of leaf dry weight at 4.47 kg. For yield of oil palm, the result revealed that CP gave the highest number of branch at 2.18 /tree/month, whereas Compact gave the highest average fresh weight/branch and fresh weight//tree/month at 15.16 and 21.06 kg, respectively. So Compact was appropriate for planting because they are gave the middle growth but gave the highest yield of oil palm.

Keywords: genotype, growth, yield, oil palm

Introduction

Oil palm (*Eleais guineensis* Jacq.) is the most economically important crops in Thailand. Cultivation of oil palm has expanded tremendously in recent years such that it is now second only to soybean as a major source of the world supply of oils and fats (Wahid *et al*., 2004). The extracted oil will be used as a substitute for petroleum-based fuels and the price rise continued. The government has set up a policy to improve the productivity of oil palm. To better meet the needs of future oil policy areas, such as oil palm plantations and to increase the competitiveness of the palm oil industry in Thailand. That is the step into the ASEAN Economic Community (AEC) in 2016. Nakorn Sri

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Thammarat is one of province in Thailand and began to grow oil palm change from the rice and fruit growing to them. Oil palm is planted with various species from the public and private sectors, including varieties imported from abroad. The farmers don't make sure and confuse to plant better to get a higher yield worthwhile investment. Oil palm is a lot of variety and different types gave the different response on growth and yield. Oil palm in the same varieties grown in different locations with a volatile environment involved a different impact on the growth and yield differences. The palm oil contains various factors. That to consider in order getting good yields on investments such as the selection of suitable areas for planting. Selection of species weather chemical fertilizer or soil because each area has an abundance of different. And the roots of palm oil in efficient water and nutrient uptake by plants under general. The soil can liberate nutrients that would have enough nutrients for the growth and yield of palm oil. As a result, yields are worth the investment, the better (Goh, 2000) and a major palm oil even grown in various environments. But still the highest yield in different environments. It is something that breeders need to respond to the growing diversity in the area (Corley and Tinker, 2003), so the plant species that can be grown in many places will have less interaction between genes and the environment. The species can adapt to various environments. The continued production of fresh fruit bunches, bunch elements and growing the stem up. Therefore, in this study the effect of different varieties on the growth and yield of palm oil. To guide farmers to select varieties of oil palm planted area in the province.

Materials and methods

Using plots in Thung Song district, Nakorn Sri Thammarat province from January to October in 2015. 6 years old of oil palm tree and planting 9x9x9 meter. Completely randomized design (CRD) was performed. 7 genotypes of oil palm could be distinguished: CP, Cirad, Nigeria black, Compact, Nong-pet, Surattani 2 and Yumgambi. It was quantitative research of growth and yield of all genotypes. Weather is recorded between experiments. Soil sample is value analysis of chemical and physical properties in experimental area. Data were analyses by ANOVA. Means were separated with Duncan's multiple range tests (DMRT).

Results and Discussions

1. Chemical and physical analysis

After soil analysis and compare standards value (Threera *et al.*, 2004) found that average pH at 5.23 are rather property, low average organic matter

at 2.93%, 1.73% organic carbon, 16.24% Available P, medium Ca at 86.61 mg/kg, low K and Mg at 35.32 and 12.39 mg/kg, respectively with low CEC at 8.67. They are effective on growth and yield of different genotypes of oil palm.

Table 1 Value of chemical and physical properties in experimental area.

Soil depths (cm)	Percent		Bray II	NH_4OAc Extract (mg/kg)			Meq/100 soil	1:5 H_2O
	O.M.	O.C.	Available P	K	Ca	Mg	CEC	pH
0-15	3.75	2.18	23.99	44.65	142.93	22.39	8.42	5.39
15-30	2.68	1.56	13.13	32.24	71.83	8.47	7.48	5.24
30-50	2.48	1.44	11.60	29.08	45.07	6.32	10.10	5.05
Average	2.97	1.73	16.24	35.32	86.61	12.39	8.67	5.23

Note: organic carbon (O.C), organic matter (O.M.), cation exchange capacity (CEC)

2. Data Weather

Weather during experiments from January to September 2015 found that in August, the highest rainfall of 220 mm per month. While the month of March, with the least rainfall of 0.2 mm, which is less than the average value for oil palm, which should be in the field with at least 120 millimeters of rainfall per month. And rainy period lasted no more than three months because of the long drought that reduced the number of female flowers. While in the month of May with a maximum temperature of 29.26 ℃, resulting in a low humidity 73.17% and 28.01%, which is sufficient average humidity in the atmosphere for the growth of oil palm. In accordance with the trial of Goh (2000), Goh and Hardter (2003) reported that the average relative humidity of around 75%, which is suitable for the growth of oil palm.

Table 2 Data of weather in 2015 (January- September).

Month	rainfall)mm./month(	Average temperature) ℃(	Average Relative humidity)%(
January	69.5	25.98	83.61
February	18.3	25.82	80.18
March	0.2	27.74	78.68
April	112.6	28.47	80.12
May	65	29.46	73.17
June	63.6	29.26	80.86
July	96.8	28.92	78.55
August	220.8	28.25	82.98
September	145.3	28.15	84.39
Average	88.01	28.01	80.28

3. The growth of oil palm

Rainfall affects affecting on growing of oil palm especially leaf area and leaf dry weight. Leaf areas are photosynthesis increasing. The leaf areas of oil palm in April have a minimum. Due to the rain falls in April are a small amount of oil palm to make growth less. In July are heavy rains that increasing the leaf area. Nigeria black gave the highest average of leaf area at 3.44 m^2 (Table 3) followed by Cirad and Compact at 2.91 and 2.83 m^2, respectively. For leaf dry weight, Cirad gave the highest average of leaf dry weight at 4.47 kg (Table 3), followed by Nigeria black and Yumgambi at 3.75 and 3.38 kg, respectively. They are significant difference with other genotypes ($p \leq 0.01$).

Table 3 Leaf areas and leaf dry weight of oil palm.

Genotypes	Leaf area) m^2)	Leaf dry weight (kg)
Nong-pet	2.58c	3.03c
Compact	2.83b	3.35bc
Surattani 2	1.81d	1.85d
Nigeria black	3.44a	3.75b
Yumgambi	2.61c	3.38bc
CP	1.92d	2.07d
Cirad	2.91b	4.47a
F-test	**	**
C.V.	10.56	13.95

** = Significant difference at $P \leq 0.01$

Values followed by different letter are significantly different according to DMRT.

4. The yield of oil palm

CP gave the highest average number of bunches at 2.18/month followed by Surattani 2 and Cirad at 2.07 and 1.76/month, respectively. Compact gave the highest fresh weight (15.16 kg/bunch) and fresh weight/tree/month (21.06 kg). They are significant difference with other genotypes ($p \leq 0.01$) (Table 1). Different genotypes gave the different response on the yield of oil palm (Sudanai, 2013). Leaf area and leaf dry weight has relationship with yield of oil palm (Threera, 2011). Wasapong (2010) reported that genotype with environment gave the effect on yield of oil palm.

Table 4 The yield of different genotypes.

Genotypes	No. of bunch (bunch)	Fresh weight of bunch (kg/bunch)	Fresh weight of bunch (fresh weight/ tree/month
Nong-pet	1.18e	14.97b	14.50e
Compact	1.57c	15.61a	21.06a
Surattani 2	2.07a	8.96f	17.46d
Nigeria black	1.52c	12.68d	18.23c
Yumgambi	1.32d	14.11c	18.05c
CP	2.18a	4.45g	11.32f
Cirad	1.76b	10.59e	20.08b
F-test	**	**	**
C.V.	23.93	13.95	10.63

** = Significant difference at $P \leq 0.01$

Values followed by different letter are significantly different according to DMRT.

Conclusion

1. The growth of oil palm varieties, Nigeria black highest average leaf area of 34.36 cm^2 and Cirad gave the average leaf dry weight 4.47 kg.

2. The yield of oil palm varieties, CP gave the number of bunch at 2.18/month. Compact gave the highest fresh weight (15.16 kg/bunch) and fresh weight/tree/month (21.06 kg).

In conclusion that Compact is appropriate for cultivation in Thung Song district, Nakorn Sri Thammarat province.

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