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Study of Different Fertilization Methods on Oil Palm (*Elaeis guineensis*) Vegetative Factors

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ABSTRACT

Oil palm propagation techniques are juvenile pot plants derived from germinated seeds and tissue culture, because it doesn't produce sucker. In the nursery stage, monitoring the conditions of irrigation and nutrition are important to ensure phenotypic quality. During the nursery stage, optimal fertilization in development of more vigorous and productive plants. This research was carried out to increase fertilizer use efficiency and its impact on vegetative growth of juvenile oil palm plants in greenhouse based Factorial experiment according completely randomized design with three replications at greenhouse of date palm and tropical fruit research institute in Ahvaz during 2011-2013. Treatments included five different fertilization methods (Without fertilization or control, soil application, fertigation, foliar spray and soil application add foliar spray on juvenile pot plants derived from germinated oil palm seeds) and eight genotypes. The results showed that different methods of fertilization were significantly different in vegetative growth characteristics. Also, different cultivars were significantly different in all vegetative traits except chlorophyll content. Interactions between treatments were significant in the growth characteristics of stem and number of leaves ($P \leq 0.05$). Fertigation with mean seedling height, stem height, stem diameter, leaf length and width, equivalent to 138.9, 26.0, 7.3, 126.5 and 40.6 cm, respectively and the average number of leaves and leaflets of 11.9 and 44.6 numbers per plant respectively and chlorophyll content of 55.3 was superior fertilization method comparing to other methods.

Keywords: *Chlorophyll, Fertigation, Foliar spray, Morphology.*

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INTRODUCTION

The extensive development of oil palm industries in many countries in the tropics has been motivated by its extremely high potential productivity. The oil palm gives the highest yield of oil per unit area compared to any other oil crop. Palm oil is used in the homes as cooking oil. In industries, it is used for the manufacture of margarine, soap, lubricating oils and candles. Palm kernel oil is used as skin lotion or as laxative, when mixed with kerosene, it is used as a wood polish. After extracting the oil, the residue, the palm kernel cake, forms an excellent animal feed (Ukwuteno *et al*., 2015). The widespread acceptance of palm oil as cooking and industrial oil means higher demand for the product than other oils. Besides, the presence of carotenoid in palm oil makes it very valuable. Carotene is a precursor for vitamin A, which is very vital for the remedy of night blindness (NRDC, 2003). The oil palm requires large amounts of mineral fertilizer (500 to 1,000 $kg.ha^{-1}$), usually carried into the field by hand or with a wheelbarrow. Each palm must receive the specified amount of fertilizer, usually applied by workers using calibrated containers to deliver the required amount to each tree. Poor supervision is one reason why fertilizer is often not applied properly and the application rate is reduced in the parts of the field most distant from the roadside. This results in spatial variability in the incidence of deficiency symptoms (as shown in the photo) and reduced yield and profitability. A second problem is fertilizer pilfering, due to the wide ratio between the value of fertilizer and the cost of labor (Caliman *et al*., 2002). The fertilizer requirements of oil palm depend on many interrelated factors that vary from one environment to another. Even in superficially similar agro-ecological environments, the yield responses of oil palm to fertilizers can vary substantially. Thus, the easiest way to determine the fertilizer requirements of oil palm is from fertilizer response trials but it is difficult and costly to conduct them in all the different environments where oil palm is grown. The other alternative is to use some variables that are related to the fertilizer requirements of oil palm based on sound principles of soil fertility and mineral nutrition of plants. There are essentially three diagnostic or prognostic approaches to estimate the optimum fertilizer rates for oil palm i.e. soil analysis, leaf analysis and nutrient balance or a combination of these methods (Foster, 2003). Balanced nutrient application is important even in high soil fertility status volcanic soils found in many of the oil palm growing areas. However, irrigation is required in the dry season in order to achieve the maximum response to mineral fertilizer. The increase in cumulative yield under balanced fertilizer application and irrigation was equivalent to an additional two years of production in the control plots (Mite *et al*., 1999). Rahnama *et al*. (2012) by evaluation different irrigation and fertilization levels effects on fruit set and yield of tissue cultured of date palm reported there was not significant effect of irrigation treatments on fruit set and yield, but fertilization treatments had significant effects. The results showed there was not significant effect of irrigation treatments on fruit set and yield, but fertilization treatments had significant effects. The interaction effects were significant on all characteristics. The highest fruit weight, fruit diameter and fruit volume was obtained in 7 days irrigation interval and control fertilization level. The highest bunch weight and yield was obtained in 7 days irrigation interval and 30% less than

control fertilization level, that may be resulted from vegetative limiting and reproductive stimulating. So based on this result in order to increase Barhee tissue culture date palm fruit fertility percent that have reproductive abnormality, recommended to limit fertilization level 30% percent less than control with 7 days irrigation interval. But this is necessary to remind that complete fertilization with considering plant condition recommended for normal plants. Uptake of nitrogen by date palm trees did not exceed 60% of that added in fast release N fertilizer (Fatehy, 2004). Using slow release fertilizer was proved to be very favorable in improving growth, nutritional status of the trees, fruit set, yield and fruit quality date palms. Bamiftah (2000) recommend 2 or 3 kg of potassium sulfate/palm/year for increasing the vegetative growth, yield and fruit quality of date palms. Morsi (2009) reported organic fertilization combined with inorganic nitrogen fertilizer was very useful in improving growth nutritional status and increasing yield and fruit quality of Sweet date palm. The highest dry matter content was observed in Khalas and Khassab cultivars of date palm when mineral fertilizers (urea, triple super phosphate and potassium sulfate) were supplemented with organic peat and micronutrients (Al-Kharusi *et al*., 2009). Overall improvement of fertilizer application method while increasing fertilizer use efficiency has positive effect on the length of the planting period in the pot until the transfer to the main land. Utilizing the optimal fertilization practices in the fields, economic losses caused by excessive use of fertilizers and pollution of the environment can be avoided and the cost of production can be reduced (Hebbar *et al*., 2004; Neena and Chandel, 2008). Ibia *et al*. (2009) suggested that nutrient budget of oil palm must be compared with the soils capacity while designing fertilizer or nutrient management scheme for economic production. For instance, increased supply of nitrogen and potassium with- out an adequate supply of magnesium on soils with a low magnesium status can lead to the development of Orange Frond symptoms in younger palms (a nutritional disorder which later depresses growth and eventually yields). Appropriate micronutrients in the nutrient budget will equally enhance the efficiency of use of nitrogen (N), phosphorus (P) and potassium (K) and also meet the crop's needs. The deficiency of micronutrients is the nutritional disorders that manifest with common incidence of chlorotic and desiccated leaves due copper (Cu) and zinc (Zn) deficiency (Obi *et al*., 2010). This research was conducted to evaluate the effect of fertigation method on yield and quality of date fruit in comparison with soil application method of nutrition (according saving water and fertilizer to reduce the cost of production).

MATERIALS AND METHODS

Field and Treatment Information

This research was carried out to increase fertilizer use efficiency and its impact on vegetative growth factors of juvenile oil palm plants in greenhouse based Factorial experiment according completely randomized design with three replications at greenhouse of date palm and tropical fruit research institute in Ahvaz during 2010-2011. Treatments included five different fertilization methods (without fertilization, soil application, fertigation, foliar spray and soil application add foliar spray on juvenile pot plants derived from germinated oil palm seeds) and eight genotypes (Mentioned in table 1). The studied genotypes in this research included 15 seedlings from each of the 8 im-

proved oil palm genotypes with special characteristics such as high tolerance to environmental stress conditions, have high fruit yield and oil content. Place of research was located in Ahvaz at longitude 48°40'E and latitude 31°20'N in Khuzestan province (southwest of Iran). The average annual rainfall, temperature and evaporation in region are 241 mm, 23 C and 3000 mm, respectively.

Table 1. Studied oil palm genotypes

Row	Genotypes	Abbreviation
1	Deli x Ghana	DG
2	Deli x Nigeria	DN
3	Tanzania x Ekona	TE
4	Bamenda x Ekona	BE
5	Compact x Ghana	CG
6	Compact x Nigeria	CN
7	Deli x Compact	DC
8	Amazon	AM

Farm Management

Fertilizer use was based on 125 gr of nitrogen, 69 gr of phosphorus, and 816 gr of potassium per hectare (Corley, and Tinker, 2003). In the soil application method when the soil moisture reached to the field capacity point, fertilizers were added to the pots. In fertigation method, nitrogen fertilizers for eight months, from November 2011 to June 2012, also phosphorus and potassium fertilizers were used every three months (including early November, early February, early May and early August) through irrigation. Due to the low solubility of phosphorus and potassium fertilizers, at first these fertilizers were soluble by volatile water in the laboratory and then used for treatments. Foliar spray method was applied in 6 times per year in a period of 2 months from autumn. In soil application method + foliar spray, half of the fertilizer was used as soil fertilizer and the other half was used as spray. In the fall of 2011, the 9-month-old seedlings produced under uniform and controlled conditions at quarantine greenhouse were transferred to pots by 16000 cc of soil and fertilizing treatments were applied. Irrigation and all plant management were done at same situation for all treatments.

Traits Measure

During the trial period all vegetative traits such as seedling height (The distance between the bottom of the pot until the end point of the leaf in vertical position), stem height (The distance between bottom of the pot until the last point of the stem), stem diameter (diameter of the middle point of the stem), Number of leaf (leaves over fifty percent complete), Leaf length (From the point of attachment of the petiole to the trunk until to the extremity of the leaf stalk), Leaf width (Mid-leaf width), Number of leaflets (Total leaves of each leaf) and Chlorophyll index (Was measured from 5 leaflets of the middle leaves leaflets in each treatment by using chlorophyll meter, Minolta Spad-502) were measured and registered.

Statistical analysis

Analysis of variance and mean comparisons were done by MSTAT-C software and Duncan multiple range test at 5% probability level.

RESULTS AND DISCUSSION

Seedling height

According result of analysis of variance effect of different fertilization method, genotypes and interaction effect of treatments on seedling height was significant at 1% and 5% probability level, respectively (Table 2). Mean comparison result of different fertilization method indicated that maximum seedling height (138.9 cm) was noted for fertigation and minimum of that (104.0 cm) belonged to control treatments (Table 3).

Table 2. Summary result of analysis of variance of measured traits

S.O.V	df	Seedling height	Stem height	Stem diameter	Number of leaf	Leaf length	Leaf width	Number of leaflets	Chlorophyll index
Fertilizer (F)	4	423.4**	496.3**	17.0*	111.0**	2931.0**	170.5**	200.1**	1785.4**
Genotype (G)	7	5285.2**	805.5**	5.3**	7.2**	2892.9**	299.5**	710.8**	9.8^{ns}
F*G	28	106.9*	35.5*	0.7**	1.3**	46.3^{ns}	5.7^{ns}	10.0^{ns}	11.4^{ns}
Error	80	61.7	18.5	0.1	0.5	44.3	11.5	12.2	12.1
CV (%)	-	6.2	19.5	4.7	8.0	5.9	8.7	8.1	0.8

^{ns}, * and **: non-Significant, significant at the 0.05 and 0.01 probability level, respectively.

Table 3. Mean comparison effect of different type of fertilizer on measured traits

Treatment	Seedling height (cm)	Stem height (cm)	Stem diameter (cm)	Number of leaf	Leaf length (cm)	Leaf width (cm)	Number of leaflets	Chlorophyll index
Control	104.0^{d}	15.0^{c}	5.1^{e}	6.0^{e}	99.0^{d}	34.9^{c}	38.5^{c}	33.5^{e}
Soil application	126.2^{c}	20.1^{b}	6.5^{d}	8.4^{d}	110.0^{c}	37.5^{b}	41.8^{b}	36.9^{d}
Fertigation	138.9^{a}	26.0^{a}	7.3^{a}	11.9^{a}	126.5^{a}	40.6^{a}	44.6^{a}	55.3^{a}
Foliar spray	129.0^{bc}	24.0^{ab}	6.8^{c}	9.0^{c}	119.8^{b}	40.8^{a}	44.7^{a}	44.3^{c}
Soil application and foliar spray	133.0^{b}	25.0^{ab}	7.0^{b}	10.1^{b}	122.3^{b}	40.9^{a}	45.5^{a}	47.1^{b}

*Means followed by similar letters have not significantly different ($p<0.05$) via Duncan test.

TE genotype with an average of 158 cm in the statistical class a produced the highest seedling height but the BE and DC genotypes in statistical class e produced the lowest one with average of 11.11 and 109.9 cm, respectively (Table 4). Interaction effect of treatment showed Maximum seedling height (169.7 cm) was obtained for fertigation method at TE genotype and minimum of that (85.0 cm) was for control at AM genotype (Table 5). The mentioned results showed a positive and significant effect of fertigation methods on improving the vegetative growth of seedlings in greenhouse. Goh *et al*. (2000), Zaharah *et al*. (2012) and Zin and Tarmizi (2007) have pointed similar results in this regard. Seedling height is an effective trait on oil palm vegetative growth. If the environmental conditions are appropriate, the plant will have a good vegetative growth with using the optimum situation and the height of the seedlings will increase, in contrast, effect of any live or non-living stress in the plant environment will have negatively effect on vegetative growth and led to decrease seedlings height (Noor *et al*., 2003).

Stem height

Result of analysis of variance revealed effect of different fertilization method, genotypes and interaction effect of treatments on stem height was significant at 1% and 5% probability level, respectively (Table 2). Mean comparison result of different fertilization method showed that the maximum and the minimum amount of stem height belonged to fertigation (26.0 cm) and control (15.0 cm) treatments (Table 3). Generally, seedlings showed a positive reaction to the application of fertilizer than to control (non application of fertilizer). Compare between different genotypes indicated maximum of stem height (35.5 cm) was obtained for TE and minimum of that (14.3 cm) was for BE (Table 4). According result of interaction effect of treatments maximum stem height (43.5 cm) was obtained for soil application + foliar spray method at

TE genotype and minimum of that (11.7 cm) was for control at DC genotype (Table 5). This result, were accordance with results of Dialami (2009) and Simon *et al*. (2001).

Stem diameter

According result of analysis of variance effect of different genotypes, interaction effect of treatments and different fertilization methods on stem diameter was significant at 1% and 5% probability level, respectively (Table 2). As for Duncan classification made with respect to different fertilizer methods maximum and minimum amount of stem diameter belonged to fertgation method (7.3 cm) and control (5.1 cm) (Table 3). These results showed that fertgation method has a positive and significant effect to increase stem diameter, which is one of vegetative growth indices. Among oil palm genotypes maximum stem diameter (7.5 cm) was obtained for BE and minimum of that (5.9 cm) was for CN (Table 4). Result of interaction effect of treatments revealed maximum stem diameter (8.5 cm) was noted for fertigation method at BE genotype and minimum of that (4.4 cm) belonged to control at DN genotype treatments (Table 5). Another researcher such as Obi and Thomas Udoh (2012), Antia-Obong and Bhattarai (2012) reported same result.

Table 4. Mean comparison effect of different genotypes on measured traits

Treatment	Seedling height (cm)	Stem height (cm)	Stem diameter (cm)	Number of leaf	Leaf length (cm)	Leaf width (cm)	Number of leaflets	Chlorophyll index
TE	158.0^{a}	35.5^{a}	6.1^{ef}	8.9^{bc}	135.7^{a}	43.1^{ab}	50.8^{a}	43.3^{a}
CN	127.0^{d}	24.2^{b}	5.9^{f}	9.2^{b}	113.3^{d}	34.0^{de}	36.4^{d}	42.9^{a}
DG	134.0^{bc}	25.4^{b}	6.8^{c}	7.9^{d}	115.3^{d}	41.7^{b}	45.6^{b}	44.3^{a}
DN	138.6^{b}	27.1^{b}	7.2^{b}	10.0^{a}	124.0^{c}	38.6^{c}	48.5^{a}	43.7^{a}
DC	109.9^{e}	15.4^{cd}	6.3^{de}	9.9^{ab}	97.0^{e}	35.8^{d}	45.7^{b}	43.6^{a}
AM	97.3^{f}	16.4^{cd}	6.4^{d}	8.6^{c}	97.7^{e}	32.3^{e}	29.6^{e}	41.8^{a}
CG	130.0^{cd}	18.0^{c}	6.1^{f}	9.1^{bc}	129.3^{b}	41.7^{b}	42.7^{c}	43.4^{a}
BE	115.0^{e}	14.3^{d}	7.5^{a}	9.1^{b}	111.7^{d}	44.2^{a}	44.7^{bc}	44.3^{a}

*Means followed by similar letters have not significantly different ($p<0.05$) via Duncan test.

Number of leaf

Number of leaf in the seedlings is one of effective trait on vegetative growth. Optimum environmental conditions led to produce more leaves in the seedling and limited situation cause to decrease leaf number. Result of analysis of variance showed effect of different fertilization method, genotypes and interaction effect of treatments on number of leaf was significant at 1% probability level (Table 2). Evaluation mean comparison result revealed in different fertilization method the maximum number of leaf (11.9) was noted for I_2 and minimum of that (6.0) belonged to control treatment (Table 3). Compare different oil palm genotypes indicated maximum number of leaf (10.0) was obtained for DN and minimum of that (7.9) was for DG (Table 4). According result of interaction effect of treatments maximum number of leaf (13.0) was noted for fertigation method at CN genotype and minimum of that (5.3 cm) belonged to control at DG and AM genotype treatments (Table 5). Some researchers such as Goh (2005), Obi *et al*. (2010) confirmed mentioned result.

Leaf length

According result of analysis of variance effect of different fertilization method and genotypes on leaf length

was significant at 1% probability level, but interaction effect of treatments was not significant (Table 2). Evaluation mean comparison result of different fertilization method revealed the maximum leaf length (126.5 cm) was noted for fertgation method and minimum of that (99.0 cm) belonged to control treatment (Table 3). Between different genotypes the maximum leaf length (135.7 cm) was observed in TE and the lowest one (97.0 cm) was found in DC and AM treatment (Table 4). This result, were accordance with results of Khaw *et al*. (2000), Jacquemard *et al*. (2002), Al-Qurashi *et al*. (2016).

Leaf width

Result of analysis of variance indicated effect of different fertilization method and genotypes on leaf width was significant at 1% probability level, but interaction effect of treatments was not significant (Table 2). The mean comparison of different fertilization method at 5% showed that treatments of fertigation (40.6 cm), foliar spray (40.8 cm) and soil application + foliar spray (40.9 cm), belonged to group a and was superior than to other treatments (Table 3). Among different oil palm genotypes the maximum and the minimum amount of leaf width belonged to BE (44.2 cm) and AM (32.3 cm) (Table 4). The results showed that seedling fertilization improved the vegetative growth and significantly increased leaf width compared to control treatment, but the sensitivity of this trait was less than fertilization method. Another researcher such as Kee and Goh (2006) and Lam *et al*. (2009) reported same result.

Number of leaflets

According result of analysis of variance effect of different fertilization method and genotypes on number of leaflets was significant at 1% probability level, but interaction effect of treatments was not significant (Table 2). The mean comparison of different fertilization method revealed that treatments of fertigation (46.6), foliar spray (44.7) and soil application + foliar spray (45.5), belonged to group a and was superior than to other treatments (Table 3). Compare different oil palm genotypes indicated maximum number of leaflets (48.5) was obtained for DN and minimum of that (29.6) was for AM (Table 4). The number of leaflets is about the fixed traits that are sometimes used to identify the cultivars, so regardless of the lack of fertilization led to weaken plant and produced fewer leaflets; the major differences observed in the genotypes are due to their genetic differences. Generally, leafy genotypes have higher photosynthetic powers and yields (Corley and Tinker, 2003). Lim *et al*. (2003), Melling *et al*. (2006) and Daneshnia (2000) reported same result.

Chlorophyll index

Regarding the fact that fertilization led to increase the amount and durability of chlorophyll leaves, so chlorophyll index showed significant differences between different fertilization methods. Effect of genotypes and interaction effect of treatments was not significant (Table 2). Evaluation mean comparison result revealed among different fertilization methods the maximum chlorophyll index (55.3) was noted for fertigation method and minimum of that (33.5) belonged to control treatment (Table 3). So fertilization method by increasing the amount of chlorophyll index led to higher vegetative growth than to other methods. Improving nitrogen consumption led to increases absorbs of phosphorus, potassium which increases leaf chlorophyll (Zin *et al*., 2001). Reijnders and Huijbregts (2008) and Wicke *et al*. (2008) have pointed similar results.

Table 5. Mean comparison interaction effects of fertilizer and genotypes on studied traits

Fertilizer	Genotypes	Seedling height (cm)	Stem height (cm)	Stem diameter (cm)	Number of leaf
Control	TE	124.0^{im}	24.0^{gl}	5.5^{rs}	6.0^{ln}
	CN	112^{mp}	12.3^{ar}	4.9^{iu}	6.0^{ln}
	DG	112.3^{mo}	13.0^{ar}	5.4^{st}	5.3^{n}
	DN	121.7^{jn}	18.0^{lr}	4.4^{v}	5.7^{mn}
	DC	93.7^{qs}	11.7^{r}	4.9^{uv}	6.7^{km}
	AM	85.0^{s}	14.7^{nr}	4.9^{tu}	5.3^{n}
	CG	96.0^{as}	13.7^{pr}	4.7^{uv}	6.7^{km}
	BE	87.7^{rs}	12.3^{ar}	$6.2l^{q}$	6.7^{km}
Soil application	TE	161.0^{ab}	34.7^{cd}	6.0^{or}	8.3^{ij}
	CN	126.0^{il}	22.7^{im}	5.7^{qs}	8.7^{hj}
	DG	131.0^{fk}	25.3^{fk}	6.4^{ip}	7.7^{jk}
	DN	141.7^{cg}	23.7^{ml}	7.9^{ab}	8.7^{hj}
	DC	112.3^{mo}	14.0^{or}	6.6^{gn}	9.3^{fi}
	AM	90.0^{qs}	16.0^{mr}	7.0^{dh}	8.7^{hj}
	CG	126.7^{hl}	12.3^{qr}	5.9^{ps}	8.3^{ij}
	BE	121.0^{jn}	12.3^{qr}	6.8^{gj}	7.7^{jk}
Fertigation	TE	169.7^{a}	34.2^{ce}	6.7^{ek}	12.0^{ac}
	CN	135.0^{ei}	30.3^{ch}	6.5^{gn}	13.0^{a}
	DG	150.0^{bd}	35.3^{bc}	7.8^{bc}	11.0^{ce}
	DN	150.0^{bd}	31.7^{cf}	8.5^{a}	13.0^{a}
	DC	118.3^{kn}	20.0^{cf}	7.2^{de}	11.7^{bc}
	AM	110.0^{np}	19.0^{kq}	6.5^{ho}	11.0^{ce}
	CG	152.3^{bc}	22.3^{im}	6.5^{ho}	11.3^{bd}
	BE	125.7^{il}	15.3^{nr}	8.5^{a}	12.0^{ac}
Foliar spray	TE	165.7^{a}	41.7^{ab}	6.1^{mq}	8.7^{hj}
	CN	130.0^{g}	27.7^{ej}	6.1^{nq}	8.7^{hj}
	DG	133.3^{ej}	25.0^{fk}	7.1^{df}	7.0^{kl}
	DN	139.3^{ph}	30.7^{cg}	7.0^{dg}	10.3^{df}
	DC	111.0^{np}	15.3^{nr}	6.4^{ip}	10.3^{df}
	AM	102.3^{oq}	16.0^{mr}	6.6^{gm}	8.7^{hj}
	CG	131.0^{fr}	21.0^{jw}	6.6^{gn}	9.0^{gi}
	BE	119.0^{kn}	15.0^{nr}	8.1^{ab}	9.3^{fi}
Soil application + Foliar spray	TE	169.7^{a}	43.0^{a}	6.2^{kp}	9.3^{fi}
	CN	132.0^{ej}	28.0^{pi}	6.3^{jp}	9.7^{fi}
	DG	143.3^{cf}	28.3^{pi}	7.4^{cd}	8.3^{ij}
	DN	140.3^{cg}	31.7^{cf}	8.3^{ab}	12.3^{ab}
	DC	114.0^{io}	16.0^{mr}	6.5^{io}	11.7^{bc}
	AM	99.3^{pr}	16.3^{mr}	6.8^{fi}	9.3^{fi}
	CG	144.0^{ce}	20.7^{ko}	6.6^{fl}	10.0^{eg}
	BE	121.7^{jn}	16.3^{mr}	8.2^{ab}	10.0^{eg}

*Means followed by similar letters have not significantly different ($p<0.05$) via Duncan test.

CONCLUSION

Due to the lack of pinewood production in the oil palm, the only methods of propagation of this tree are the use of potted seedlings from improved seeds and tissue culture. Regardless of the origin of seedlings, oil palm seedlings should spend some time in the pot and controlled conditions in order to adapt in terms of weight and size to a satisfactory level and ready to be transported to the main land. Optimizing the growth conditions of seedlings, while accelerating the growth led to product of lush

and vigorous seedlings and the establishment of strong and succulent seedlings in the main land with higher rates and fewer losses. This matter in addition to reducing the losses in the profitability period will reduce investment profits and will encourage farmers to grow the cultivation of this valuable plant. The results of this research showed that one of the methods of increasing vegetative growth is optimum fertilizing of potted seedlings. Evaluation of vegetative traits of stem and leaf seedlings of oil palm indicated that fertilizing method was effective on vegetative growth and there was a significant difference between different fertilizing treatments for vegetative traits. Among different fertilizing methods, fertigation because of nitrogen, phosphorus and potassium nutrients gradually during long time through irrigation available to the seedlings had positive and significantly effect on vegetative growth and production of stronger seedlings. It is recommended that after transferring seedlings from small pots to larger pots, the required nitrogen fertilizer (based on the soil weight of the pot) used in form of soluble in water during the growing season, also phosphorus and potassium fertilizers every four months must be available the plant through irrigation. Also, based on the results of this experiment, TE oil palm genotype has high leg but AM belong to short leg genotypes and other genotypes stay between them, so according to the needs and after compatibility studies, the superior and suitable genotype of each region was introduced and for cultivation will be recommended.

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