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Growth and Development of Seashore Paspalum Grass as Affected by Different Culture Media and Irrigation Levels

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ABSTRACT

This study was conducted at the nursery of 'American University in Cairo' located at New Cairo-Fifth District/Settlement, Cairo Governorate, Egypt. During the 2014 and 2015 seasons. The reason of this study was to examine the impact of different soil mixtures, namely, (M1), 75% sand + 20% clay + 5% compost (M2), 50% sand + 40% clay + 10% compost (M3), 25% sand + 60% clay + 15% compost and (M4), zero% sand + 100% clay + zero% compost. Under different irrigation levels (7, 5, or 3 liters/m^2/day) were done on vegetative growth and chemical composition of seashore Paspalum grass. Results showed that the plants grown in culture media M2 containing (50% sand, 40% clay and 10% compost) and irrigated with highest water level (7 liters/m^2/day) resulted in significantly increasing plants height, fresh and dry weight of clippings, fresh and dry weight of underground parts and chlorophyll a, b and a + b content. Data also observed that the plants grown in M4 containing zero% sand + 100% clay + zero% compost and irrigated with highest water gave the heaviest fresh and dry weight of side shoots, also the same mixture produced the lowest values of Non-coverage. These programs may be suggested for conquering the harmful effect on development and substance composition of seashore Paspalum grass, under poor aeration and drainage in clay soil, and poor water retention in sandy soil. In order to reduce the above problems. Organic matter, clay and sandy soil must be mixed. Conclusion On the basis of study results. The ideal culture media is created from a combination of large sand particles, smaller loam or clay particles and organic matter for fertility and save water.

Keywords: culture media; *Paspalum vaginatum;* irrigation levels.

INTRODUCTION

In modern urban living, turfgrasses play significant role in enhancing quality of aesthetic life, environment and functional values. As well the turfgrasses industry is considered to be a billion dollars industry which has an impact on the economic. Most grasses are part of the family members Poaceae Gramineae. (*Paspalum vaginatum)* a warm-season turf may be used in many places as lawn because its capability to grow quickly and make the ground Covered with wonderful form and color.

Green turf is a dream for every green keeper. Establishing and maintaining quality. Turf requires ensured supply of quality irrigation water which is the important challenge worldwide. Turfgrasses are among the important plant categories that are used for many reasons such as a connection between different style components in the garden, recreational areas, games areas, air-ports or Lack of soil erosion, landscape of new cities, coastal resorts and touristic villages. Most of these communities are built in desert areas where availability of water may be limited or where irrigation water may be very costly. That shortage in water supply causes water stress to plant. Turf growth and development is affected by water stress as observed in different ways and the most important effect can be seen on cell division and growth (Mckersi and Leshem, 1994), phytohormones (Drolet *et al*., 1986; Smirnoff and Cumbes, 1989), stomata opening and gas exchange (Turner *et al*., 1978) and photosynthesis (Chaves, 1991 and Lawlor, 1995). Turfgrass water requirements different from species to species, zone to zone, season to season and from soil to soil. Turfgrass mostly fulfill their water need from soil moisture. Soil composition and construction have highly effect on water permeation, permeability, and water-holding ability (Mbah and Nenneji, 2010; Dhrmana and Jashothan, 2012) Water-holding capacity is controlled primarily by soil texture and organic matter (Reynolds, and Top, 2008) Soils with small particles size (silt and clay) have a greater surface size than those with sand particles, and a greater surface size allows soil to save more water, especially soil with a large proportion of silt and clay particles which called Fine soil, has a greater water-holding capacity (Hedley and Yule, 2009).

Sandy soil keep less water and nutritional value are easily disappear from the soil more than clay-based soils. But Clay soils can create problems in lawns. They are compacted and have poor drainage and aeration. They stay soggy when wet, and turn rock hard when they dry out in the summer. When soils are compacted, necessary air, water and nutrients cannot move through them so roots will be stunted and the grass is stressed, weakened, and more prone to disease, insects and even weeds. Clay soils are not inherently bad, but can be problematic if they lack good structure. Many kinds of materials are available for clay soil improvement such as sandy soil and Organic matter. The good soil texture, often described as having "a crumb-like structure," is created from a combination of large sand particles, smaller loam or clay particles and organic matter for fertility. It is very important for the structure of soils, water properties and retention. Studies show that the additions organic compost can improvement lawns establishment and characteristics of quality compared with fertilizer exporter of nutrients (Norrie and Gosselin, 1996; Garling and Boehm, 2001; Loschinkohl and Boehm, 2001) agriculture soil mainly impact the growth of vegetation. A good growing soil enhances the aeration, nutrient absorption, roots growth, allow the process of gaseous exchange between the roots and the air through the passage of oxygen to the roots (Awing *et al*., 2009) and save water. In the case of most Egyptian sandy desert soil, organic matter and clay are practically absent. In order to increase the fertility and save water of sandy desert soil, organic matter and clay must be incorporated. This study was conducted to investigate the effect of different culture media, irrigation amounts and their interaction on the vegetative growth and chemical composition of Paspalum plant.

MATERIALS AND METHODS

This research was conducted at the nursery of 'American University' located at New Cairo-Fifth District/Settlement, Cairo Governorate, Egypt. During the two successive seasons of 2014 and 2015 (from July-1st to November-15th of each season), the objective of the study was to investigate the effect of culture media and different irrigation levels and their interactions on the vegetative growth and chemical composition of seashore Paspalum turfgrass. Table (a) presented the main constituents of the used mixtures. The physical and chemical properties of the different media are shown in Table (b). The physical and chemical characteristic of the mixture soil were determined at the Research Station in Sadat City, Desert Development Center, American University in Cairo.

The experimental area was divided into square beds (36 pits) measuring 1.5m length X 1.5m width X 0.25m depth(Fig 1). Pits were made by removing soil before refilling with mixture soil, a distance between beds was 50 cm. The replicates were also separated from each other by a distance of 50 cm, but a distances between treatments were 1.5 m. The surface layer of the soil was excavated to depth of 25 cm and replaced by new soil mixture (Fig 2). Soil mixture irrigated with different irrigation levels (7,5, or 3 liters/m^2/day during the period from July to 1st October, then the irrigation levels were reduced to 7, 5, or 3 liters/m^2/ three days per week till the termination of the experiment on 15thNovember 2014 and 2015 in two seasons) respectively.

ON 1st June 2014 and 2015 (in the first and second season respectively), the sod of plants were taken with dimensions of (1mX1m), and planted in the middle of prepared beds which dimensions is (1.5mX1.5m), (Fig 3). The plants were watered daily at the rate of 12 l/m^2 until the turfgrass become well established on 1st July (30 days after planting on 1st June). The turfgrass was mowed on 1st June to a height of 3cm before initiated the different irrigation treatments on 1st July in the two seasons of 2014 and 2015.and then turfgrass was mowed every two weeks according to (Carrow, 1996).

The following data were recorded: Plants height (cm), fresh and dry weight of clippings (g/m^2), fresh and dry weight of side shoot plants (g /m^2), fresh and dry weight of underground parts (g/m^2), Non-coverage (%) and Chlorophyll a and b, and total Chlorophyll a+ b (mg/g fresh weight). Chlorophyll levels was assessed as described by Goodwine (1965). The Physical and chemical characteristics of the soil was estimated by U.S. Salinity Lab. (1954) Black. (1965) Olsen and Sommers. (1982).

(a) The Constituents of the used mixtures.

Soil mixtures	Sand (%) (vol./vol./vol. /vol.)	Clay (%) (vol./vol./vol. /vol.)	Compost (%) (vol./vol./vol. /vol.)
1st Mixture	75%	20%	5%
2nd Mixture	50%	40%	10%
3rd Mixture	25%	60%	15%
4th Mixture	Zero	100%	Zero

(b) Physical and chemical analysis of the used soil mixtures.

Soil mixtures	Sand	Gravel	Silt	OM	E.C dsm-1	pH	Anion (meq/L.)			Cation (meq/L.)			
							$HCO3^-$	Cl^-	$SO4^-$	Ca^{++}	Mg^{++}	Na^+	K^+
M1	86.8	9.4	8.4	0.40	17.63	8.06	14	180	16.2	74	34	28	4.4
M2	82.0	4.3	11.2	0.86	12.04	7.84	10	120	13.8	50	36	27	2.5
M3	66.6	0.0	23.2	2.19	11.92	7.86	2	126	13.6	50	32	40	4.3
M4	62.5	0.0	25.3	1.54	1.48	8.41	5.6	5.4	4.3	5.6	5	53	0.4

Fig. 1. Pits measuring 1.5x1.5x0.25 m

Fig. 2. Pits filled with different soil mixtures

Fig. 3. Sods of turfgrasses planted

The experiment was completely randomized block design with three water levels and four kinds of soil to create 12 treatments with 3 replicates. All obtained data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the factorial experiment in randomized complete block design as published by Gomez and Gomez (1984) by using "MSTAT-C" computer software package. Least significant difference (LSD) method was used to test the differences between treatment means at 5 % level of probability as described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

I Vegetative growth

Data presented in Tables (1-3) showed that the plants grown in M2 containing 50% sand + 40%clay + 10% compost, produced the highest values of plants height (cm) (4.52 and 4.88 cm), fresh weight of clippings (g/m2) (109.49 and 147.31 g), dry weight of clippings (g/m2) (44.84 and 56.53 g), fresh weight of underground parts (g/m2) (26.50 and 28.72 g) and dry weight of underground parts (g/m2) (12.79 and 13.35 g) in the first and second seasons, respectively. When compared with the other soil mixtures. These results are in agreement with the results obtained by Brar and Palazzo (1995) on two turfgrasses tall and hard festcue. Greater leaf area, leaf number, plant height, shoot and root dry matter, were observed when the grasses graw in loamy soil. Sorochan and Rogers (2001) on cool season turfgrass perennial ryegrass (Lolium perenne) and supina bluegrass (Paa supina), they reported that the use of particular mulching material, including the compost or loam soil enhanced turfgrass covering. Gill et at., (2004) on the Physical properties of a clay loam soil mixed with sand, The authors found that the root and shoot growth are increased, in mixtures of sand and clay loam soil, compared with those in clay loam soil alone. Murphy (2007) mentioned that sand-loam mixes were effective at improving nutrient retention and turf quality.

Table 1. Effect of different culture media and irrigation amounts on fresh weight (g) of clippings, fresh weight (g) of side shoots and fresh weight (g) of the underground parts of paspalum plant during 2014 and 2015 seasons.

Season (2014)															
Characters	**fresh weight (g) of clippings**					**fresh weight (g) of side shoots**					**fresh weight (g) of the underground parts**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	152.68	157.16	127.46	117.89	138.80	577.11	899.14	1025.78	1084.96	896.75	23.02	34.193	20.35	21.85	24.85
5 liter/m^2/day	116.35	131.23	127.01	102.48	119.27	518.73	788.48	823.05	925.55	763.95	27.516	27.523	23.016	20.016	26.51
3 liter/m^2/day	32.26	40.09	53.63	68.35	48.58	356.53	519.68	552.20	577.85	501.56	18.416	17.8	20.016	18.683	18.72
Mean	100.43	109.49	102.70	96.24		484.12	735.77	800.34	862.79		22.98	26.50	21.12	22.85	
L.S.D at 5%															
Soil types (M)			2.75					43.58					3.74		
Irrigation amount(I)			2.46					36.06					4.04		
(M)*(I)			4.93					72.12					NS		

Season (2015)															
Characters	**fresh weight (g) of clippings**					**fresh weight (g) of side shoots**					**fresh weight (g) of the underground parts**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	196.86	205.25	172.47	158.29	183.22	613.48	952.58	1099.78	1180.03	961.47	28.68	37.31	26.68	25.01	29.42
5 liter/m^2/day	156.83	173.45	155.22	134.43	154.98	537.27	841.94	900.60	986.48	816.57	25.51	30.51	24.68	22.68	25.85
3 liter/m^2/day	51.45	63.23	80.08	88.51	70.82	376.24	548.57	593.29	633.32	537.86	15.68	18.35	23.35	20.68	19.51
Mean	135.05	147.31	135.92	127.08		509.00	781.03	864.56	933.28		23.29	28.72	24.90	22.79	
L.S.D at 5%															
Soil types (M)			2.08					24.97					2.53		
Irrigation amount(I)			2.12					19.13					2.10		
(M)*(I)			4.24					38.27					4.20		

The plants grown in M4 containing zero% sand + 100% clay + zero% compost produced the highest values of fresh weight of side shoot plants (g /m2) (862.79 and 933.28 g) and dry weight of side shoot

plants (g /m2) (349.69 and 357.73 g) in the first and second seasons, respectively. However, the plants grown in M4 containing 100% clay produced the lowest values of Non-coverage (%) (4.4 and 4.1 %) in the first and second season, respectively. These outcomes are in agreement with those obtained by Hornis *et al*., (1983) mentioned that clay soil improved the vegetative growth and increased the dry weight of Codiaeum variegatum and Dieffenbacnia amoena plants, water and elements are readily washed through the sand soil while, clay soil hold water and elements well. Azza *et al*., (2010) on Jatropha curcas L results showed that clay media can be used to reduce the effect of water stress up to 500 cm3/pot.

Table 2. Effect of different culture media and irrigation amounts on plant height (cm) and Non-coverage% (m^2) of paspalum plant during 2014 and 2015 seasons.

Season (2014)										
Characters	**Plant height (cm)**					**Non-coverage (m^2)**				
Treatments	**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	4.94	5.04	4.68	4.59	4.81	0.0	0.0	0.0	0.0	0.0
5 liter/m^2/day	4.58	4.72	4.68	4.46	4.61	0.0	0.0	0.0	0.0	0.0
3 liter/m^2/day	3.68	3.80	3.94	4.09	3.88	27.6	17.2	16.0	13.3	18.5
Mean	4.40	4.52	4.43	4.38		9.2	5.7	5.3	4.4	
L.S.D at 5%										
Soil types (M)			0.07					0.2		
Irrigation amount(I)			0.06					0.2		
(M)*(I)			0.13					0.4		
Season (2015)										
Characters	**Plant height (cm)**					**Non-coverage (m^2)**				
Treatments	**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	5.38	5.46	5.15	5.00	5.25	0.0	0.0	0.0	0.0	0.0
5 liter/m^2/day	4.98	5.15	4.96	4.76	4.96	0.0	0.0	0.0	0.0	0.0
3 liter/m^2/day	3.91	4.04	4.22	4.30	4.11	25.2	16.0	14.8	12.4	17.1
Mean	4.76	4.88	4.78	4.69		8.4	5.3	4.9	4.1	
L.S.D at 5%										
Soil types (M)			0.06					0.2		
Irrigation amount(I)			0.05					0.2		
(M)*(I)			0.11					0.4		

Table 3. Effect of different culture media and irrigation amounts on dry weight (g) of clippings, dry weight (g) of side shoots and dry weight (g) of the underground parts of paspalum plant during 2014 and 2015 seasons.

Season (2014)															
Characters	**Dry weight (g) of clippings**					**Dry weight (g) of side shoots**					**Dry weight (g) of the underground parts**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	63.11	61.64	49.27	44.90	54.73	257.22	368.10	420.19	427.14	368.16	11.026	16.306	9.676	10.316	11.83
5 liter/m^2/day	49.47	53.02	50.37	40.09	48.24	237.09	331.15	336.51	366.06	317.70	13.616	13.273	10.983	9.558	12.80
3 liter/m^2/day	16.42	19.85	26.08	32.81	23.79	172.90	236.50	249.30	255.86	228.64	9.75	8.8	9.783	9.183	9.37
Mean	43.00	44.84	41.91	39.27		222.41	311.92	335.33	349.69		11.46	12.79	10.14	10.95	
L.S.D at 5%															
Soil types (M)			1.22					21.93					1.62		
Irrigation amount(I)			1.25					15.88					1.86		
(M)*(I)			2.50					31.76					2.72		
Season (2015)															
Characters	**Dry weight (g) of clippings**					**Dry weight (g) of side shoots**					**Dry weight (g) of the underground parts**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	75.33	73.68	60.03	53.65	65.67	257.35	364.24	411.66	435.85	367.27	13.51	17.01	12.05	11.21	13.44
5 liter/m^2/day	62.13	66.06	57.45	48.94	58.65	234.31	330.97	345.85	374.08	321.30	12.46	14.15	11.43	10.30	12.09
3 liter/m^2/day	25.15	29.84	37.28	40.70	33.24	174.63	234.45	249.30	263.26	230.41	7.76	8.89	11.23	9.95	9.46
Mean	54.20	56.53	51.59	47.76		222.10	309.89	335.60	357.73		11.24	13.35	11.57	10.49	
L.S.D at 5%															
Soil types (M)			1.10					13.33					1.10		
Irrigation amount(I)			1.11					10.59					1.04		
(M)*(I)			2.21					21.19					2.09		

The results presented in Tables (1-3) showed that the vegetative growth which included Plant height (cm), fresh and dry weight of clippings (g/m^2), fresh and dry weight of side shoot plants (g /m^2), fresh and dry weight of underground Parts (g/m^2) and non-coverage (% /m^2) were progressively increased. The elevated values for every one of these characters were acquired due to the utilize of the high water level (7 liters/m^2/day from July to 1st October, then 7 liters/m^2/ three days from 1st October till the mid-November), followed by The moderate water level (5 liters/m^2/day from July to 1st October, then 5 liters/m^2/ three days from 1st October till the mid-November). The lowest water level (3 liters/m^2/day from July to 1st October, then 3 liters/m^2/ three days from 1st October till the mid- November) produced significantly the least values under sufficient watering conditions. These results are confirmed by Throssell (1986) on *Poa pratensis,* Fry and Butler (1989) On *Festuca arundinaceous cv. Rebel*, Lakanmi and Okusanya (1990) on *Paspalum,* Lodge and Lawson (1993) on *Festuca rubra*, *Agrostis castellana* and *A. capillaries* and Costa *et al*., (2002) on fairway grasses of golf courses, mention that turfgrass was improved directly with the raise in the application rate of irrigation.

The data presented in Tables (1-3) showed that the plants grown in M2 containing 50% sand + 40%clay + 10% compost and irrigated with highest water level (7 liters/m2/day from July to 1st October, then 7 liters/m2/ three days from 1st October till the mid-November) produced the highest values of plants height (cm), fresh and dry weight of clippings (g/m2) and fresh and dry weight of underground parts (g/m2) in the first and second seasons, respectively. The lowest values of Plants height (cm), fresh and dry weight of clippings (g/m2), fresh and dry weight of side shoot plants (g/m2), were obtained from the plants grown in M1 which contain lower percentages of clay and higher percentages of Sand (75% sand +20% Clay + 5% compost) and irrigated with lowest water level (3 liters/m2/day from July to 1st October, then 3 liters/m2/ three days from 1st October till the mid-November), when compared with the culture media (M2, M3, M4) containing lower percentages of sand and higher percentages of clay and compost. In harmony with these results were those obtained by, Kevin *et al*., (2005) mentioned that the sand root zone consistently had the lowest volumetric water content, the water-holding capacity of the rootzone mixes containing soil or peat is higher than the sand rootzone.

Ⅱ Chemical composition

Color content: The plants grown in M2 containing 50% sand + 40% clay + 10% compost, produced the highest values of Chlorophyll a and b, and total Chlorophyll (mg/g fresh weight) these results are in accordance with those obtained by EI-Naggar *et al*., (2004) on Cyperus papyrus,L. They found that the highest significant increase in total chlorophylls (a + b) in fresh leaves and total carbohydrates in dried rhizomes were obtained by using the growing medium of sand + clay + composted leaves.

From the shown data in Table (4) it can be inferred that, raise water levels caused an improvement in the content of photosynthetic pigments Chlorophyll a and b, and total Chlorophyll a+ b (mg/g fresh weight).Therefore it can be stated that irrigation with (7 liters/m2/day from July to 1st October, then 7 liters/m2/ three days from 1st October till the mid-November) was the best irrigation levels for enhancing photosynthetic pigments. These results are in agreement with the findings of Candogan *et al*., (2015) on perennial ryegrass (Lolium perenne L.) who found that the quality and visual color were in decrease significantly with decreases in irrigation water.

Table 4. Effect of different culture media and irrigation amounts on photosynthetic pigments (mg/g fresh weight) of paspalum plant during 2014 and 2015 seasons.

Season (2014)															
Characters	**Chlorophyll (a)**					**Chlorophyll (b)**					**Chlorophyll (a+b)**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	0.540	0.657	0.658	0.555	0.603	0.354	0.446	0.434	0.374	0.402	0.894	1.102	1.092	0.929	1.004
5 liter/m^2/day	0.544	0.640	0.627	0.562	0.593	0.352	0.425	0.420	0.370	0.392	0.896	1.065	1.047	0.931	0.985
3 liter/m^2/day	0.528	0.585	0.584	0.542	0.560	0.333	0.385	0.383	0.354	0.364	0.861	0.970	0.967	0.896	0.923
Mean	0.538	0.627	0.623	0.553		0.346	0.419	0.412	0.366		0.883	1.046	1.036	0.919	
Season (2015)															
Characters	**Chlorophyll (a)**					**Chlorophyll (b)**					**Chlorophyll (a+b)**				
Treatments	**Different media**					**Different media**					**Different media**				
Irrigation amounts	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**	**(M1)**	**(M2)**	**(M3)**	**(M4)**	**Mean**
7 liter/m^2/day	0.579	0.678	0.663	0.611	0.633	0.375	0.465	0.441	0.407	0.422	0.953	1.143	1.104	1.018	1.055
5 liter/m^2/day	0.556	0.649	0.623	0.600	0.607	0.353	0.435	0.432	0.399	0.405	0.909	1.083	1.055	0.999	1.011
3 liter/m^2/day	0.534	0.593	0.586	0.562	0.569	0.340	0.388	0.385	0.364	0.369	0.874	0.981	0.972	0.925	0.938
Mean	0.556	0.640	0.624	0.591		0.356	0.429	0.420	0.390		0.912	1.069	1.044	0.981	

As regard the interaction effect between different culture media and irrigation levels on Chlorophyll a and b, and total Chlorophyll a+ b (mg/g fresh weight) the data was presented in the same table showed that the

highest values were obtained from the plants grown in M2 containing 50% sand + 40% clay + 10% compost and irrigated with highest water level (7 liters/m^2/day from July to 1st October, then 7 liters/m^2/ three days from 1st October till the mid-November). Similar results were obtained by Manoly and Nasr (2008) on Bermuda grass *Cynodon dactylon*, L. They mention that the highest rate of water followed by the medium improved photosynthetic pigments contents.

CONCLUSION

From the above results, Clay soils are not inherently bad, but can be problematic if they lack good structure, to significantly alter a clay soil, sand must be incorporated to about 50% and organic matter 10% by volume of the total soil volume. Soil mixture containing sand, clay and compost (50% sand, 40% clay and 10% compost) and irrigated with highest water level (7 liters/m^2/day from July to 1st October, then 7 liters/m^2/ three days from 1st October till the mid-November) resulted in increasing vegetative growth and chemical composition of *Paspalum vaginatum.*

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تأثير بيئات الزراعه وكميات الرى المختلفه على نمو وتطور نبات الباسبالم

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أجريت هذه الدراسه فى مشتل الجامعه الأمريكيه الموجود فى التجمع الخامس – القاهره الجديده – محافظة القاهره خلال الفتره من 2014 الى 2015. وكان هدف هذه الدراسه فحص تأثير بعض مخاليط الزراعه المختلفه، (المخلوط الأول) ويحتوى على 75% تربة رملية + 20%تربة طمبية + 5% كمبوست، (المخلوط الثانى) ويحتوى على 50% تربة رملية + 40% تربة طمبية + 10% كمبوست، (المخلوط الثالث) ويحتوى على 25% تربة رملية + 60% تربة طمبية + 15% كمبوست و (المخلوط الرابع) ويحتوى على صفر% تربة رملية + 100% تربة طمبية + صفر% كمبوست. مع معدلات رى مختلفه (7، 5 و 3 لتر للمتر المربع فى اليوم) على الصفات الخضرية والتركيب الكمياوى لنجيلة الباسبالم وأوضحت النتائج زياده معنويه فى طول النبات، والوزن الطازج والجاف لناتج القص، والوزن الطازج والجاف للجذور و محتوى الكلورفيل أ، ب وأ + ب للنباتات المزروعه فى المخلوط الثانى ويحتوى على 50% تربة رملية + 40% تربة طمبية + 10% كمبوست والمروى بمعدل مرتفع من الماء (7 لتر للمتر المربع فى اليوم). وأظهرت النتائج ايضا زياده فى الوزن الطازج والجاف للنموات الجانبيه و أقل القيم من عدم التغطيه وذلك للنباتات المزروعه فى المخلوط الرابع ويحتوى على صفر% تربة رملية + 100% تربة طمبية + صفر% كمبوست والمروى بمعدل رى مرتفع. هذا التطبيق يمكن إستخدامه للتغلب على التأثير الضار على النمو والتركيب الكيماوى لنجيلة الباسبالم، فى ظل سوء التهويه والصرف فى التربه الطينيه وعدم القدره على ألاحتفاظ بالماء فى التربه الرمليه. لتقليل المشاكل السابقه يجب خلط التربه الطينيه مع التربه الرمليه مع الماده العضويه. وإستنادا على نتائج هذه الدراسه فإن التربه المثاليه تتكون من إتحاد من حبيبات رمل كبيره وحبيبات طمى صغيره وماده عضويه من أجل التغذيه والاحتفاظ بالماء.