

## EFFECT OF DIFFERENT MEDIA AND IRRIGATION AMOUNTS ON SOME GROWTH CHARACTERISTICS OF PASPALUM (*Paspalum vaginatum*).

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### ABSTRACT

Pot experiment was carried out during 2014 – 2015 On *Paspalum vaginatum* (paspalum turf) at research station and laboratory of the department of vegetables and ornamental plants-Faculty of Agriculture Mansoura University.

Four mixtures of culture media were used to investigate the effect of compost on vegetative growth under three water levels as follows:

#### Soil Mixtures:

Media	Sand%	Clay%	Compost% (vol./vol./vol.)
1 <sup>st</sup> medium	50	50	Zero
2 <sup>nd</sup> medium	45	45	10
3 <sup>rd</sup> medium	40	40	20
4 <sup>th</sup> medium	35	35	30

#### Irrigation:

- (1.250)L/week/pot.
- (2.500)L/week/pot.
- (3.750)L/week/pot.

Results revealed that plant height was significantly affected by compost and irrigation. The use of the 4<sup>th</sup> media with 3.75L/pot significantly gave the greatest height 7.23 cm.

Fresh weight in the same media under the same irrigation significantly produced the greatest value (77.42 g/pot).

Dry weight percentage did not affected by media and irrigation as 2<sup>nd</sup> media with only 1.25L/pot gave the value 37.66% while, 1<sup>st</sup> media with 3.75L/pot gave 37.65% with out significant differences in between.

### INTRODUCTION

*Paspalum* a warm- season turfgrass is a perennial grass with rhizomes and stolons the stem grow 10 to 80 cm tall. The leaves are 10 to 19 cm long with a 3-8 mm width, they are usually green or blue-green in colour.

Cultivation media mainly affects the growth of plants. A good growing media improves the aeration, elements uptake and roots development and allow oxygen diffusion to the roots and permit gaseous exchange between the roots and atmosphere outside the root substrate (Awing, *et al.*2009).

Irrigation also has great effect on turfgrass growth and development. The amounts of water supplied to lawns affects the growth and appearance of the lawn. It is very important to determine the minimum watering requirement for turfgrass species that can be applied without affecting plant growth, quality and appearance significantly.

The current study aimed to investigate the effect of several culture media using clay, sand and compost and water amounts on growth and

chemical composition of *Paspalum vaginatum* determining the suitable media and water amounts may help in reducing the cost of irrigation in arid regions.

## MATERIALS AND METHODS

This study was conducted at research station and laboratory of the Department of vegetables and ornamental plants – Faculty of Agriculture Mansoura University, Arab Republic of Egypt during the two successive seasons of 2014 and 2015 for investigating the effect of growth media and amounts of irrigation water on some vegetative growth characteristics of paspalum. 35 cm diameter pots were used to cultivate paspalum vaginatum turf. Pots were filled with foam in the thickness of 10 cm lied out at the bottom of each pot.

Cultivation was carried out in April. Pots were filled with the used mixed soil up to its half, then they were irrigated next day, after that they were fully filled with the same soil mixture leaving 2 cm at the pot with out soil.

**The mixtures used were as the following:**

Media	Sand%	Clay%	Compost% (vol./vol./vol.)
1 <sup>st</sup> medium	50	50	Zero
2 <sup>nd</sup> medium	45	45	10
3 <sup>rd</sup> medium	40	40	20
4 <sup>th</sup> medium	35	35	30

Pots were divided into three groups according to the water amounts in three levels as follows:

- a. (1.250) l / week / pot
- b. (2.500) l / week / pot
- c. (3.750) l / week / pot

These quantities were divided into three times / week (Saturday - Monday - Wednesday).

All pots were treated with the same fertilization regime 1g/pot monthly with the commercial fertilizer (zeen fert) NPK 20:20:20.

Weeds and exotic plants were removed; manually and whenever the need arises.

**pests resistance:** periodic spraying with pesticides to resist green worm.

Cuts were conducted periodically every month 15 days after fertilizing. The first cut was in May, the second in June, the fourth in July while the last cut was in August.

Turf was cut 3cm above the soil surface.

**Measurements:**

- 1) Plant height; through measuring the length of the plant starting from the pot edge up to the top of potted plant, measuring of the plant length was carried out in five different points and the average for each pot was taken.
- 2) Fresh weight of the plant; the weight of each pot was taken using sensitive balance.

3) Dry weight of the plant; vegetative parts of the plants were dried in an oven at a temperature of 70 °C until reaching a stable weight and calculate the percentage of dry matter according to the following equation:

$$\text{Dry matter} = (\text{dry weight} / \text{fresh weight}) \times 100.$$

## RESULTS AND DISCUSSION

### 1. Effect of growing media, irrigation treatments and their interaction on plant height during 2014 season:

#### Effect of growing media:

Table (1) represents the effect of growing media on plant height during the first season. It is noticed that (4<sup>th</sup> medium) significantly resulted in the greatest value of plant height (11.33cm) followed by (9.86) which obtained from (3<sup>rd</sup> medium) while the least values were resulted from (1<sup>st</sup> medium) and (2<sup>nd</sup> medium) as they were 8.39 and 8.20 cm respectively with non significant differences in between. These results may be due to the role of organic matter in enhancing the growing condition. These results are in agreement with Garling and Boehm (2001) who mentioned that compost increased growth of turfgrass.

#### Effect of irrigation treatments:

Table (1) also refers to the effect of water amounts on plant height during 2014 season. The application of 3.75 L/pot significantly gave the greatest value of plant height as it was 10.46 cm followed by 205L/pot (9.39cm) while, the least value was only 8.49cm resulted from the application of 1.25L/pot with significant differences among the three values. These results who found that the high level of irrigation followed by the medium one, greatly increased plant height.

**Table 1: Effect of media , irrigation and their interaction on plant height during 2014 season.**

A	B	Mowing dates				Media Mean of (A)	Irrigation Mean of (B)	Interaction Mean of (A*B)
		May	June	July	August			
A <sub>1</sub>	B1	11.96	9.73	9.60	5.32	8.39	10.46	9.15
	B2	11.20	8.96	8.26	4.86			8.32
	B3	10.50	7.53	8.06	4.77			7.71
A <sub>2</sub>	B1	10.53	8.83	10.86	5.50	8.20	9.39	8.93
	B2	10.20	7.76	9.63	5.33			8.23
	B3	10.06	6.96	9.40	3.40			7.45
A <sub>3</sub>	B1	11.20	14.50	14.06	6.76	9.86	8.49	11.63
	B2	10.30	11.73	11.06	5.83			9.73
	B3	10.06	8.96	8.96	4.96			8.24
A <sub>4</sub>	B1	12.30	13.76	14.96	7.53	11.33	0.54	12.14
	B2	11.73	13.53	12.86	7.06			11.30
	B3	11.10	12.83	11.66	6.63			10.55
LSD at 5%						0.62	0.54	1.07

**Effect of interaction:**

The same table showed that (4<sup>th</sup> medium) when received 3.75L/pot gave the greatest value of plant height followed by (3<sup>rd</sup> medium) when irrigation with the same irrigation level as they were 12.14 and 11.63cm respectively without significant differences in between but, they both were significant when compared with the least value which resulted from (2<sup>nd</sup> medium) when irrigated with 1.25L/pot as it was only 7.45cm. The previous results are in agreement with the found of Lawson (2002) on grass.

**During 2015 season:**

**Effect of growing media:**

Table (2) shows the effect of growing media on plant height during the second season. Similar results to the first season were obtained in the second one as the greatest significant value of plant height was resulted from (4<sup>th</sup> medium) asit was 6.75cm while the least value was only 4.86cm that gained from (1<sup>st</sup> medium).

**Effect of irrigation treatments:**

Table (2) cleared that there were significant differences among the three irrigation rates as the great one was 6.24cm which resulted from the application of 3.75 L/pot while the application of 2.5 L/pot gave 5.87cm and 1.25 L/pot resulted in the least value as it was only 5.35 cm height.

**Effect of interaction:**

Data in table (2) cleared that the inter action between growing media and irrigation treatment resulted in the greatest significant value of plant height when (4<sup>th</sup> medium) irrigation with 3.75 L/pot as it was 7.23cm followed by the same medium when received only 2.5 L/pot and (3<sup>rd</sup> medium) when watered with 3.75 L /pot as they were 6.89 cm 6.55 in order. The least plant height value was occurred when (1<sup>st</sup> medium) irrigated with only 1.25 L/pot as it was 4.45cm. Previous results of both seasons are a like and in agreement with the founds of Karnok and Tucker (2001) who studied the effect of a soil wetting agent (WA) on relieving soil hydrophobicity and the effect on root growth and shoot quality of penncross creeping bent grass.

**Table 2: Effect of media , irrigation and their interaction on plant height during 2015 season.**

A	B	Mowing dates				Media	Irrigation	Interaction
		May	June	July	August	Mean of (A)	Mean of (B)	Mean of (A*B)
A <sub>1</sub>	B1	5.96	5.40	4.73	4.53	4.86	6.24	5.15
	B2	5.96	5.43	4.63	3.96			5.00
	B3	5.73	4.76	4.20	3.10			4.45
A <sub>2</sub>	B1	7.86	5.86	5.40	4.96	5.50	5.87	6.02
	B2	6.66	5.73	5.10	4.43			5.48
	B3	6.16	5.40	4.63	3.76			4.99
A <sub>3</sub>	B1	7.63	7.10	6.06	5.43	6.18	5.35	6.55
	B2	7.50	6.83	5.43	4.73			6.12
	B3	7.10	6.63	5.30	4.43			5.86
A <sub>4</sub>	B1	9.40	7.63	5.93	5.96	6.75	5.35	7.23
	B2	8.86	7.00	5.83	5.86			6.89
	B3	7.50	6.86	5.50	4.63			6.12
LSD at5%						0.21	0.19	0.38

**Effect of growing media, irrigation treatments and their interaction on fresh weight**

**During 2014 season:**

**Effect of growing media:**

Data in table (3) reveal that there were non significant differences between the two greatest values of fresh weight obtained from (4<sup>th</sup> medium) and (3<sup>rd</sup> medium) as they were 68.28 and 66.15 g/pot in order. Both values were significant when compared with the least one which obtained from (1<sup>st</sup> medium) as it was only 40.39 g/pot. These results are in agreement with those of Cockerham *et al.*(2005) who found that could be made to utilize large volumes of compost from green-waste diverted from landfills. The volume of incorporation of green-waste compost soil amendment for optimal turf performance.

**Effect of irrigation treatments:**

Table (3) cleared that there were significant differences among the three levels of irrigation as the greatest level (3.75 L/pot) gave 62.32 g/pot fresh weight followed by the moderate level (2.5 L/pot) as it was 55.59 g/pot while, the least value was obtained from the least irrigation level (1.5 L/pot) as it was only 47.08 g/pot fresh weight.

**Effect of interaction:**

Table (3) also showed that although the greatest value of fresh weight was 79.18 g/pot obtained from (3<sup>rd</sup> medium) when received 3.75 L/pot, there were non significant differences between it and the following value which obtained from (4<sup>th</sup> medium) when irrigated with the level of 2.5 L/pot as it was 71.99 g/pot. On the other hand, these values were both significant when compared with the least values resulted from (1<sup>st</sup> medium) and (2<sup>nd</sup> medium) when both received only 1.25L/pot as they were 34.66 and 34.45 g/pot respectively. These results may be due to the rule of organic matter in holding water.

**Table 3: Effect of media, irrigation and their interaction on fresh weight during 2014 season.**

A	B	Mowing dates				Media Mean of (A)	Irrigation Mean of (B)	Interaction Mean of (A*B)
		May	June	July	August			
A <sub>1</sub>	B1	50.50	87.90	34.07	16.46	40.39	62.32	47.23
	B2	45.53	72.75	27.70	11.14			39.28
	B3	38.86	71.80	18.62	9.35			34.66
A <sub>2</sub>	B1	86.06	81.39	39.67	15.88	45.17	55.59	55.75
	B2	62.20	70.27	33.68	15.13			45.32
	B3	53.86	50.49	22.73	10.73			34.45
A <sub>3</sub>	B1	120.53	122.23	49.78	24.20	66.15	47.08	79.18
	B2	88.83	116.08	35.71	22.48			65.78
	B3	73.30	92.43	32.78	15.44			53.48
A <sub>4</sub>	B1	94.10	96.12	50.78	27.50	68.28	47.08	67.12
	B2	134.96	92.38	35.32	25.31			71.99
	B3	121.10	91.75	26.73	23.36			65.73
LSD at 5%						5.18	3.35	8.41

**During 2015 season:**

**Effect of growing media:**

Table (4) referred to the effect of growing media on fresh weight during the second season. It is clear that (4<sup>th</sup> medium) significantly gave the greatest value of fresh weight as it was 68.66 g/pot while , the least value was only 44.91 g/pot which resulted from (1<sup>st</sup> medium).

**Effect of irrigation treatments:**

Table (4) also revealed that the greatest significant value was obtained due to the addition of 3.75 L/pot as it was 63.56 g/pot followed by that irrigated with 2.5 L/pot (56.03 g/pot) while, the least one was only 49.93 g/pot which resulted from watering with the level of 1.25 L/pot with significant differences among each other.

**Effect of interaction:**

Data shown in table (4) showed cleared that the greatest significant value of fresh weight was obtained from (4<sup>th</sup> medium) when irrigated with 3.75 L/pot as it was 77.42 g/pot. This value is significant when compared with the following one 66.99 g/pot which resulted from (3<sup>rd</sup> medium) if irrigated with only 1.25 L/pot. The least value of fresh weight in the second season just like the first one was resulted from (1<sup>st</sup> medium) when received only 1.25 L/pot. As it was 37.58. These results may be related to the ability of organic matter to hold more water and nutrients besides the role of mixture in improving aeration and roots growth and it reflects on plant up take and growth.

**Table 4: Effect of media, irrigation and their interaction on fresh weight during 2015 season.**

A	B	Mowing dates				Media	Irrigation	Interaction
		May	June	July	August	Mean of (A)	Mean of (B)	Mean of (A*B)
A <sub>1</sub>	B1	64.83	44.28	31.14	63.34	44.91	63.56	50.89
	B2	63.97	41.28	26.19	53.55			46.25
	B3	63.17	30.31	22.54	34.30			37.58
A <sub>2</sub>	B1	75.76	58.24	44.89	56.75	51.82	56.03	58.91
	B2	69.83	51.15	41.94	47.46			52.59
	B3	66.26	49.83	34.03	25.77			43.97
A <sub>3</sub>	B1	84.10	64.20	54.78	64.89	60.62	49.93	66.99
	B2	84.00	63.47	51.14	36.46			58.77
	B3	82.37	60.58	47.91	33.54			56.10
A <sub>4</sub>	B1	100.76	74.60	67.36	66.97	68.66	49.93	77.42
	B2	89.80	70.36	63.12	42.75			66.50
	B3	84.76	66.48	59.10	37.87			62.05
LSD at 5%						7.80	5.77	8.59

**Effect of growing media, irrigation treatments and their interaction on dry weight percentage**

**During 2014 season:**

**Effect of growing media:**

Table (5) revealed that there were non significant differences in dry weight percentage among the four tested media as values were 36.65, 35.41, 33.60 and 35.21% for (1<sup>st</sup> medium),( 2<sup>nd</sup> medium),(3<sup>rd</sup> medium) and (4<sup>th</sup> medium) in order.

**Effect of irrigation treatments:**

The same table cleared that in the same trend, different water amounts added to the tested pots did not have significant differences among each other as the addition of 1.25, 2.5 and 3.75 L/pot gave 34.57, 34.65 and 36.44% dry weight respectively.

**Effect of interaction:**

Although media and irrigation had non significant differences, the interaction shown in table (5) revealed that there were significant differences among the treatments. The greatest significant value was 37.66% dry weight resulted from (2<sup>nd</sup> medium) when irrigated with only 1.25L/pot followed by 37.65, 36.56 and 36.37% dry weight that were gained from (1<sup>st</sup> medium) when irrigated with 3.75 L/pot, (1<sup>st</sup> medium) when irrigated with only 1.25 L/pot and (4<sup>th</sup> medium) when irrigated with 1.25 L/pot respectively. There non significant differences among the previous results.

On the other hand, all of these values were significant when compared with the least value (32.06%) which resulted from (3<sup>rd</sup> medium) when received 3.75 L/pot.

**Table 5: Effect of media, irrigation and their interaction on dry weight% during 2014 season.**

A	B	Mowing dates				Media	Irrigation	Interaction
		May	June	July	August	Mean of (A)	Mean of (B)	Mean of (A*B)
A <sub>1</sub>	B1	18.70	36.08	54.29	41.54	36.65	34.57	37.65
	B2	22.41	38.47	39.29	42.83			35.75
	B	23.08	39.35	42.26	41.54			36.56
A <sub>2</sub>	B1	25.26	36.64	36.81	38.30	35.41	34.65	34.25
	B2	18.30	38.88	38.66	41.40			34.31
	B3	21.08	39.97	38.52	51.05			37.66
A <sub>3</sub>	B1	24.80	31.72	33.49	38.26	33.60	36.44	32.06
	B2	21.73	39.60	35.22	37.73			33.57
	B3	24.88	36.29	38.16	41.37			35.17
A <sub>4</sub>	B1	24.33	35.85	36.43	40.59	35.21	36.44	34.30
	B2	26.53	34.77	35.23	43.34			34.97
	B3	26.66	38.96	38.72	41.12			36.37
LSD at 5%						-	-	1.50

**During 2015 season:**

**Effect of growing media:**

Data in table (6) cleared that there were non significant differences in dry weight according to the four tested media they gave the values 25.38, 24.39, 24.31, and 24.21% for (3<sup>rd</sup> medium), (1<sup>st</sup> medium), (2<sup>nd</sup> medium) and (4<sup>th</sup> medium) respectively. These results are similar to those of the first season.

**Effect of irrigation:**

Table (6) revealed that the greatest significant value of dry weight percentage was 25.59% according to the use of 3.75 L/pot followed by 24.48% which resulted from the application of 2.5 L/pot with significant

differences in between. There were non significant differences between the last value and the least one that resulted from adding only 1.25 L/pot that it was 23.94%.

**Effect of interaction:**

Data in table (6) referred to the effect of interaction. It is clear that the greatest values were resulted from (3<sup>rd</sup> medium) when received either 3.75 or 2.5 L/pot as they were 25.81 and 25.55% respectively with out significant differences in between. On the other hand, the least values were 23-45 and 23-69% that were obtained from adding 1.25L/pot to (2<sup>nd</sup> medium) and (1<sup>st</sup> medium) in order. Although there were non significant between these values, they both were significant when compared with the previous great values.

**Table 6: Effect of media , irrigation and their interaction on dry% weight during 2015 season.**

A	B	Mowing dates				Media	Irrigation	Interaction
		May	June	July	August	Mean of (A)	Mean of (B)	Mean of (A*B)
A <sub>1</sub>	B1	18.79	26.14	23.44	26.40	24.39	23.94	23.69
	B2	18.90	26.14	24.21	26.40			23.91
	B3	20.21	27.18	25.88	28.97			25.56
A <sub>2</sub>	B1	19.09	24.65	23.77	26.30	24.31	24.48	23.45
	B2	17.15	26.15	26.55	28.53			24.59
	B3	18.35	23.72	27.33	30.20			24.90
A <sub>3</sub>	B1	19.86	25.47	28.22	25.60	25.38	25.29	24.78
	B2	16.94	26.95	31.10	27.20			25.55
	B3	18.84	26.66	29.22	28.53			25.81
A <sub>4</sub>	B1	19.50	24.51	26.66	24.73	24.21	25.29	23.85
	B2	18.55	24.07	27.88	25.00			23.87
	B3	18.62	25.47	29.21	26.30			24.90
LSD at 5%						0.91	0.81	1.60

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تأثير بيئات النمو وكميات الري المختلفة على بعض صفات النمو لنبات الباسبالم  
محمد نزيه شرف الدين ، حسين على احمد ، احمد عبدالمنعم هلالى و  
نه به ز على عبدالرحمن  
قسم خضروالزينة - كلية الزراعة - جامعة المنصورة - مصر.

تم اجراء هذه الدراسة فى مشتل نباتات الزينة بكلية الزراعة جامعة المنصورة خلال موسمى (٢٠١٤، ٢٠١٥) كان الهدف من هذه الدراسة معرفة افضل الخلطات المستخدمة لزراعة مسطح من نبات الباسبالم تحت افضل ظروف الري.

استخدم لهذا الغرض اصص مقاس ٣٥ سم تم ملاءها بالبيئات التالية:

البيئات المستخدمة	رمل	طمي	كمبوست (% حجم/حجم/حجم)
البيئة الاولى	٥٠	٥٠	صفر
البيئة الثانية	٤٥	٤٥	١٠
البيئة الثالثة	٤٠	٤٠	٢٠
البيئة الرابعة	٣٥	٣٥	٣٠

تم ملء الاصص بالبيئات المقترحة وتسوية سطحها وريها حتى ثبات مستوى البيئة داخل الاصص ثم تم زراعة النباتات بكل اصص وريها. خلال هذه التجربة تم اجراء كل الاجراءات الزراعية المطلوبة من مقاومة للحشائش ومقاومة للافات.... الخ.

وتم رى التجربة بثلاث معدلات الري ثلاث مرات بالاسبوع كالتالى:

- ١- (١.٢٥) لتر/اسبوع/اصص.
  - ٢- (٢.٥) لتر/اسبوع/اصص.
  - ٣- (٣.٧٥) لتر/اسبوع/اصص.
- وكان يتم التسميد الدورى للاصص باستخدام سماد زين فيرت N,P,K ٢٠:٢٠:٢٠ كل شهر ومن ثم يتم اخذ القياسات بعد التسميد ب(١٥) يوم.
- وكانت القياسات محل الدراسة
- ١- طول النبات (سم).
  - ٢- الوزن الطازج للنبات (غم).
  - ٣- الوزن الجاف للنبات (غم).

واوضحت النتائج مايلى:

- ١- اعطت بيئة رابعة (٣٥% من كل من الرمل والطين + ٣٠% كمبوست) ففترنه بمعامله الري ثالثة (٣.٧٥) لتر/اسبوع/اصص) احسن النتائج المعلفة بطول النبات معنويا.
- ٢- نفس المعاملات السابقة انتجت اعلى وزن طازج معنويا.
- ٣- لم تتاثر صفة الوزن الجاف معنويا.

وتوصى هذه الدراسة باستخدام الكمبوست فى محل خلطات التربة المستخدمة لزراعة نبات الباسبالم بنسبة ٣٠% من مخلوط الزراعة مما يوفر من كميات المياه المستخدمة لاعطاء افضل نتائج النمو والتكوين واللون للمسطح الاخضر.

