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ORIGINAL ARTICLES

Using Date Palm Leaves Compost (DPLC) For Growing Some Vegetable Crops Transplants

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ABSTRACT

The main objective of this study was to examine possible use of Date Palm Leaves Compost and its mixtures for planting Tomato, Eggplant, Pepper and Cucumber as compare to peatmoss. This work was carried out at Agriculture Research Station, El-Kharga, New Valley during February 10 in 2010 and February 14 in 2011 early summer seasons. Generally, planting in 50% DPLC + 50 % sand mixture improved the vegetative growth of transplants better than rest mixtures in all crops except some characters in Cucumber 100 % peatmoss was the best . So using treatment 3 (50 % DPLC + 50 % sand) instead of treatment 1 (100 % Peatmoss) is promising and economic except Cucumber. Also, using 100 % DPLC in growing vegetables transplants under this experimental condition not recommended as a result from this work but using DPLC with sand is better.

Key words: DPLC, Date palm compost, Peatmoss, Vegtable transplants

Introduction

Date palm (*Phoenix dactylifera* L.) is an important fruit crop in Egypt as well as in the world. The cultivated number is about 14 million trees (FAO, 2009).In the New Valley region, where 1.3 million trees are grown, its agriculture wastes from a major problem. Bahsa, (1998) indicated that a range of 10 – 20 leaves are pruned annually from each tree. Leaving the pruned leaves around the plant causes sever problems of insects and disease infestation along with fire hazards. In many cases the mid rip of the leaf is used for traditional industries while the leaflets are left.

Developing alternative methods to use leaflets is a challenge du to the huge amount produced annually in many locations of Egypt .The use of horticulture wastes as compost could be of positive impact on plant growth as found by Hartz *et al*., (1996). Ali, (2008) examined possible use of Date Palm Leaves (DPL) to determined its effect on seed germination and growth of many ornamental plants for landscape development. Competitive products that are used for seed germination of ornamental plants are relatively expensive as a ton of peatmoss costs 2500-4000 LE as compared to DPL which costs an average of 310 LE. So growing transplants in DPLC is economically better than peatmoss especially. Ali, (2008) found that total number of seeds germinated, rate of seed germination, plant height, number of leaves per plant and the dry-biomass per plant were better in the Date Palm Leaves Compost (DPLC) relative to the peatmoss. Supplementing compost with mineral fertilizers is well known for their beneficial effect on soils and plants. Ali (2011) stated that the heterogeneity of the DPLC mixtures, their use as growth media for ornamental plants is very promising. DPLC mixtures seem potential low cost alternative to imported growing medium. Also, added more research is needed to improve DPLC mixtures in an arid environment for sustainable landscape development for community services. Information on the use of Date Palm Leaves Compost (DPLC) is limited under local conditions.

The main objective of this study was to examine the growth of some vegetables transplants namely, Tomato, Eggplant, Pepper and Cucumber in peatmos , DPLC and its mixture with sand as growing medium.

Materials And Methods

This study was carried out in the greenhouse of the Agriculture Research Station, El-Kharga, New Valley during February 10 in 2010 and February 14 in 2011 early summer seasons to examine the possibilities of using Date Palm Leaves Composts as medium for vegetable transplants cultivation.

Preparation of Date Palm Leaves Compost (DPLC):

Date palm leaves compost was prepared by following the method described by Abu-Alfadhal (1970) with some modification of Ali, (2011). The dried Date Palm Leaves (DPL) were chopped into 10 cm segments and

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buried in 2x1 m size concrete pit with a 1.1 m depth. The compost layers were built in such a way that each layer was about 25 cm deep. First a layer of 96 kg of dried date palm leaves was placed in the bottom and then, the desired quantity of a mixture of ammonium sulfate, trisuper phosphate, fine (100 μ) calcium carbonate and clay in a ratio of 35:7:35: 100 kg, respectively, per ton of dried date palm leaves was distributed homogeneously. Each layer was sprayed with 77 L of water having a total salinity of 640 mg L^{-1} Total Dissolved Solids (TDS). In all, there were 4 identical layers of DPL, making the total depth of DPL up to 1 m in height. The compaction of date palm leaves was done manually at the time of making each compost layer for proper decomposition. Initially, the compost layers were stirred after six weeks followed by remixing the compost layers with an interval of 3-weeks. After 6-months, the compost pit was opened. The completely decomposed date palm leaves (compost) were separated from the un-decomposed part of date palm leaves which was mainly the hard mid-rib of the palm leaves. The decomposed portion of the date palm leaves (compost) was used in the experiments.

Five medium were used in these experiments. The tested medium were, 1 made of 100 % peatmoss, 2 made of 25 % DPLC+ 75 % sand 3 made of 50 % DPLC+ 50 % sand, 4 made of 75 % DPLC+ 25 % sand and 5 made of 100 % DPLC.

Four vegetable crops, i.e., Tomato, Eggplant, Pepper and Cucumber were used to measure their response to the medium using four sets of experiments. Each experiment handled a single crop.

Greenhouse experiment layout:

The seeds (50 seeds in each replication) of Tomato (super strain B), Eggplant (Black beauty), Pepper (California wender) and (10 seeds in each replication) of Cucumber (beta alfa) were placed in trays filled with 100 % petmoss, mix DPLC with sand as mentioned (25, 50 and 75 % DPLC) and 100 % DPLC. The trays were kept in a greenhouse with inside temperature of 25±2°C the treatments were replicated 5 times. The seed germination was complete in a week. The pots were fertilized at the rate of 150 mg L^{-1} of compound water soluble fertilizer with a composition of 20:20:20 with irrigation water. Used sand was washed many times to get rid of salts.

Table 1: Comparative chemical composition of DPLC and peatmoss.

Analysis	DPLC	Peatmoss
Weight of m3	600 kg	450 kg
Moisture%	27.00	26.73
pH (1 : 10)	8.38	6.32
EC (1 : 10)	3.45 DS\m	1.33 DS\m
Total nitrogen %	0.90	0. 94
Organic substances %	26.97	45.00
Organic carbon %	15.64	26.10
C: N Ratio	17.37	27.77
Total phosphorus %	0.79	0.004
Total potassium%	0.94	0.06

After 6 weeks from planting, in each replication, all germinated plants was counted, data recorded on five plants such as, Height of plants was measured, number of leaves were counted, stem thickness was measured, fresh plants were weighted and the shoot dry weight was determined after oven drying at 70°C for 24 hours.

Statistical analysis:

The experiments were laid out as a Completely Randomize Design with 5 replications and with 5 plants per replication. All the data were analyzed in combined analysis using ANOVA (Mstat-c, 1991) and means were compared using L.S.D at 0.05 and Duncan's New Multiple Range Test, (Steel and Torrie, 1996).

Results And Discussion

Data in Tables 2 and 3 represents the combined means and significance status of the four crops in the two seasons experiments. The findings could be summarized as follows:

I – Germination of seeds:

The data indicated that germination of seeds varied according to the examined crops Table 2 and Fig 1. Tomato germination was maximum when Treatment 3 (50% DPLC + 50% sand) was used .However, the recorded value did not differ statistically from that of Treatments 1 (100% peatmoss) or 4 (75% DPLC + 25 % sand). As for Eggplant and Pepper, both of them were better under Treatment 3 or 4. On the other hand,

Cucumber germination was at its best when peatmoss was used as media. The differences reported here could be due to the differences in germination pattern of plants belonging to *Solanaceae* as compared to *Cucurbitaceae*. In addition, medium containing DPLC are alkaline with high EC value as compared to the acidic, low EC peatmoss. These attributes, along with P and K values, could affect the newly developed roots and reduce its germination in a manner that differed according to the crop itself. These results differ from those of others investigators who concluded that DPLC proved better growing medium for seed germination of ornamental plants than the peatmoss. This could be attributed to moderate pH, available ammonium and Water Holding Capacity (WHC) and the higher nutrient value of the DPLC than the peatmoss (Ali, 2008). Also, the results disagree with those of Burger *et al*. (1997), who found that seed germination was better in green plants compost.

Table 2: Effect of the different treatments on percentage of germination in all crops.

Treatments	Tomato	Eggplant	Pepper	Cucumber
1 (100 % Peatmoss)	72.40 AB	65.20 BC	63.68 BC	82.00 A
2 (25 %DPLC + 75 % sand)	64.40 BC	62.40 CD	59.20 C	60.00 B
3 (50 %DPLC + 50 % sand)	76.40 A	72.40 A	71.60 A	68.00 B
4 (75 %DPLC + 25 % sand)	72.80 AB	69.60 AB	68.80 AB	60.00 B
5 (100 % Peatmoss)	58.00 C	58.00 D	60.40 C	36.00 C
LSD 0.05	9.21	4.54	5.55	10.47

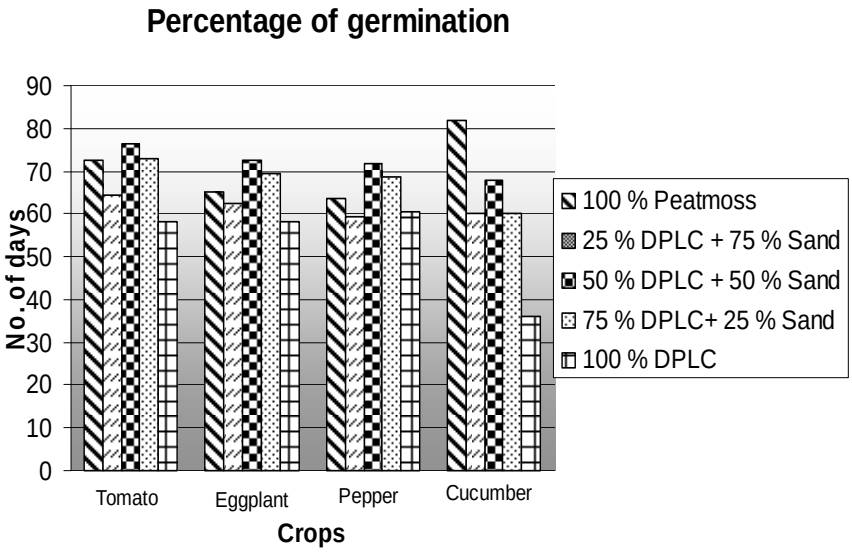

Fig. 1: Percentage of germination in all crops.

II - Seedling growth attributes:

Tomato: The effect of using DPLC combinations in comparison to the peatmoss is listed in Table (3). The differences between treatments were highly significant for all studied characters except stem thickness was only significant. Treatment 3 (50% DPLC + 50% sand) was the best for all studied characters. No significant differences were found between 3 (50% DPLC + 50% sand) and both treatments 1 (100% peatmoss) and treatment 4 (75% DPLC + 25 % sand), and both treatments were ranked second to treatment 3 in most of the studied characters. Lowest response was found for seedlings, grow in treatment 5 (100 % DPLC) for all the studied characters.

Eggplant: The differences between treatments was highly significant in plant height and No. of leaves , and only significant in stem thickness, fresh weight and dry weight. Treatment 3 (50% DPLC + 50% sand) was the best for all studied characters in Eggplant (Table 3) the second best treatment in the order was 4 (75% DPLC + 25 % sand) for all studied characters except plant height treatment 1 (100% peatmoss) was the second best. Treatment 5(100 % DPLC) registered the lowest values for all studied characters except stem thickness treatment 2 (25 % DPLC + 75 % sand) was the least.

Pepper: The differences between treatments were highly significant for all studied characters except plant height was only significant and dry weight was not significant. Treatment 3 (50% DPLC + 50% sand) was the best for all studied characters (Table 3), the second best treatment was 4 (75% DPLC + 25 % sand) for all studied characters except plant height treatment 1 (100% peatmoss) was the second best. The lowest values in this respect were recorded from treatment 5 (100 % DPLC).

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Cucumber: The illustrated data in (Table 3) showed the highly significant differences between treatments studied with regard to plant height and No. of leaves, and only significant in stem thickness, fresh weight and dry weight. Treatment 1 (100% peatmoss) was the best in plant height and stem thickness and treatment 3 (50% DPLC + 50% sand) was the best for No. of leaves, fresh and dry weight. Also, treatment 5 (100 % DPLC) was the least for all studied characters in cucumber. This results agree with (Roa, 1998) who found that effect of compost on growth can vary with plant species. Also, these results not similar with (Ali, 2011) and (Swanson, 1989) who reported that plants produced in DPLC grew considerably larger than those produced in DPLC, sand or clay (2:1) mixture. This might be due to the more P availability in DPLC than its mixture with sand and clay or on the other hand due to better physical properties of DPLC.

Table 3: Effect of the different treatments on the vegitative characters in all crops.

Plants	Characters	Treatments										Lsd (0.05)	C.V. %
		(1)		(2)		(3)		(4)		(5)			
Tomato	Plant height (cm)	16.32	AB	14.94	BC	17.88	A	15.94	AB	12.86	C	2.43	11.64
	NO. of leaves / plant	5.24	ABC	4.84	BC	6.36	A	6.00	AB	4.20	C	1.14	16.01
	Stem thickness (m/m)	2.71	AB	2.14	AB	2.78	A	2.31	AB	2.06	B	0.62	19.01
	Fresh weight (gm/plant)	5.53	A	4.72	BC	5.82	A	5.20	AB	4.15	C	0.73	10.68
	Dry weight (gm/plant)	1.52	AB	1.39	BC	1.56	A	1.46	AB	1.25	C	0.15	7.73
Eggplant	Plant height (cm)	16.32	AB	14.8	B	18.08	A	16.08	B	12.64	C	1.89	9.03
	NO. of leaves / plant	4.92	BC	4.92	BC	6.08	A	5.78	AB	4.32	C	0.96	13.82
	Stem thickness (m/m)	2.93	ABC	2.28	C	3.49	A	3.31	AB	2.55	BC	0.73	18.59
	Fresh weight (gm/plant)	5.76	A	5.36	AB	6.07	A	5.82	A	4.40	B	1.15	15.63
	Dry weight (gm/plant)	1.76	A	1.69	A	1.79	A	1.77	A	1.39	B	0.27	11.93
Pepper	Plant height (cm)	18.10	A	16.14	AB	18.56	A	16.86	A	13.46	B	3.04	13.64
	NO. of leaves / plant	4.60	B	4.60	B	5.72	A	5.48	A	4.00	B	0.86	13.19
	Stem thickness (m/m)	2.26	B	2.10	BC	2.68	A	2.60	A	1.87	C	0.25	8.14
	Fresh weight (gm/plant)	3.97	BC	4.54	AB	5.11	A	4.97	A	3.76	C	0.64	10.62
	Dry weight (gm/plant)	1.27	-	1.29	-	1.36	-	1.33	-	1.24	-	N.S	7.23
Cucumber	Plant height (cm)	18.50	A	15.76	B	17.52	AB	16.14	B	10.82	C	1.81	8.57
	NO. of leaves / plant	4.48	BC	5.24	AB	5.72	A	5.48	A	4.00	C	0.95	14.18
	Stem thickness (m/m)	3.72	A	3.05	BC	3.47	AB	3.16	BC	2.78	C	0.51	11.65
	Fresh weight (gm/plant)	5.96	A	5.62	A	6.06	A	5.84	A	4.11	B	1.23	16.67
	Dry weight (gm/plant)	1.43	AB	1.33	B	1.52	A	1.40	AB	1.27	B	0.16	8.75

Conclusions:

In this study, using of the DPLC as a growing media proved to be promising and had potential low cost alternative to treatment peatmoss . In *Solanaceae* crops, Tomato, Eggplant and Pepper, treatment 3 (50% DPLC + 50% sand) was the best all studied characters. While, treatment 1 (100% peatmoss) was the best in some characters in Cucumber. Also, using 100 % DPLC in growing vegetables transplants under this experimental condition not recommended as a result from this work but using DPLC with sand is better.

References

Abu-AlFadhal, M.M., 1970. Organic Manures. 1st Edn., Al-Saadah Publishers, Cairo, Republic of Egypt, Egypt.

Ali, Y.S.S., 2008. Use of date palm leaves compost as a substitution to peatmoss. Am. J. Plant Physiol., 3: 131-136.

Ali, Y.S.S., 2011. Effect of Mixing Date Palm Leaves Compost (DPLC) With Vermiculite, Perlite, Sand and Clay on Vegetative Growth of Dahlia (Dahlia pinnata), Marigold (Tagetes erecta), Zinnia (Zinnia elegans) and Cosmos (Cosmos bipinnatus) Plants. Research Journal of Environmental Sciences, 5: 655-665.

Bahsa, M.A.A., 1998. Fruit production in the Kingdom of Saudi Arabia. Technical Publication, Dirab Experimental Station, King Saud University.

Burger, D.W., T.K. Hartz and G.W. Forister, 1997. Composted green waste as a container medium amendment for the production of ornamental plants. Hort. Sci., 32: 57-60.

FAO, 2009. Agriculture data. Food and Agriculture Organization of United Nation, Rome, Italy. http://faostat.fao.org/.

Hartz, T.K., F.J. Costa and W.L. Schrader, 1996. Suitability of composted green waste for horticultural uses. Hort. Sci., 31: 961-964.

Mstat, C., 1991. A microcomputer program for design management and analysis of agronomic research experiments. Michigan State University, East lansing, MI, USA.
Roe, N.E., 1998. Compost utilization for vegetable and fruit crops. Hortic. Sci., 33: 934-937.
Steel, G.D. and J.H. Torrie, 1996. Principles and Procedure of Statistics with Special Reference to the Biological Sciences. 1st Edn., McGraw-Hill Book Co. Inc., New York.
Swanson, B.T., 1989. Critical physical properties of container media. Am. Nurseryman, 169: 59-63.