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The effect of palm waste substrate on quality characteristics of 2 dwarf grenadines varieties and spray in soilless culture

Hedayat Dehghani Poode*, Ahmad Mohamadi Ghahsareh, Nemat allah Etemadi, Mahmood Kalbasi

Department of Soil Science, Khorasgan (Isfahan) Branch, Islamic Azad University, Isfahan, Iran

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Abstract

Growing plants in substrates are developing due to many advantages such as plant nutrient control, increasing product quality and quantity that soil cultivation and increasing performance. The purpose of this research is to investigating effect of particles size and period of compositing palm tree wastes as substrates on quality and quantity characteristics of grenadine this experiment was conducted in researches greenhouses of khorasgan Eslamic Azad university (Esfahan) as combine and then separated by sift in three sizes 0-0.5, 0.5-1 and 1-2 cm and 3 time periods 0 (without composting 3 and 6 month for composting period to be considered. Then these substrates with the cocopeat-perlit substrate were spilled in pots 3litrs and was planted grenadine with 2 different dwarf varieties and spray in to this bed. In dwarf variety, effect of substrate on flower diameter and canopy level was meaningful and in spray, none of the quality parameters were not meaningful difference.

* **Corresponding Author:** Hedayat Dehghani Poode ✉ hedayat_dp@yahoo.com

Introduction

Now, we have thousands of grenadine variety in world as modified and proposed. Some of them are compatible to particular environmental conditions. All used varieties are grown as 2 kind standard and spray for producing green house cut flower. The most important subject is the selection and maintance native plants for preparing cuttings.

The most important substrates physical feature is suitable amount of available water along with supplying adequate airSubstrate humidity curve propose very good information about substrate in supplying water and air for plant roots in different humidity and volume of substrate. Also, Availability of water in substrate is effectiveness for plants.

In porous materials, by reducing water amount, water conductivity decrease sharply (savas., 2003). For investigating effect of off-irrigation and substrate on some tomato growth parameters and performance in soilless culture, results showed that there werenot meaningful difference between experimental substrates (perilt , lika, periletlika) in terms of node number, length and diameter of stem, number of in florescences, stem and leave dry weight number of fruits, average fruit weight in every shrub. Mutual effect of off- irrigation and substrate showed that the most performance and average fruit weight related to lika substrate with off- irrigation was 12 times in day that there was not meaningful difference with 8 times in day and similar substrate (shahinRokhsar *et al*., 1386).

For investigating number effect of substrates on straw berry had the most effect on developing root (sezal *et al*., 2005). In various researches, husk has been used as organic compounds (shelled pine) or inorganic (vermiculite and perlite) substitutes. Rice husk have cation exchange capacity and low water- holding capacity (teskaldimi., 2006). Investigation results about planting peat plvs leaves in sarah, waste coconut (cocopeat), palm wastes (palm peat) and sugar cane bagasse in pure and also mixed to 50% perlit showed that the highest leaf area, fresh and dry weight of shoot and root, number of root and length of the srews in cocopeat substrate and the lowest was observed in sugarcane bagasse Borji in 1389 examined tomato culture in palmpeat treatments of 2 fermented month 100% , crude palmpeat 100% , crude palm peat + coco peat (50% = V/V), fermented 2 month palm peat + coco peat (50%=V/V), crude palm+ perlit (50% = V/V), fermented 2 month palm + perlit (50% = V/V), perlit + coco peat (50% V/V) perlit 100%. The most rate of actual specific mass was related to perlit substrate, palm peat 1 and palmpeat2 that was more than coco peat. Superficial specific mass in perlit had the lowest and in cocopeat and palmpeat 1(0.16g/cm2) and palmpeat 2 (0.17g/cm2) had the most amount. The most pore rate was related to palmpeat 1 (92%) and lowest pore rate was related to perlit (68%). The most rate of water- holding capacity was related to coco peat (90/48%) and its lowest was related to perlit (69.7%). Samiee and *et al* have examined effect of chemical and physical features of Aglunama plant in 4 substrates that peatmas, coco peat, palmpeat and sugarcane bagasse have been used. In experiments, the most growth has obtained in coco peat substrate and there are not meaningful differences between Aglunama stem lengths in various substrates, but its shortest was related to coco peat and its longest was related to sugarcane bagasse coco peat has been created best growth for having suitable chemical and physical features. In plant Mean while , palmpeat substrate in plant growth indicators cases have have meaningful difference with peatmus that shows that this substrate can be used as substitution bed. MohamadiGhahsared *et al*(2011) have examined effect of coco peat, palm peat and perlit substrates on tomato plant chemical and physical features. In this experiment, the most chemical- physical features such as EC, CEC, C/N WHC in above substrate was reffered to coco peat and perlit and the most pore rate was related to palmpeat and Lowest lowest rate was related to perlitMean while, the most N K and P Concetration was reffered to coco peat substrate and its Lowest was related to perlitMortazavi in 1391 divided palm substrate in to 3 sizes 0-5, 5-10 and 10-20 ml and examined 3 composing periods 3 and 6

month on them and investigated chemical- physic features of these substrates. Obtained results of this research show that there are meaningful differences between particles size during composting period in EC, PH andoc in level 5%. In all levels, oc decrease from primary to end and the most difference was observed in 0-5 size. Hesami and *et al.* (1389) studied palm wastes usage as substitution for coco peat in straw berry culture. So various relations of palm petiolule, coco peat and perlit with 15 treatments and 4 repetitions have been used. Design results showed that 2 parts of perlit one part of palm petiolule + one part of coco peat treatment had meaningful difference in trams of quantity factors with other treatment and named better treatment. Also treatment of 3 parts of palm petiolule + one part of coco peat and 3 parts of coco peat + one part of palm petiolule had best fruit qulityinterms of soluble silid matter rate in fruit extraction. According to commercial culture environment is compound of perlit and coco peat, so experiment results shows negative response relation to coco peat substitutes possibility with palm wastes. The purpose of this research is growth comparison, clove quality and quantity features in palmpeat substrates (palmpeat in sizes 0-0.5, 0.5 -1, 1-2 cm and composting period 0 , 3, 6 month) with coco peat and perlit composition and selection of best bed.

Materials and methods

Plant material and experimental design

This experiment was conducted for studing effect of palmpeat substrate on greenhouse clove quality and quantity features in soilless culture in 2013 in research green house of Esfahan Eslamic Azad university (khorasgan) in culture period 9 months. In this experiment clove with *Dianthus caryophylluslilliot* varieties and spray variety of sim group has been used over substrate was used palm yarn that divided to 3 sizes 0-0.5, 0.5-1 and 1-2cm and 3 periods of composting 0 , 3 and 6 months on them and this substrate was spilled pots 3 litrs and in every pot was planted clove subshrub in january 2013. Before planting pots was washed and after clove cuttings plant, pots were put on the table, and irrigation system under pressure was used for pots irrigation.

Experimental treatments

This experiment was lpanted including 10 treatments (substrate) that 2 clove varieties on this 10 treatment as completely randomized design in 4 repetitions. Treatments include. Coco peat + perlit (50=V/V). (coco+ per), palm with less particle size from 5.0 cm with composing period 0 (c_1s_1) , palm with less particle size from 5.0 cm with composing period 6 month (c_1s_3), palm with particle size 1- 5.0 cm with composing period 0 (c_2s_2), palm with1-5.0 cm with composting period 3months (c_2s_2),palm with particle size 1-5.0 cm with composting period 6 months (c_2s_3) palm with particle size 1-2 cm with composting period 0 (c_3s_1) ,palm with particle size 1-2 cm with composting period 3 months (c_3s_1), palm with particle size 1-2 cm with composting period 6 months (c_3s_3).

substrate physical and chemical analysis

In this research, superficial and real specific mass and pore of total substrate were measured by (Barva and Bartakur., 1998) method and water- holding capacity method by volume method. In (1) and (2) tables, substrates physical and chemical features are observable.

Measuring methods studied

After growth period and in dwarf varity, reminder shrubs were separated and were measured their eights and also rootsofthis shrubs separated from substrate and measured their weights. Roots and dwarf variety shrubs and spray variety branches were transmitted to Avan in 70 c and after 24h their dry weights measured. flower diameter, using kulis and for measuring canopy mass in dwarf variety, 2 Liners were put vertically on each others accidentally on canopy level and measured canopy level and recorded and after germinating first flower, flowers were accounted stem diameter in spray variety was measured using kulisslimbs length in spray variety was measured using meter so in dwarf variety, dry and fresh weight of root and plant number and diameter of flower, canopy level and plant height and in spray variety, dry and fresh weight of roots and

limbs and diameter and number of flower and length and diameter of stem measure.

Statistical analysis

Statistical calculations were conducted using SAS Statistical program and then were conducted averages comparison by Danken test method.

Results and discussion

Effect of substrate on clove quality features dwarf variety substrate effect on fresh plant weight

Effect of substrate on fresh plant weight dwarf variety was meaningful in level 5%. Averages comparison that figure (1) has meaningful difference with the most fresh plant weight rate related to treatment 0-0.5 cm and composting 6 months (244.86g) in level 5% with treatment 1-2 cm and composting 3months and treatment 1-2 cm and composting 0 month. Substrate effect on fresh limbs weight in spray variety was not meaningful. The most fresh weight was related to treatment 0-0.5 cm and composting 6 month that have difference with cococpeat perlit treatments and 0.5-0 cm and composting 3months and 1-2 cm and composting and had not difference with other treatments. If particle size is coarser, specific level is lower and total pores is more and in conclusion, water- holding capacity become lower and when particle size become coarser , cation exchange rate become lower too and also plant in coarser substrates and without compost have have lower performance, on the other hand , when particle become finer and analyze more then water and nutrient in this substrate lead to plant and performance and growth indicator become higher and plant weight become higher. (mohamadi Ghehsareh., 2012). Ali Mahboob (2010) examined effect of compost turgor and sawdust and cow fertilizer in Bakhidifen plant culture- Results showedthat the most fresh eight of stem and leaf in substrate 25% compost turgor cow fertilizer + sawdust. Was observed. Effect of substrate on dry plant weight, dwarf variety, in level 5% did not become meaningful and the most dry plant weight is related to treatment 0-0.5 cm and composting 6 month. Khayat and *et al* results showed that the most dry plant and leaf weight is related to compost turgor treatment.

Table 1. The physical properties of the material in the substrate before culture.

Water holding capacity %	Easy Available water %	Total Porosity %	Air porosity %	Bulk density g.cm^3	substrate
89.65	24.84	83	26.6	0.25	C_1S_1
57.50	17.01	88	48	0.18	C_1S_2
37.75	9.5	87	57.7	0.19	C_1S_3
94.26	16.64	89	35.7	0.17	C_2S_1
74.57	18.80	88	33	0.18	C_2S_2
83.48	16	87	40.5	0.19	C_2S_3
92.62	20.93	90	31.5	0.15	C_3S_1
58.91	19	89	35.6	0.16	C_3S_2
59.31	10	88	48.2	0.17	C_3S_3

C_1S_1 (0-0.5 cm and 0 month composting), C_1S_2 (0.5-1 cm and 0 month composting), C_1S_3(1-2 cm and 0 month composting), C_2S_1 (0-0.5 cm and 3 month composting), C_2S_2 (0.5-1 cm and 3 month composting), C_2S_3 (1-2 cm and 3 month composting), C_3S_1 (0-0.5 cm and 6 month composting), C_3S_2 (0.5-1 cm and 6 month composting), C_3S_3(1-2 cm and 6 month composting).

substrate effect on number of flower

Substrate effect on flower number in dwarf variety in level 1% became meaningful. According to figure (2), the most flower number is related to cocopeat- perlit treatment (11.33 average number) But effect of substrate on limbs number, spray variety was not meaningful . The most rate of flower number is related to treatment 1- 0.5 cm and composting 3months (9.475 average flower in every limb) and lowest rate of flower number is related to coco peat-perlit treatment (5.298 flower number in every limb) sizes 1-0.5 and 1-2 cm and composting 3months (9.475 average flower in every limb) and lowest rate of flower number is related to coco peat treatment

(5.298 flower number in every limb). Sizes 1-0.5 and 1-2 cm and composting 0 month have used bed particle because of have had composting period and substrate material were coarser and presence of microorganisms in substrate, because of have been C kind. When organic matter is crude, C to N ration is higher and microorganism compete to plant for organic matter fermentation for nutrient absorption and because microbal numbers are great in Rizospher, plant performance decrease. Vilson *et al* (2011) examined 2peat culture environment and coconut yarn along with various composting levels (0-25-50-100) and breeded hyacinth in this culture environment. Results that this flower in culture environment without peat coco nut composting period caused to decrease these parameters. But flowers didn't have good quality. Mohammad Ali khalj in 2011 examined lilium on various substrates and investigated quality and quantity features in this flower. Obtained results showed that substrate of this flower must be have good permeability and sitabledrainage, But very light soil is not suitable for it. Information shows that peat and perlit substrate (1:1) is best treatment for producing this plant. In peat and perlit treatment (1:1), flowers have more numbers. Malupa and *et al* (1996) compared zherbera growth, fim variety, in 3 perlit. Substrate, perlit and peat mix proportional to 1 to 1 and pumais and results showed that the most flower number is related to peat + perilt (1:1) mix and lowest flower number is related to pumais substrate.

Table 2. The chemical properties of the material in the substrate before culture.

C/N	CEC (cmol/kg)	pH	EC (ds/m)	substrate
37.88	38.85	6.84	6.29	C_1S_1
40.83	28.84	6.74	3.91	C_1S_2
43.67	18.22	6.69	3.41	C_1S_3
29.85	47.49	6.72	5.68	C_2S_1
33.56	36.26	6.62	4.42	C_2S_2
30.76	28.99	6.54	3.80	C_2S_3
25.43	59.11	6.91	5.99	C_3S_1
28.20	38.30	6.86	4.62	C_3S_2
23.68	34.95	6.82	4.97	C_3S_3

C_1S_1 (0-0.5 cm and 0 month composting), C_1S_2 (0.5-1 cm and 0 month composting), C_1S_3(1-2 cm and 0 month composting), C_2S_1 (0-0.5 cm and 3 month composting), C_2S_2 (0.5-1 cm and 3 month composting), C_2S_3 (1-2 cm and 3 month composting), C_3S_1 (0-0.5 cm and 6 month composting), C_3S_2 (0.5-1 cm and 6 month composting), C_3S_3(1-2 cm and 6 month composting).

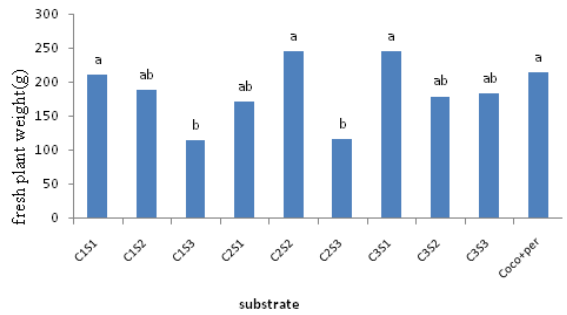

Fig. 1. Effect of substrate on fresh plant weight dwarf variety.

Effect of substrate on canopy level, dwarf variety: effect of substrate on plant canopy level, dwarf variety had meaningful difference in level 5%. As observe in figure (3), the most rate of canopy level is related to 0-0.5 cm treatment and composting 0 month (775.47 cm2) that have meaningful difference with treatment 1-2 and composting 0 month. But had not meaningful difference with other treatments. As we said before, low plant growth in substrate with sizes 1-2cm and composting 0 month is due to coarse substrate particle that have had problem ion providing nutrients and have damaged canopy growth effect of various substrates on Ahar quality and quantity features examined by Hamid Amjaziand *et al*. This research showed that the most leaf area is in compost turgor treatment. Must be noted that substrate effect on root dry and fresh weight, flower diameter and plant height were not meaningful. Substrate on none

of quality parameters, spray variety, had not meaningful effect.

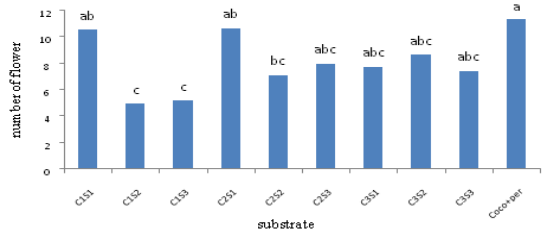

Fig. 2. Substrate effect on flower number in dwarf variety.

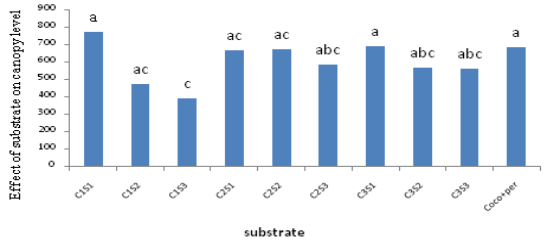

Fig. 3. Effect of substrate on canopy level, dwarf variety.

Conclusion

Plant dry and fresh weight, flower number, canopy level, dwarf variety in present substrate have meaningful dissrence. According to present result, conducting composting period for limb clove culture, spray variety, dosen't recommend and only must be used fine particle 0- 0.5cm of palm wastes According to considering economical problems and exchange exit of country, more efficiency of palm owners, palm wastes optimum management and importation present substrates, palm wastes substrate, palm wastes substrate propose as other substrate substitution for present clove. We propose that future studies, effect of substrates onHydropuniccommercial plants performance and growth such as cut – limb flower (Rose and zherebera) and other vegetables and also strawberry that have suitable economical justification in Hydropunic cultures must be studied

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