SOURCES ALTERNATIVE OF ORGANIC MATTERS FOR MIX OF SUBSTRATES FOR THE PRODUCTION OF YELLOW-PASSION SEEDLINGS

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ABSTRACT: Most of the time, seedlings of yellow passion fruit are produced from seeds. The success in the establishment of the culture depends on several factors, such as the use of seeds of good quality and choice of the best substrate. This work the aim, was to evaluate sources alternative of organic matter in the mixture of substrates for the production of yellow-passion (*Passiflora edulis* Sims *f. flavicarpa* Deg) seedlings. The experimental design was in blocks completely randomized, with ten treatments, with four repetitions and ten plants per parcel, been the treatments: pure soil (S), soil + goat manure (S + GM) in the proportion of 3:1, soil + sheep manure (S + SM) in the proportion of 3:1, soil + bovine manure (S + BM) in the proportion of 3:1, soil + earthworm humus (S + H) in the proportion of 3:1, soil + goat manure + sheep manure (S + GM + SM) in the proportion of 2:1:1, soil + goat manure + bovine manure (S + GM + BM) in the proportion of 2:1:1, soil + sheep manure + bovine manure (S + SM + BM) in the proportion of 2:1:1 , soil + sheep manure + bovine manure (S + SM + BM) in the proportion of 2:1:1, pure soil fertilized with single superphosphate and potassium chloride (S + P + K) at doses of 1 kg m^{-3} and 0.5 kg m^{-3} respectively and pure soil fertilized with only single superphosphate (S + P) at a dose of 1 kg m^{-3}. The use of goat and sheep manure in mixtures of substrates provided good results in the production of Yellow-passion seedlings. Of all the tested substrates, the substrate soil + bovine manure in the proportion of 3:1 promoted the best development of the yellow-passion seedlings.

Key words: *Passiflora edulis* Sims *f. flavicarpa* Deg, goat manure, sheep manure, fertilization

FONTES ALTERNATIVAS DE MATÉRIA ORGÂNICA PARA MISTURA DE SUBSTRATOS PARA A PRODUÇÃO DE MUDAS DE MARACUJAZEIRO 'AMARELO'

RESUMO: Na maioria das vezes, a muda de maracujazeiro 'amarelo' é produzida a partir de sementes. Neste sentido, o êxito no estabelecimento da cultura depende de vários fatores, entre os quais está a utilização de sementes de boa qualidade e a escolha do melhor substrato. Nesse trabalho objetivou-se avaliar fontes alternativas de matéria orgânica na mistura de substratos para a produção de mudas de maracujazeiro 'amarelo' *(Passiflora edulis* Sims *f. flavicarpa* Deg). O delineamento experimental utilizado foi o de blocos casualizados com dez tratamentos, quatro repetições e dez plantas por parcela, sendo os tratamentos: solo puro (S), solo + esterco caprino (S + EC) na proporção de 3:1, solo + esterco ovino (S + EO) na proporção de 3:1, solo + esterco bovino (S + EB) na proporção de 3:1, solo + húmus (S + H) na proporção de 3:1, solo + esterco caprino + esterco ovino (S + EC + EO) na proporção de 2:1:1, solo + esterco caprino + esterco bovino (S + EC + EB) na proporção de 2:1:1, solo + esterco ovino + esterco bovino (S + EO + EB) na proporção de 2:1:1, solo puro adubado com superfosfato simples e cloreto de potássio (S + P + K) nas doses de 1 kg m^{-3} e 0,5 kg m^{-3} respectivamente e solo puro adubado apenas com superfosfato simples (S + P) na dose de 1 kg m^{-3}. A utilização de esterco caprino e ovino em misturas de substratos proporcionou bons resultados na produção de mudas de

maracujazeiro 'amarelo'. De todos os substratos testados, o que promoveu melhor desenvolvimento das mudas de maracujazeiro 'amarelo' foi o substrato solo + esterco bovino na proporção 3:1.

Palavras-chave: *Passiflora edulis* Sims *f. flavicarpa* Deg, esterco caprino, esterco ovino, adubação.

INTRODUCTION

The seedling is the most important input in the establishment of the orchard; seedlings produced with quality, provided that properly managed, rises profitable orchards, but they need to use the best techniques for formation of the same (Pasqual et al. 2001).

The quality of the substrate for production of seedlings results from the combination of yours chemical and physical properties, which can be adjusted by the formulation of double or triple mixes (Negreiros et al. 2004).

The association of materials, especially in combination with the soil, improving the conditions for seedling growth. Thus, the vast majority of work with substrate in the development phase of seedlings includes mixtures of soil, vermiculite and organic materials in the stage of developing them. It is advisable to mix soil and organic materials such as sand, as a way to improve the texture and provide good conditions for seedling growth (Ramos, et al. 2002). For a material be used as a substrate for seedlings, beyond to have appropriate physical and chemical characteristics is necessary to be available near the place of production in sufficient quantity with low-cost (Brasil, 2006).

In the production of passion fruit's (*Passiflora edulis* Sims *f. flavicarpa* Deg) seedlings various mixtures in the composition of the substrate were investigated already, example, soil + cow manure at a ratio of 1:1, commercial substrate Plantmax and vermiculite (Ribeiro et. al. 2005); organic compost, sand, Plantmax (Souza et. al. 2007); Plantmax, sand and Red Latosoil (Wagner Junior, et. al. 2006). However, research carried out with production of passion fruit's seedlings having as components of the substrate mixtures with sheep's and goat's manure were not found in the literature.

Due to lack of information on the use of alternative sources of organic matter such as goat manure and sheep manure in comparison with traditional sources such as cow manure and compost, was performed this current work that objectified evaluate different sources of organic matter in the mixture of substrates for production of yellow passion fruit's seedlings.

MATERIAL AND METHODS

The experiment was installed in a seedling's production from nursery located in the municipality of Mossoró-RN in the period from 27/10/2007 to 04/02/2008.

The seeds were taken from fruits of passion fruit 'yellow' obtained in supermarkets in the city of Mossoró-RN. After the withdrawal of seed, they were placed to ferment for two days in a glass container, to facilitate the separation of seed mucilage. Then, the seeds were washed in running water and placed in a paper `newspaper` to dry. After drying three seeds were sown in each plastic bag with a capacity of 1.5 L filled with different mixtures of substrates tested.

After germination, about 15 days after sowing, the seedlings were roughly leaving only one plant more vigorous by container.

The experimental design was randomized blocks with ten treatments (eight different mixtures of substrates and soil with two recommendations for fertilization), with four replicates and ten plants per plot, and the treatments: pure soil (S), soil + goat manure (S + GM) in the proportion of 3:1, soil + sheep manure (S + SM) in the proportion of 3:1, soil + bovine manure (S + BM) in the proportion of 3:1, soil + earthworm humus (S + H) in the proportion of 3:1, soil + goat manure + sheep manure (S + GM + SM) in the proportion of 2:1:1, soil + goat manure + bovine manure (S + GM + BM) in the proportion of 2:1:1, soil + sheep manure + bovine manure (S + SM + BM) in the proportion of 2:1:1 , soil + sheep manure + bovine manure (S + SM + BM) in the proportion of 2:1:1, pure soil fertilized with single superphosphate and potassium chloride (S + P + K) at doses of 1 kg m^{-3} and 0.5 kg m^{-3} respectively and pure soil fertilized with only single superphosphate (S + P) at a dose of 1 kg m^{-3} (Table 1).

Table 1 - Results of the chemical analysis of substrates used in the experiment with 'Yellow' passion fruit.

Substrate	pH	P	K^+	Ca^{2+}	Mg^{2+}	Na^+	SB	Al^{3+}
		mg dm^{-3}	.....			$cmol_c.dm^{-3}$	.....	
(S) 100%	8.20	154.10	1.74	4.80	1.70	2.72	10.96	0.00
(S+GM) 3:1	8.50	180.56	2.00	8.30	3.90	3.34	17.54	0.00
(S+SM) 3:1	7.00	24.45	0.30	2.90	1.90	0.34	5.44	0.00
(S+BM) 3:1	8.80	277.65	2.26	8.60	3.20	3.52	17.59	0.00
(S+H) 3:1	8.40	454.41	2.32	7.60	4.10	3.97	17.98	0.00
(S+GM+SM) 2:1:1	7.60	45.60	0.46	24.90	3.40	0.57	29.33	0.00
(S+GM+BM) 2:1:1	8.40	95.01	0.52	7.00	2.40	0.77	10.69	0.00
(S+SM+BM) 2:1:1	7.10	32.85	0.28	3.70	1.40	0.33	5.72	0.00

(S) = pure soil, (S + GM) = soil + goat manure in the proportion of 3:1, (S + SM) = soil + sheep manure in the proportion of 3:1, (S + BM) = soil + bovine manure in the proportion of 3:1, (S + H) = soil + earthworm humus in the proportion of 3:1, (S + GM + SM) = soil + goat manure + sheep manure in the proportion of 2:1:1, (S + GM + BM) = soil + goat manure + bovine manure in the proportion of 2:1:1, (S + SM + BM) = soil + sheep manure + bovine manure in the proportion of 2:1:1 , (S + SM + BM) = soil + sheep manure + bovine manure in the proportion of 2:1:1.

The duration of the experiment was 100 days, when the seedlings had adequate time to be transplanted to the field. Were assessed the following parameters: length of air part (cm) diameter of the cervix (mm), length of the root (cm), number of leaves per plant; dry matter from air part, root's dry matter and the total dry matter (g) and the seedling's length of the air part and the base's diameter (cm mm^{-1}).

The length of the air part of the seedlings was obtained by measuring the distance between the base and the apex of seedlings. The length of the root was obtained by measuring the distance between the base and the root's tip. The dry weight of the air part and root's dry matter were obtained after kiln drying of forced circulation with air at 60ºC, until constant weight by taking weighed on analytical balance. Was obtained the dry matter total through adding (dry weight of air part most of the dry root). The data were subjected to analysis of variance and the means to test Scott-Knott (1974) at 5% level of probability.

RESULTS AND DISCUSSION

It was noted, by analysis of variance F (p <0.01) effect of substrates in the length of the air part (LAP), the base's diameter (BD), number of leaves (NL), dry matter of air part (DMAP), The dry root (DMSR), total dry matter (TDM) and the length of the air part and diameter of the cervix (LAP/DC) of ' yellow ' passion fruit seedlings. Not taking effect of substrates for length of the root (LR).

The length of the air part provides an excellent balance of the initial prediction of growth in the field, technically being accepted as a good measure of the potential for developing seedlings. It is a measure of easy determination, not a destructive method, and its measurement is very simple (Gomes et al. 2002). For this parameter, statistical analysis showed that there had been significant response of the different substrates. The average return for this morphological parameter in each treatment can be seen in Table 2. Where it is observed that the best results were obtained in treatments with use of substrates (S + SM) 3:1; (S + CM) 3:1; (S + H) 3:1, (GM + S + SM) 2:1:1; (GM + S + CM) 2:1:1 and treatment with fertilization (S + P + K). Been the values for this parameter equal statistically by the test of Scott-Knott at 5% of probability. Already the lowest values were obtained when soil was used without any source of organic matter (soil), soil with sheep manure (S + SM) at a ratio of 3:1, sheep manure soil with more cow manure (SM + S + CM) at a ratio of 2:3:1 and soil fertilized with only simple superphosphate (S + P).

Table 2 - Different substrates in the length of the air part (LPA); diameter of the colon (DC), number of leaves (NL), dry matter of the air part (DMAP) and root (DMSR), total dry matter (TDM) and the length of the air part and diameter of the cervix (LPA/DC) in the production of seedlings of 'yellow' passion fruit. Mossoró-RN, 2008.

	Variables Analized						
Substrates	**LPA**	**DC**	**NL**	**DMAP**	**DMSR**	**TDM**	**LPA/DC**
	cm	**mm**		……**g**……			**cm mm^{-1}**
(S) 100%	19.335 B	1.84 B	6 A	0.5 B	0.08 B	0.58 B	10.54 B
(S+GM) 3:1	58.875 A	3.51 A	9.35 A	2.81 A	0.375 A	3.18 A	16.22 A
(S+SM) 3:1	46.9575 B	3.09 A	8.18 A	2.12 B	0.270 B	2.39 B	14.98 B
(S+BM) 3:1	95.375 A	4.36 A	10.6 A	4.9 A	0.698 A	5.6 A	21.74 A
(S+H) 3:1	69.03 A	3.83 A	9.29 A	3.26 A	0.415 A	3.68 A	18.05 A
(S+GM+SM) 2:1:1	69.6025 A	3.82 A	9.4 A	3.45 A	0.505 A	3.95 A	17.75 A
(S+GM+BM) 2:1:1	66.7525 A	4.27 A	9.47 A	3.94 A	0.603 A	4.54 A	16.01 A
(S+SM+BM) 2:1:1	31.43 B	2.52 B	7.76 A	1.54 B	0.215 B	3.84 A	11.81 B
(S+P+K)	69.515 A	3.9 A	8.23 A	3.33 A	0.508 A	1.76 B	17.85 A
(S+P)	35.3825 B	2.27 B	7.05 A	1.21 B	0.14 B	1.35 B	14.28 B
CV (%)	35.18	22.27	20.72	48.66	44.74	47.83	19.19

* Averages followed by the same letter in the column do not differ by test-Scott Knott, at 5% level of probability.
(S) = pure soil, (S + GM) = soil + goat manure in the proportion of 3:1, (S + SM) = soil + sheep manure in the proportion of 3:1, (S + BM) = soil + bovine manure in the proportion of 3:1, (S + H) = soil + earthworm humus in the proportion of 3:1, (S + GM + SM) = soil + goat manure + sheep manure in the proportion of 2:1:1, (S + GM + BM) = soil + goat manure + bovine manure in the proportion of 2:1:1, (S + SM + BM) = soil + sheep manure + bovine manure in the proportion of 2:1:1 , (S + SM + BM) = soil + sheep manure + bovine manure in the proportion of 2:1:1, (S + P + K) = pure soil fertilized with single superphosphate and potassium chloride, (S + P) = pure soil fertilized with only single superphosphate.

For the diameter of the base, dry weight of the air part and root dry matter of ' yellow ' passion fruit seedlings best responses were also achieved in the same substrates which resulted in greater length of the air part. In relation to the total dry treatments also provided the best results. As the highest average (5.6 g) for this parameter obtained in dealing with earth-use and cow manure (S + CM) 3:1. This treatment is only separated at the level of 5% by the test of Scott-Knott of treatments without any source of organic soil matter (soil); soil more sheep manure (S + SM) 3:1; soil fertilized with simple superphosphate and chloride potassium (K + S + P) and soil fertilized with only simple superphosphate (S + P), which provided the lowest average for the total dry weight (Table 2). For Antunes et al. (2000), the changes made with greater weight of dry root and the air part, reflects a plant more prepared for react positively on the field at the time of planting in a definitive place.

Testing doses of phosphate fertilizer and organic compound (bean straw, corn straw, rice straw, bark of banana and orange peel, and components, charcoal and cow manure) in the production of seedlings of yellow passion fruit, Gurgel et al. (2007) concluded that the compound in a dose of up to 40 kg m^{-3} with the triple superphosphate promoted good results in the production of seedlings.

The resulting figure by dividing the length of the air part of a seedling at the diameter of expressing collect a balance of growth, linking these two important morphological parameters in a single index (Carneiro, 1995). It is observed in Table 2 that the substrate that provided the best response to this switch was being treated with use of earth and cow manure (S + CM) 3:1. For Fermino & Kampf, (2003) the use of organic substrates with appropriate characteristics to the species planted makes possible reduction in cultivation and consumption of inputs such as fertilizers and pesticides.

The use of substrates composed of mixtures of goat manure, sheep manure and cow manure yielded good results in the production of seedlings of 'yellow' passion fruit, showing that these sources of organic matter (goat and sheep manure) may be an alternative to substrates to be used in the production of seedlings of this species. According Tibau (1983) presents the goat manure fermentation faster than the manure from chicken and cow and can be successfully used in agriculture after a shorter period of decomposition. The manure of goats is more robust and less water to the cow manure and pigs, has

better structure, allowing for aeration and for that reason can be recovered quickly ferment in agriculture after a shorter period of "tanned" (Henriques, 1997).

The goat and sheep manure is a valuable product and its use provides both the possibility of recovery of degraded earth, as an important alternative source of income for producers. Some studies have examined the potential for using the manure of goats and sheep and all emphasize its value in view the comparisons made with the manure of cow, however, little data exist in the literature about its use (Alves & Pinheiro, 2008).

The importance of organic matter in the substrate due to its influence on the properties, physical, chemical and biological weapons. Thus, their presence can be influenced in fertility, availability of nutrients in the water holding capacity and the CTC, thus, a better plant growth. Thus, the organic matter in these substrates was crucial to obtaining the results observed as the proper development of the air part and total dry weight.

According to the results described, it appears that the soil (S) 100% proved to be lower for the development of seedlings in relation to other substrates. This happens, in part, due to the soil present low levels of essential nutrients such as calcium, magnesium and potassium (Table 1) and, consequently, have hampered the development of seedlings. According Mourão et al. (1998) the soil has not shown satisfactory results for the production of seedlings of fruit plants.

CONCLUSIONS

The use of goats and sheep manure in mixtures of substrates provided good results in the production of seedlings of 'yellow' passion fruit.

The soil (S) 100% proved to be lower for the development of seedlings in relation to other substrates. Of all the tested substrates, which promoted better development of seedlings of 'yellow' passion fruit was the substrate soil + cow manure in the ratio 3:1.

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