Pear and apple pomace compost in the production of tomato (*Lycopersicon esculentum* Mill.) seedlings

Compost de orujo de pera y manzana como alternativa en la producción de plantines de tomate (*Lycopersicon esculentum* Mill.)

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Abstract

Alternative substrates replacing non-renewable resources like peat, for growing media in horticulture, have gained importance. This work aimed to evaluate if pear and apple pomace compost could constitute an alternative to a commercial substrate for tomato seedlings production. Two experiments were carried out on trays with 100 cm^3 alveoli (experiment 1) and 30 cm^3 alveoli (experiment 2). In experiment 1, three substrates were used: commercial substrate (CS), mixture of CS and pomace compost (CS+C) and pure compost (C). In experiment 2 a fourth treatment with a mixture of compost and perlite (C+P) was incorporated. The obtained results indicated that seedling development using CS+C and CS as substrates, was similar in cells of 100 cm^3 and higher in cells of 30 cm^3. In addition, seedling growth on C+P in relation to CS, showed similar or higher values for some variables. These results indicate that replacing non-renewable resources such as peat in tomato seedling production, with a product obtained from a residue, would be feasible.

Keywords
aerial biomass • agroindustry wastes • *Lycopersicon esculentum* • nutrients • seedling production

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Resumen

La búsqueda de sustratos alternativos para reemplazar los recursos no renovables como la turba utilizada en medios de cultivo en horticultura, resulta importante. El objetivo de este trabajo fue evaluar si el compost de orujo de pera y manzana podría usarse como una alternativa a un sustrato comercial para la producción de plantines de tomate. Se realizaron dos experimentos en bandejas con alvéolos de 100 cm^3 (experimento 1) y 30 cm^3 (experimento 2). En el experimento 1, se usaron tres sustratos: sustrato comercial (CS), mezcla de CS y compost de orujo (CS + C) y compost puro (C). En el experimento 2 se incorporó un cuarto tratamiento con una mezcla de compost y perlita (C + P). Los resultados obtenidos indicaron que el desarrollo de los plantines usando CS + C y CS como sustrato fue similar en celdas de 100 cm^3 y mayor en celdas de 30 cm^3. Además, el crecimiento de los plantines en C + P en relación con CS mostró valores similares o más altos en algunas variables. Estos resultados indicaron que sería factible reemplazar el uso de recursos no renovables como la turba en la producción de plantines de tomate por un producto obtenido de un residuo.

Palabras clave

biomasa aérea • residuos agroindustriales • *Lycopersicon esculentum* • nutrientes • producción de plantines

Introduction

Plant substrate is any solid material other than soil, which allows root anchoring, water and nutrient absorption, and gas exchange from and to the root (27). Commercial substrates constitute mixtures of different products such as blond and black peat moss, pine bark of different granulometry, perlite, sand and humectants (16). Peat has been widely used as a growing medium in horticulture given its good physical properties and high nutrient exchange capacity (30). However, being a non-renewable, high-cost product, to replace it by cheaper and eco-friendly substitutes, (4, 5, 10) turns important.

In this sense, numerous studies on peat replacement by organic waste or compost have tested alternatives like substrates degraded by fungi (19, 23, 24), sludge from the paper industry (15), and compost made from urban, agroindustrial and green solid waste (9, 10, 11, 14). These substrates obtained by fungal degradation or waste composting resulted appropriate for total or partial replacement of peat, in the cultivation and production of seedlings of species like tomato (*Lycopersicon esculentum* Mill.), lettuce (*Lactuca sativa* L.), courgette (*Cucurbita pepo* L.), pepper (*Capsicum annum* L.), and geranium (*Pelargonium zonale* L.). Current requirements on organic waste usage have driven research lines based on the possible use of these wastes as components of substrates replacing peat. In this sense, the composting of pure agroindustrial wastes and as part of mixtures with other by-products, have proven to be similar or superior when used in the production of horticultural seedlings, compared to commercial products used for this purpose (7, 8).

Composting is a widely used technology for waste re-utilization. It allows the generation of biofertilizers and soil conditioners, and the production of gas, humus, and biofuels, among others. In this way, a rational use of these resources is promoted, while the negative impact of organic matter accumulation, is reduced (12).

This work aimed to evaluate pear and apple pomace compost as an alternative to a commercial substrate for tomato seedlings production (*Lycopersicon esculentum* Mill. Var. Flora Dade).

Materials and methods

Pear and apple pomace compost

Pear and apple pomace compost was produced by Jugos S.A. (Villa Regina, Río Negro-Argentina) using the windrow composting system. The pomace was arranged in pyramidal piles, 2 m wide x 1 m high x 150 m long, facilitating compost turning with rotovator for better homogenization and aeration during the process. The mixing frequency depended on temperature (never above 55 °C), moisture content (always over 40%), electrical conductivity, pH and organic matter. After 12 to 15 months, depending on the environmental conditions, the aforementioned physicochemical parameters were re-assessed.

Plant material and growth conditions

Two experiments were conducted in a laboratory under controlled conditions, 25-28 °C, illuminance of 7500 lux (using LED tubes of 18 W) and 12-hours photoperiod. Indeterminate growth Flora Dade tomato seeds (*Lycopersicon esculentum* Mill.) provided by Guasch Seeds, were used. Their germinative power, previously measured in Petri dishes, was 89.9%.

The experiments were carried out on different dates, using alveolate trays with dissimilar cell volumes. In both experiments, the commercial mixture Grow Mix Multipro (Terrafertil S.A., Argentina), composed of Sphagnum peat moss, bark compost, calcite lime, dolomite lime and wetting agents, was used as control substrate (CS) .

Experiment 1

Six alveolate trays of 25, 100 cm^3 cells, were used. Seedling development was evaluated on 3 substrates (CS, CS+C, and C), consisting of mixtures between the commercial substrate with pear and apple pomace compost (C) in the following proportions:

CS: Commercial substrate.

CS+C: Commercial substrate and Compost 1:1 v/v.

C: Compost.

For each treatment, two adjacent trays, were used. In the center of each cell, one seed was placed at a depth of approximately 2 mm.

Sowing took place on June 2nd, 2018. Seedling development was evaluated for 32 days. Daily irrigation by manual spray, was approximately 30 mL/cell.

Experiment 2

The second experiment was conducted in four alveolate trays of 128, 30 cm^3 cells, with the same variety and identical culture conditions as experiment 1. In addition, a fourth treatment, consisting of a mixture of compost and perlite (C+P) in a 3:1 v/v ratio, was incorporated.

Sowing was carried out on August 14th, 2018. Growth evaluation was carried out for 30 days. Daily irrigation was approximately 10 mL/cell.

Physicochemical analysis of substrates

The following physical and chemical properties of the tested substrates and mixtures were determined in triplicate:

• Percentage of organic matter (%OM) with an automatic carbon analyzer by dry combustion (IR).

• Total nitrogen (N) by semi-micro Kjeldahl.

• Available phosphorus (P) by the Bray-Kurtz method No. 1.

• Potassium by extraction with ammonium acetate at pH = 7 and determination by atomic emission spectrophotometry by induced plasma.

• Electrical conductivity (EC) and pH, with ASDW AD 8000 meter-conductivity pH, adapted from FAO (2009) using distilled water as an extractant in a 1:2.5 ratio v/v standing for 45 minutes.

• Total porosity (TP); aeration porosity (AP); water holding capacity (WHC); bulk density (BD) and particle density (PD), employing porometers of 15 cm height and 7.6 cm diameter, according to Pire *et al.* (2003).

Growth and development

After sowing, percentage of emergence was determined and date of appearance of the first, second and third true leaves for each treatment was daily recorded by direct counting.

Approximately one month after the sowing, 29 seedlings of the CS treatment, 27 of the CS+C and 23 of the C (pseudo-replicates) of experiment 1, and 44 seedlings for each treatment of experiment 2, were randomly selected. The number of randomly chosen individuals corresponded to a representative sample of each treatment, ± 10% and 90% confidence. In the CS+C and C treatments of experiment 1, the number of seedlings was lower given that finding 29 healthy individuals, was not possible.

For shoot fresh weight (SFW) and root fresh weight (RFW) determinations, seedlings were carefully extracted from the cells, placed in plastic mesh envelopes and submerged in water for five to ten minutes in order to carefully remove attached substrate. Water was drained on absorbent paper. Shoots were separated from roots by cross-section at neck level.

SFW and RFW were weighed with an Ohaus analytical digital balance (± 0.0001g). Total fresh weight of each plant (TFW) was obtained as SFW plus RFW. Shoot height (h) was measured from neck to apex, while stem diameter (d) was obtained at neck level with a digital SATA caliper (± 0.01 mm).

For shoot and root dry weight (SDW, RDW) determinations, samples were oven-dried at 60 °C until constant weight (72 h approx.). Dry weight was recorded with an analytical balance (± 0.0001 grams). Total dry weight of each plant (TDW) was determined as SDW plus RDW.

Statistics

In each experiment, means comparison was performed by one-way ANOVA and Tukey test ($p<0.01$) using InfoStat version 2016 (3). ANOVA assumptions (normality and homoscedasticity) were tested by the modified Shapiro-Wilks´ and Levene's tests, respectively. SFW, RFW, TFW, SDW, RDW, and TDW were square-root transformed, meeting these assumptions. Reported data correspond to untransformed values.

Results

Chemical and physical properties of the substrates

Table 1 shows organic matter, macronutrients and physicochemical properties of the tested substrates. The CS treatment had significantly higher OM. Total N was higher for those substrates containing compost, although not significant for C+P with respect to CS. Similar results were observed for P, twice higher, and K, 2.5 times higher in C with respect to CS. This treatment presented significantly lower pH and EC values than those containing compost (CS+C, C, C+P).

TP and WRC resulted considerably higher in the CS+C mix than in C. As for BD, the lowest value was obtained for CS (0.18 $Mg.m^{-3}$) and the highest for C (0.55 $Mg.m^{-3}$).

OM: organic matter, N: nitrogen, P: phosphorus, K: potassium, EC: electrical conductivity, TP: total porosity, AP: aeration porosity, WHC: water holding capacity, BD: bulk density, PD: particle density
Different letters in each row show significant differences (Tukey´s test, p≤ 0.01).

OM: materia orgánica, N: nitrógeno, P: fósforo, K: potasio, EC: conductividad eléctrica, TP: porosidad total, AP: porosidad de aireación, WHC: capacidad de retención de agua, BD: densidad aparente, PD: densidad de partículas.
Letras distintas en la misma fila indican diferencias significativas (prueba de Tukey, p≤0,01).

Table 1. Mean concentration and SD of the organic and inorganic components and physicochemical properties of the tested substrates (n=3).

Tabla 1. Concentración de los componentes orgánicos e inorgánicos y propiedades fisicoquímicas de los sustratos utilizados. Los valores representan la media y la DE (n=3).

	Treatment			
Properties	**CS**	**CS+C**	**C**	**C+P**
OM (%)	45.9 ±1.8^{a}	33.5 ± 3.1^{b}	22.6 ± 0.8^{c}	19.7 ± 0.5^{c}
N (%)	1.19 ± 0.08^{b}	1.70 ± 0.10^{a}	1.83 ± 0.04^{a}	1.35 ± 0.06^{b}
P (ppm)	76 ± 6^{c}	122 ± 10^{b}	142 ± 6^{a}	140 ± 8^{ab}
K (ppm)	667 ± 45^{b}	1576 ± 23^{a}	1880 ± 160^{a}	1652 ± 56^{a}
pH	5.70 ± 0.03^{c}	6.43 ± 0.06^{b}	7.04 ± 0.10^{a}	6.92 ± 0.06^{a}
EC ($dS.m^{-1}$)	0.53 ± 0.00^{c}	3.51 ± 0.09^{a}	3.38 ± 0.04^{a}	3.09 ± 0.03^{b}
TP (%)	66.3 ± 3.7^{ab}	67.7 ± 0.9^{a}	59.5 ± 0.3^{b}	63.6 ± 1.8^{ab}
AP (%)	7.4 ± 1.1^{ab}	3.9 ± 0.1^{bc}	2.7 ± 0.6^{c}	8.1 ± 1.7^{a}
WHC (%)	58.9 ± 2.7^{ab}	63.7 ± 1.0^{a}	56.8 ± 0.3^{b}	55.4 ± 1.2^{b}
BD ($Mg.m^{-3}$)	0.18 ± 0.00^{d}	0.44 ± 0.01^{b}	0.55 ± 0.03^{a}	0.38 ± 0.02^{c}
PD ($Mg.m^{-3}$)	0.52 ± 0.05^{c}	1.37 ± 0.02^{ac}	1.36 ± 0.07^{a}	1.04 ± 0.01^{b}

Growth and development in experiment 1

Seedling development in trays with 100 cm^3 alveoli showed marked differences in accumulated emergence and time of appearance of the first, second and third true leaves for treatments CS and CS+C with respect to C. Thus, emergence percentages for the mixtures containing commercial substrate reached a maximum of 94% at eleven days after sowing, while the seedlings developed on C, reached 74% after 16 days.

Appearance time of the first, second and third true leaves in 90% of the seedlings developed on CS and CS+C, was 15 and 26 days, respectively. In the C substrate, a maximum of 60-70% was obtained between day 24 and 25 for the first and second true leaves, while the third true leaf emerged on day 24, reaching only 10% at the end of the experiment (figure 1 A-D).

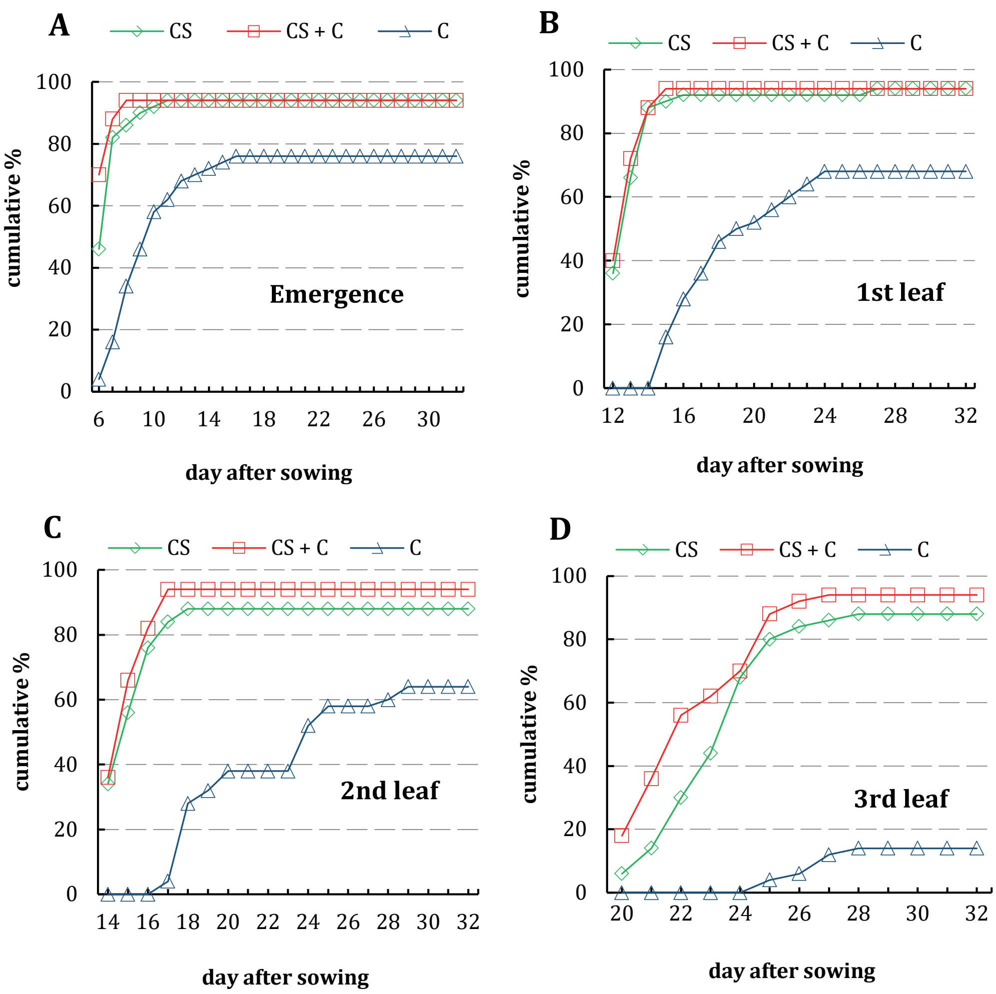

Figure 1. Cumulative emergent percentages (**A**) and appearance of the first (**B**), second (**C**) and third (**D**) true leaves of tomato seedlings grown on substrates CS, CS+C, and C as a function of time in days since sowing.

Figura 1. Porcentajes de emergencia acumulada (**A**) y aparición de la primera (**B**), segunda (**C**) y tercera (**D**) hoja verdadera de plantines de tomate cultivados en sustratos CS, CS+C y C en función del tiempo en días desde la siembra.

Developmental variables h, d, SFW, RFW, TFW, SDW, RDW and TDW, resulted similar between CS and CS+C treatments, and significantly higher than treatment C (table 2, page 133). Even though the precision balance weighted to 0.0001 g, standard deviations are indicated by one or two significant figures.

h: plant height, d: stem diameter, SFW: shoot fresh weight, RFW: root fresh weight, TFW: total fresh weight, SDW: shoot dry weight, RDW: root dry weight, TDW: total dry weight. Different letters in each row show significant differences (Tukey´s test, p≤ 0.01).

h: altura de la planta, d: diámetro del tallo, SFW: peso fresco de la parte aérea, RFW: peso fresco de la raíz, TFW: peso fresco total, SDW: peso seco de la parte aérea, RDW: peso seco de la raíz, TDW: peso seco total. Letras distintas en la misma fila indican diferencias significativas (prueba de Tukey, p≤0,01).

Table 2. Growth and development properties of the tomato seedlings measured in experiment 1 (100 cm^3 cells). Values represent mean and the SD (n=29, 27 and 23 for CS, CS +C and C, respectively).

Tabla 2. Propiedades de crecimiento y desarrollo de los plantines de tomate medidas en el experimento 1 (celdas de 100 cm^3). Los valores representan la media y la DE (n=29, 27 y 23 para CS, CS +C y C, respectivamente).

Properties	Treatments		
	CS	**CS+C**	**C**
	n = 29	n = 27	n = 23
h (mm)	74 ± 12^a	67.6 ± 9.2^a	44.6 ± 8.9^b
d (mm)	2.76 ± 0.58^a	3.00 ± 0.57^a	1.50 ± 0.47^b
SFW (g)	0.84 ± 0.38^a	1.07 ± 0.33^a	0.25 ± 0.14^b
RFW (g)	0.23 ± 0.11^a	0.210 ± 0.067^a	0.086 ± 0.038^b
TFW (g)	1.07 ± 0.48^a	1.28 ± 0.40^a	0.33 ± 0.17^b
SDW (g)	0.087 ± 0.042^a	0.100 ± 0.037^a	0.028 ± 0.015^b
RDW (g)	0.016 ± 0.010^a	0.011 ± 0.008^a	0.003 ± 0.003^b
TDW (g)	0.10 ± 0.05^a	0.11 ± 0.05^a	0.031 ± 0.018^b

Growth and development in experiment 2

Figure 2 (page 134) shows tomato seedling development in 30 cm^3 cells. Cumulative emergence percentages (figure 2A, page 134) and appearance of the first, second and third true leaves (figure 2B-2D, page 134) for the CS+C treatment, were the highest, followed by CS. Unlike the results obtained in the first test with 100 cm^3 cells, for C+P treatment the third leaf was anticipated with respect to CS. Development in C produced the lowest values for all the variables analyzed.

Unlike experiment 1, the values obtained for h, d, SFW, RFW, TFW, SDW, and TDW for the CS+C treatment resulted higher, except for RDW. In the case of the seedlings developed on CS and C+P, statistically identical values were obtained in most of the variables, except for SFW, TFW, and TDW. Compost (C) restricted plant development, obtaining significantly lower values for all variables except for RDW, which was similar to that obtained in the CS treatment, as shown in table 3 (page 134).

Comparison of development between experiments

When comparing developmental variables according to cell size (experiments 1 and 2), seedling h resulted higher in the larger cells for the CS treatment, but showed no significant differences in the CS+C and C treatments (figure 3A, page 135).

SFW and d resulted higher for the bigger cells of the CS treatment, while for C, larger diameters and weights resulted in the smaller cells (figure 3B-3C, page 135).

RFW developed on CS+C was notably higher in the smaller cells, while no differences were found for the CS and C treatments (figure 3D, page 135).

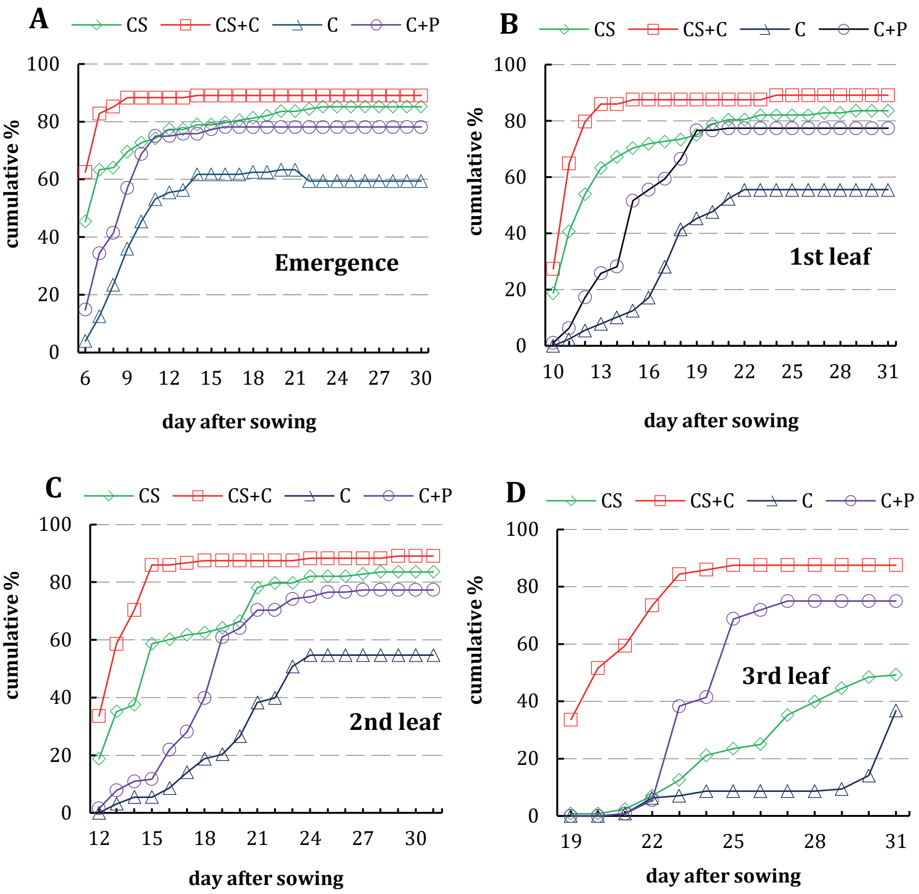

Figure 2. Cumulative emergent percentages (**A**) and appearance of the first (**B**), second (**C**) and third (**D**) true leaves of tomato seedlings grown on substrates C, CS+C, C and C+P as a function of time in days since sowing.

Figura 2. Porcentajes de emergencia acumulada (**A**) y aparición de la primera (**B**), segunda (**C**) y tercera (**D**) hoja verdadera de plantines de tomate cultivados en sustratos C, CS, CS+C y C en función del tiempo en días desde la siembra.

Table 3. Growth and development properties of tomato seedlings measured in experiment 2 (30 cm^3 cells). Values correspond to means and SD (n= 44).

Tabla 3. Propiedades de crecimiento y desarrollo de los plantines de tomate medidas en el experimento 2 (celdas de 30 cm^3). Los valores representan las medias y las DE (n= 44).

Properties	Treatments			
	CS	CS+C	C	C+P
	n=44	n=44	n=44	n=44
h (mm)	45.5 ± 5.5^b	60.6 ± 6.7^a	39.7 ± 5.9^c	43.8 ± 6.6^{bc}
d (mm)	2.08 ± 0.25^b	2.78 ± 0.30^a	1.86 ± 0.22^c	2.24 ± 0.25^b
SFW (g)	0.49 ± 0.15^c	1.20 ± 0.25^a	0.47 ± 0.13^c	0.69 ± 0.13^b
RFW (g)	0.31 ± 0.11^b	0.60 ± 0.22^a	0.18 ± 0.10^c	0.39 ± 0.12^b
TFW (g)	0.80 ± 0.23^c	1.81 ± 0.42^a	0.65 ± 0.22^c	1.08 ± 0.23^b
SDW (g)	0.065 ± 0.023^{bc}	0.131 ± 0.033^a	0.07 ± 0.11^c	0.079 ± 0.052^b
RDW (g)	0.025 ± 0.009^{ab}	0.053 ± 0.057^a	0.024 ± 0.044^b	0.054 ± 0.090^a
TDW (g)	0.090 ± 0.030^c	0.184 ± 0.070^a	0.10 ± 0.12^c	0.13 ± 0.10^b

h: plant height, d: stem diameter, SFW: shoot fresh weight, RFW: root fresh weight, TFW: total fresh weight, SDW: shoot dry weight, RDW: root dry weight, TDW: total dry weight. Different letters in each row show significant differences (Tukey´s test, p≤ 0.01).

h: altura de la planta, d: diámetro del tallo, SFW: peso fresco de la parte aérea, RFW: peso fresco de la raíz, TFW: peso fresco total, SDW: peso seco de la parte aérea, RDW: peso seco de la raíz, TDW: peso seco total. Letras distintas en la misma fila indican diferencias significativas (prueba de Tukey, p≤0,01).

Different letters in each treatment show significant differences (Tukey´s test, p≤ 0.01).

Las barras de error representan una DE. Letras distintas para el mismo tratamiento indican diferencias significativas (prueba de Tukey, p≤0,01).

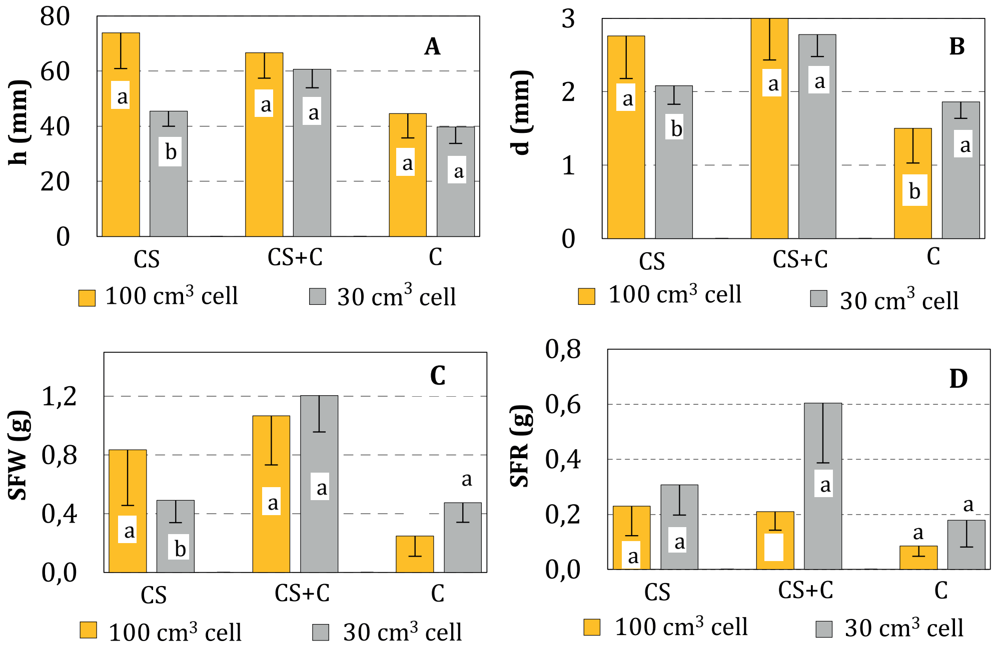

Figure 3. Seedling height (h, **A**), stem diameter (d, **B**), shoot fresh weight (SFW, **C**) and root fresh weight (RFW, **D**) for commercial substrate (CS), mixture of CS and pomace compost (CS+C) and pure compost (C) treatments in trays with large cells (100 cm^3) and small cells (30 cm^3). Error bars represent one SD.

Figura 3. Altura de los plantines (**A**), diámetro de los tallos (**B**), peso fresco de la parte aérea (**C**) y peso fresco de la raíz (**D**) para los tratamientos CS, CS + C y C en bandejas con celdas grandes (100 cm^3) y celdas pequeñas (30 cm^3).

Discussion

Experiment 1

In experiment 1 (trays with 100 cm^3 alveoli) seedling emergence and appearance time of the first, second and third true leaves revealed that the commercial substrate (CS) and the mixture with compost (CS+C) allowed the highest accumulated percentages in terms of days after sowing. In treatment C, these variables resulted in lower values (figure 1, page 132).

In this regard, the reduced seedling emergence percentages in treatment C (74% at 16 days) compared to treatments CS and CS+C (94% emergence at 11 days) could be explained by the low TP and AP values (table 1, page 131), quite different to the optimum for tomato seedlings (TP≤ 85% and AP from 20 to 30%) (1). Both factors are important for seedling germination/emergence since porosity is related to water holding and aeration capacities, allowing oxygen in the root media (26). Additionally, treatment (C) resulted to have high electrical conductivity (2.38 dS.m^{-1}), indicating moderate to high saline content for this species (2, 28), and consequent lower quality of easily usable water for seed imbibition and seedlings initial growth.

Appearance time of the first, second and third true leaves was markedly anticipated in CS and CS+C with respect to C, indicating that TP and AP substrate physical factors are directly related to seedling development (18), especially when associated with high OM levels, as observed in table 1 (page 131).

The highest cumulative leaf appearance percentages in CS and CS+C treatments corresponded, as expected, to the highest values of d, h, SFW, SDW, RFW and DRW. Seedling development in C, resulted significantly lower in relation to CS and CS+C (figure 1, page 132 and table 2, page 133). Similar results were obtained by Romero Aranda *et al.* (2001) when analyzing salinity effects on dry matter production, height and number of leaves of two different tomato varieties.

Experiment 2

In experiment 2 (30 cm^3 cell trays), the incorporation of a fourth treatment (C+P) formulated from the combination of compost and perlite (in relation to volumes 3:1) allowed appreciating increased total porosity and aeration porosity percentages, and a decrease in bulk density with respect to C. This resulted in significantly higher seedling developmental variables, allowing similar or superior results to those of CS.

In accordance, at the end of the experiment, 75% of plants under C+P treatment had three true leaves, lower than the 88% obtained with the CS+C treatment, and higher than the percentages obtained in CS and C treatments (49% and 37%, respectively). This could have been due to the notably higher phosphorus and potassium contents in C+P with respect to CS. Despite the complete and balanced CS formulation, after 25-30 days of growth in a volume of 30 cm^3, macronutrients content (NPK) turns deficient. According to Santacruz Oviedo *et al*. (2012), larger volume containers showed greater plant retaining capacity, benefiting late transplant. This would explain experiment 1, considering nutrient content in the CS treatment, in 100 cm^3 cells, enough for 30 days of seedling growth, and third leaf development.

The higher RDW, SDW, d and h in the C+P treatment with respect to CS and C, but not with respect to CS+C, is noticeable. This allows inferring that improvements in physical characteristics TP, AP and BD, in addition to high levels of available phosphorus and potassium, as those reported by Martínez *et al*. (2017), are necessary for plant development (table 3, page 134).

Development with different volumes of cells

The SFW, d, and h of CS treatment were significantly higher as cell size increased. These results agree with those obtained by Vagnoni *et al*. (2014), who studied, among other variables, height, leaf, stems and root dry weights, and leaf area in three different cell volumes (20 cm^3, 40 cm^3 and 120 cm^3). Similarly, Wilches Rojas *et al*. (2008) found that maximum heights occurred in trays with larger alveolar volume. According to these authors, this is given by a bigger and deeper rhizosphere with better nutrient and water absorption capacities.

In the CS+C treatment, h, d and SFW showed no important differences between cell sizes. Differences in RFW resulted in 30 cm^3 volume cells. This could be given by restricted root exploration due to smaller cell size and a subsequent greater, partitioning of biomass towards the roots with respect to the shoots, as indicated by Mugnai *et al*. (2011).

For treatment C, in 30 cm^3 cells, seedlings developed higher d and SFW than those in 100 cm^3 cells. The physical and chemical characteristics (BD, TP, AP, and EC) of this treatment, could have differentially affected seedling development in larger cells than in smaller ones.

Conclusions

Results obtained in 30 and 100 cm^3 alveolate trays allow considering pear and apple pomace compost as a complementary source of commercial substrate replacement. From the environmental point of view, usage of non-renewable resources such as peat, part of the composition of the commercial substrate, may be replaced by an eco-friendlier product, obtained from pear and apple pomace waste.

In 30 cm^3 cell trays of the compost and perlite treatment (3:1 v/v), obtained seedling quality would enable a high post-transplant survival percentage.

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