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CULTURE OF CHERRY TOMATO TREATED WITH PYROLIGNEOUS ACID[1]

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INTRODUCTION

The use of pyroligneous acid (PA), a by-product of charcoal production, is an ancient practice applied in agriculture to control soil and plant pests and diseases. Studies on the impact of the use of this kind of product are of great agricultural and environmental importance, and absolutely necessary to support the correct and safe application of chemicals (synthetic or alternative agricultural supplies) on the soil.

OBJECTIVE

The main goal of the present work was to evaluate the effects of PA on nutrition, yield, classification and characteristics of taste (total soluble solids and titratable acidity) in the cherry tomato plants grown in soil treated with five concentrations of PA (0; 1; 2; 4; 8% v/v), and as for the presence and absence of shoots PA spraying (0.1% v/v).

MATERIALS AND METHODS

The experimental design was completely randomized in a factorial scheme (5 X 2), with four replications. The variables analyzed were: soil chemical properties, shoots dry mass, stem diameter, leaf area, foliar nutrient accumulation and foliar levels, fruit titratable acidity (TA) distribution and total soluble solids (TSS). The number and total fresh fruit mass were assessed, as well as their distribution by size (Figure 1).

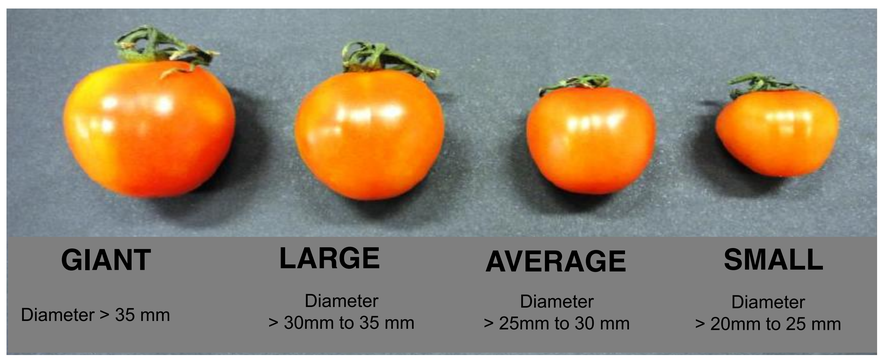

Figure 1 - System of distribution of fruit size according to its diameter and weight.

RESULTS

Table 1 - Effect of treatments on accumulation and leaf contents of nutrients in tomato.

PA concentration on soil (C)	N	P	K	Ca	Mg	S	Cu	Fe	Mn	Zn
	g kg^{-1}						mg kg^{-1}			
ACCUMULATION										
Control (water)	42.1	5.9	39.3	20.24	6.46	2.01	21.87	97.5	63.37	42.37
1% PA	39.7	5.7	39.9	21.65	6.93	2.35	26.37	100.5	54.37	45.75
2% PA	43.6	6.9	42.4	19.8	6.64	2.33	21.25	101.75	55.5	42.25
4% PA	38.4	6.1	45.5	26.15	6.51	2.56	21.87	94.62	67.12	47.25
8% PA	42.9	6.9	42.5	18.77	5.22	1.92	25.12	100.5	63.87	46.62
F test	1.58^{ns}	1.61^{ns}	1.91^{ns}	10.30**	3.44*	4.64**	8.50^{ns}	0.56^{ns}	2.46^{ns}	1.06^{ns}
Pulverization[1] (P)										
P_1	40.8a	6.3a	41.6a	21.80a	6.47a	2.29a	24.35a	97.55a	63.25a	46.05a
P_2	41.9a	6.2a	42.3a	20.84a	6.24a	2.18a	22.25b	100.40a	58.45a	43.65a
F test	0.58^{ns}	0.03^{ns}	0.23^{ns}	1.42^{ns}	0.54^{ns}	0.96^{ns}	8.91**	0.67^{ns}	2.26^{ns}	1.35^{ns}
MSD	3.18	0.84	3.23	1.64	0.64	0.22	1.44	7.08	6.52	4.21
F test for Interaction C x P	0.58^{ns}	0.91^{ns}	3.19*	5.12**	0.86^{ns}	1.14ns	6.53**	1.88^{ns}	4.07**	0.63^{ns}
CV (%)	11.92	20.06	11.93	11.95	15.53	15.48	9.55	11.08	16.59	14.54
CONTENTS										
Control (water)	2.8	0.65	5.06	2.4	0.74	2.01	2.06	25.73	16.97	7.78
1% PA	2.89	0.59	4.5	2.28	0.75	1.71	1.99	26.54	16.71	7.65
2% PA	2.71	0.55	4.21	2.28	0.75	1.66	1.72	27	17.01	6.88
4% PA	2.69	0.59	4.59	2.11	0.7	1.59	1.73	30.15	16.25	7.6
8% PA	2.77	0.65	4.64	2.47	0.79	1.87	1.91	29.23	18.66	8.56
F test	1.22^{ns}	2.08^{ns}	5.02**	1.32^{ns}	0.88^{ns}	3.72*	1.66^{ns}	1.26^{ns}	0.48^{ns}	2.51^{ns}
Pulverization[1] (P)										
P_1	2.78a	0.60a	4.48a	2.35a	0.75a	1.83a	2.06a	27.19a	19.89a	8.02a
P_2	2.78a	0.61a	4.72a	2.27a	0.74a	1.71a	1.71b	28.27a	14.35b	7.36a
F test	0.02^{ns}	0.03^{ns}	3.76^{ns}	0.54^{ns}	0.11^{ns}	2.35^{ns}	10.95**	0.52^{ns}	22.13**	3.81^{ns}
MSD	0.13	0.05	0.25	0.22	0.07	0.16	0.21	3.04	2.41	0.69
F test for Interaction C x P	1.21^{ns}	1.25	3.17*	2.74*	2.40^{ns}	13.00**	0.13^{ns}	2.14^{ns}	0.65^{ns}	0.68^{ns}
CV (%)	7.42	13.63	8.39	14.75	13.82	14.22	17.59	17	21.07	13.92

[1] P_1 = Pulverization with water; P_2 = Pulverization 0.1% (v/v) PA. Distinct letters in the columns indicate significant differences according to Tukey's test. (**; *significant 1 and 5%, ^{ns} = no significant). PA = pyroligneous acid.

Table 2 - Effect of treatments on tomato fruit size.

Pulverization[1] (P)	Giant	Large	Average	Small	None
P_1	3.80 a	29.80 a	23.75 a	14.65 b	11.80 a
P_2	3.40 a	29.25 a	23.40 a	19.40 a	14.10 a
F test	0.68^{ns}	0.01^{ns}	0.02^{ns}	4.22*	1.49^{ns}
MSD	0.33	0.65	0.68	0.54	0.48
F test for Interaction C x P	1.80^{ns}	0.44^{ns}	0.58^{ns}	0.84^{ns}	1.26^{ns}
CV (%)	24.09	18.49	21.25	20.06	20.4

[1] P_1 = Pulverization with water; P_2 = Pulverization 0.1% (v/v) PA. Distinct letters in the columns indicate significant differences according to Tukey's test. (**; *significant 1 and 5%, ^{ns} = no significant;). PA = pyroligneous acid.

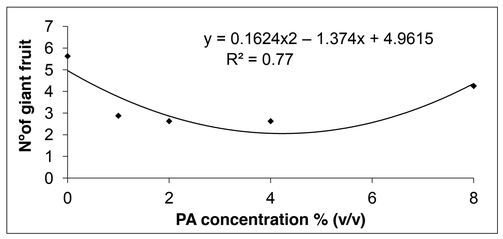

Figure 2. Effect of PA concentration in the production of giant fruit.

CONCLUSIONS

- The chemical characteristics of soil were not changed by de PA application.
- The application of PA on soil and aerial spraying did not influence the plant total dry matter accumulation, leaf area, and stem diameter, but acted on foliar levels and nutrients accumulation.
- The spraying of 0.1% (v/v) of PA increased the production of small fruits, and the application of PA on soil reduced giant fruits production. Fruits total number and total fresh mass were not influenced by application of PA on soil or spraying of aerial part.
- The TA and TSS were not influenced by the application of PA on soil and spraying of aerial part of cherry tomatoes.

ACKNOWLEDGEMENTS