

Article:

Mucuna and Avocado-Seed Residues as Sustainable Fertilizers and Biostimulants for Cherry Tomatoes

Journal: *Agrochemicals*

Authors: Alberto Camas-Reyes ¹, Andrés A. Estrada-Luna ², José de Jesús Ponce-Ramírez ¹, María Karina Manzo-Valencia ³, Francisco Galván- Pantoja ¹, Martha Edith Moreno-Valencia ¹, Ana Lilia Hernández-Orihuela ⁴, José Arbel Santiago-Díaz ¹, Silvia Valdés-Rodríguez ³, and Agustino Martínez-Antonio ^{1,*}

Corresponding author: Dr. Agustino Martínez-Antonio ^{1,}. Email: agustino.martinez@cinvestav.mx; ama@biosintetica.mx

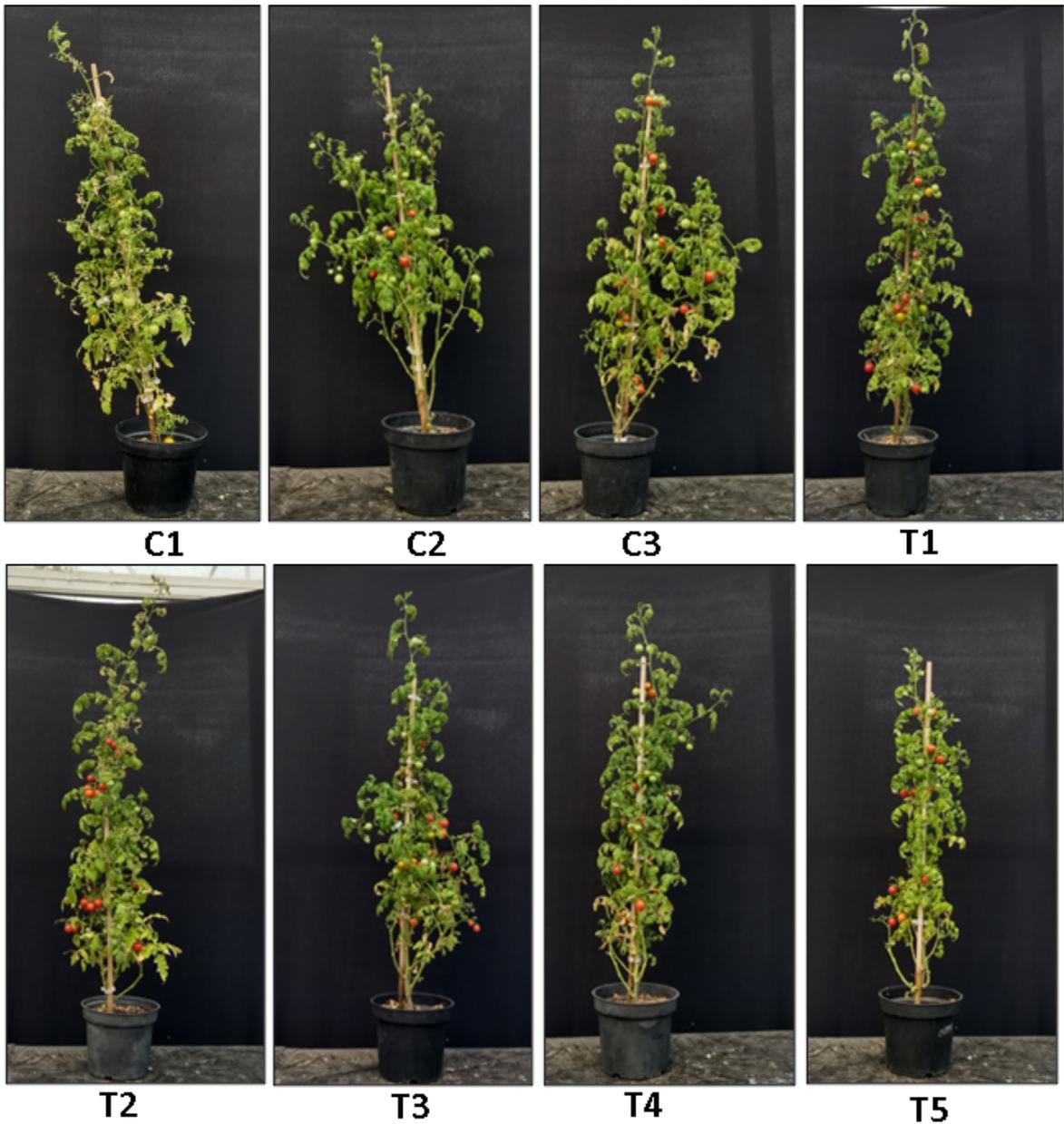
Phone number: A.M.-A: + 52 (462) 624 9660

Affiliation: Laboratorio de Ingeniería Biológica, Departamento de Ingeniería Genética, Centro de Investigación y de Estudios Avanzados del IPN-Unidad Irapuato, 36824 Guanajuato, Mexico.

A. Supplementary Figures for Cherry plants experiment

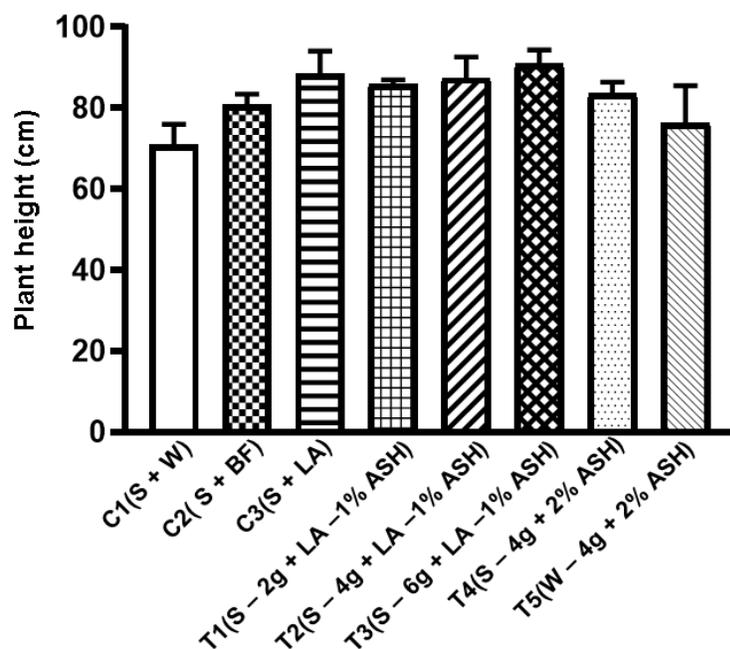


Supplementary Figure S1. A photograph of this experiment's Cherry tomato plants when growing in the greenhouse.

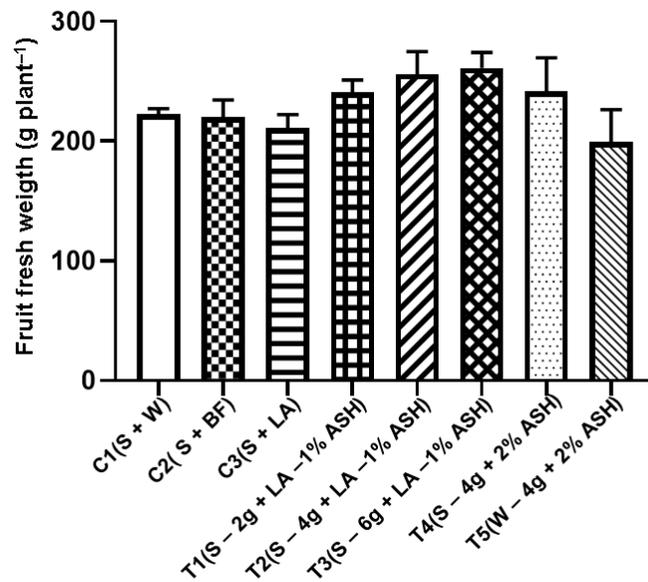


Supplementary Figure S2. Plant height. This photograph shows a representative comparison of plant stature among the different treatments. The plants that were treated with T1-T3 showed higher height than the others.

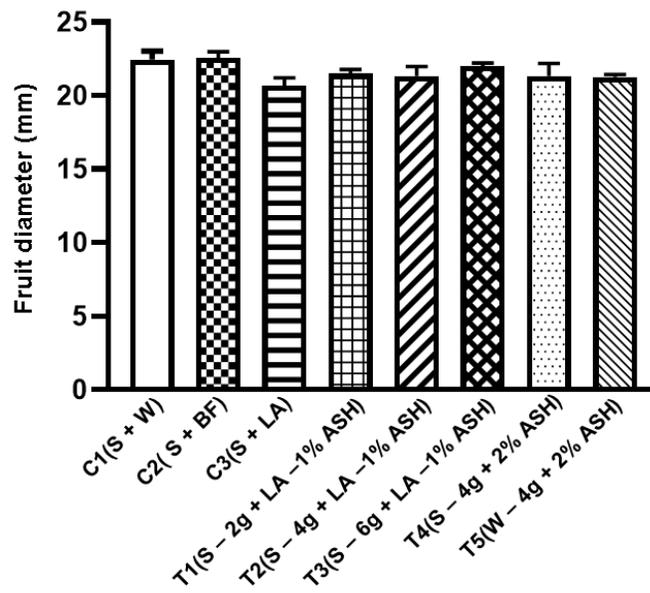
D. Supplementary figures of the agronomic measures



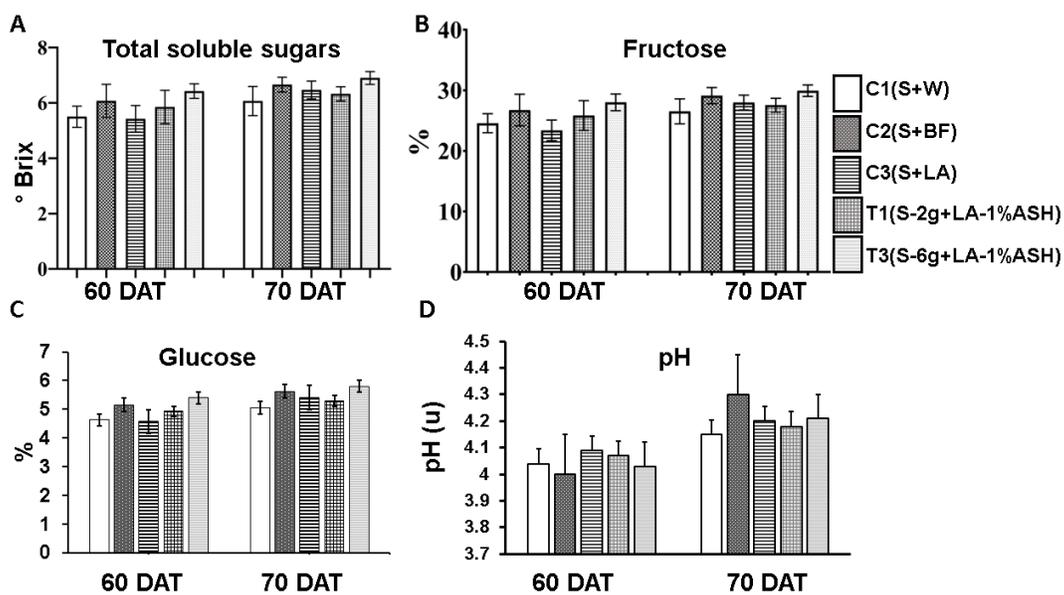
Supplementary Figure S3. Plant height. This graph shows differences in plant height among different treatments, although the differences were not statistically significant ($p < 0.05$). C3, T2, and T3 treatments presented a higher difference compared to C1 treatment.



Supplementary Figure S4. Fruit fresh weight. There were not significant ($p < 0.05$) differences in Cherry tomatoes fresh weight among the different treatments, although T2 and T3 treatments presented higher values than C1-C3 controls.

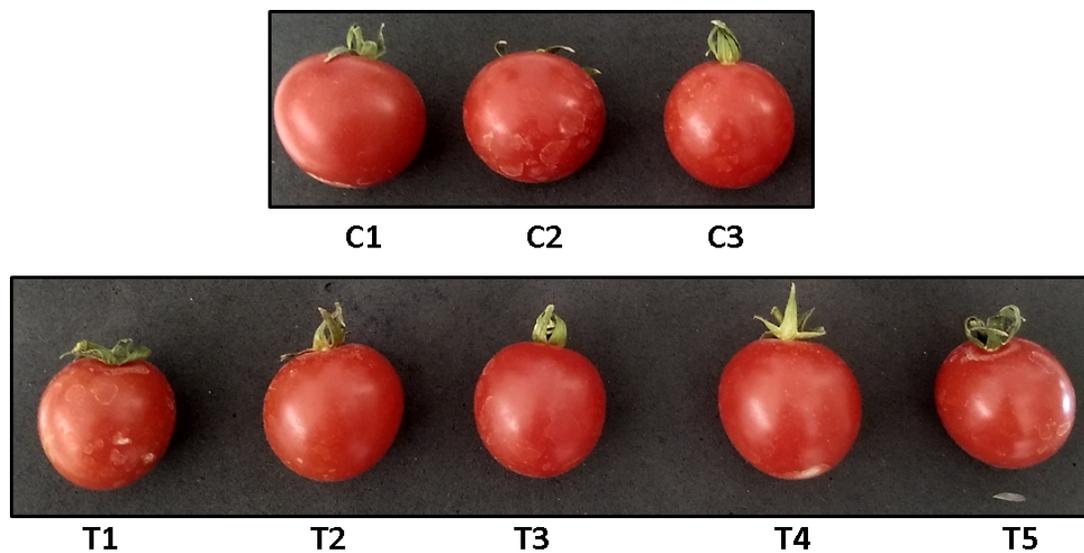


Supplementary Figure S5. Fruit diameter (mm). Fruits were not significantly different ($p < 0.05$) in equatorial circumference.

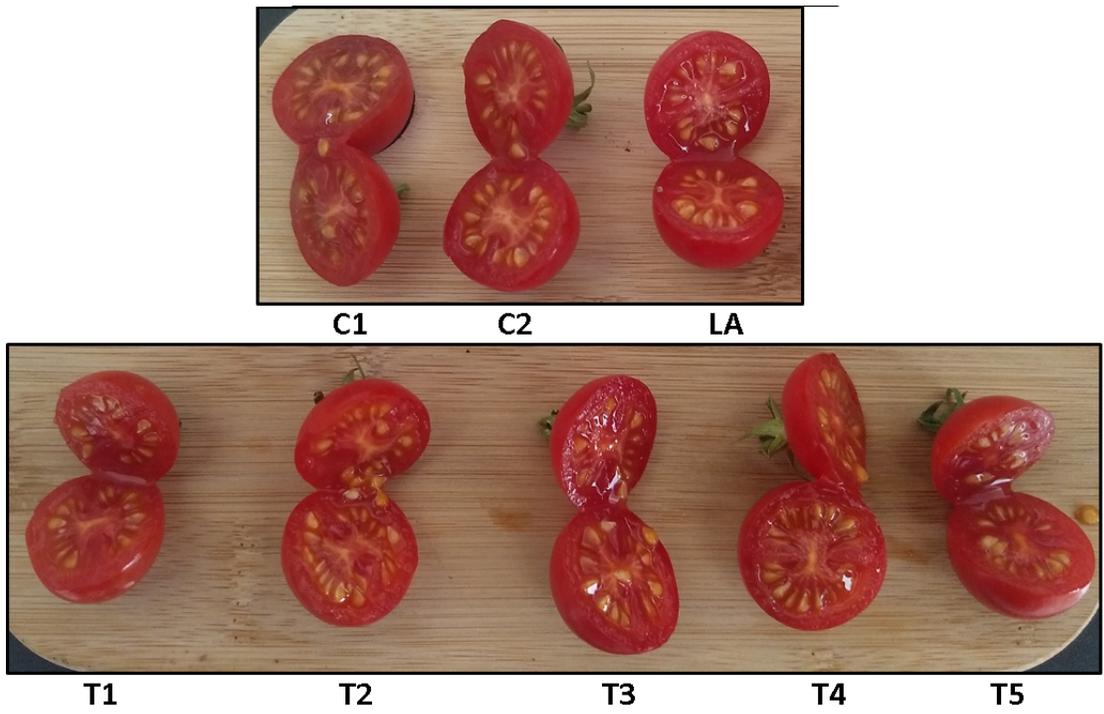


Supplementary Figure S6. Fruit quality of Cherry tomatoes. Measurement of sugar concentration and pH trend of the fruits at 60 and 70 days after transplanting. DAT = days after transplanting.

E. COMPLEMENTARY PHOTOS OF THE FRUITS



Supplementary Figure S7. Mature fruits. The picture shows a representative view of ripe fruits harvested four months after transplanting. All fruits had an intense red color.



Supplementary Figure S8. Inside view. Cross sections of tomato fruit tissues present normal characteristics. For instance, on mesocarp thickness, and placenta or seed size.



Cherry red dried tomatoes

Supplementary Figure S9. A sample of dried tomatoes after incubation in an oven at 60°C for 72 hr.

B. SUPPLEMENTARY TABLES CONTAIN THE DATA OF THE EVALUATED AGRONOMIC PARAMETERS

Supplementary Table S1. Plant height data (cm). Each value represents the average measure per plant from six measuring dates.

C1	C2	C3	T1	T2	T3	T4	T5
82.55	84.85	85.60	85.48	72.95	86.75	80.93	49.82
71.70	85.47	100.77	88.73	86.78	88.05	76.43	77.23
71.70	74.08	73.93	85.95	96.72	101.32	88.18	88.95
57.43	78.35	93.00	82.87	94.22	87.25	88.40	89.12

Supplementary Table S2. Number of flowers data. Each value represents the average number of flowers per plant from six count dates

C1	C2	C3	T1	T2	T3	T4	T5
26.00	20.83	23.50	27.67	31.17	33.67	20.17	33.00
18.50	20.17	23.33	30.83	15.67	24.50	23.17	32.67
23.33	16.17	18.33	20.17	27.33	26.83	20.67	22.33
14.17	23.17	32.00	17.83	36.33	34.83	36.67	25.00

Supplementary Table S3. Fruit number data. Each value represents the average number of fruits per plant from five harvesting dates

C1	C2	C3	T1	T2	T3	T4	T5
13.20	11.40	17.40	16.40	14.40	21.00	19.60	9.60
12.40	7.40	14.00	12.60	15.00	16.00	16.20	13.40
11.60	11.60	11.80	12.80	17.00	16.80	14.80	14.00
10.40	13.80	14.00	17.80	16.60	14.60	14.00	14.20

Supplementary Table S4. Fruit fresh weight data (g). Each value represents the average weight of the sum of fresh weights of five harvesting dates per plant

C1	C2	C3	T1	T2	T3	T4	T5
222.5	240.4	196.6	238.8	200.3	273.8	315.8	139.3
233.0	179.9	244.4	218.2	279.4	247.8	252.6	190.2

223.9	240.4	205.0	239.1	279.9	290.6	206.4	271.6
210.5	219.3	197.5	267.6	264.0	232.1	192.0	195.4

Supplementary Table S5. Fruit dry weight data (g). Each value represents the average weight of the sum of dry weights of five harvesting dates per plant

C1	C2	C3	T1	T2	T3	T4	T5
26.10	28.70	22.60	31.50	28.00	36.10	41.60	14.10
31.20	19.70	27.90	36.70	42.30	37.90	33.00	27.10
25.20	28.70	24.50	29.90	37.10	37.70	29.50	33.80
25.80	23.30	24.70	33.70	30.70	28.00	22.70	25.90

Supplementary Table S6. Fruit diameter data (mm). Each value represents the average weight of the sum of dry weights of ten harvesting dates per plant

C1	C2	C3	T1	T2	T3	T4	T5
23.76	21.68	19.86	20.73	20.67	22.07	22.50	21.38
21.25	23.44	19.86	21.53	23.21	21.45	21.65	20.76
21.68	23.13	21.97	21.47	20.26	21.98	22.38	21.21
23.12	22.00	21.14	22.19	21.22	22.50	18.82	21.69

C. ANOVA TABLES WITH THE RESULTS OF THE STATISTIC ANALYSIS.

Supplementary Table S7. ANOVA statistics for plant height

Source	DF	SS(Adj)	MS (Adj)	F-Value	p-Value
Treatments	7	1262.00	180.3	1.790	0.1359
Residual	24	2417.00	100.7		
Total	31	3679.00			

No significant ($p < 0.05$) at 95% of confidence level.

C V= 12.4 %

Supplementary Table S8. ANOVA statistics for flowers production

Source	DF	SS (Adj)	MS (Adj)	F-Value	p-Value
Treatments	7	1001.0	100.1	2.6540	*0.0170
Residual	24	1244.0	37.71		

Total 31 2245.0

* Significance ($P < 0.05$) at 95 % confidence level.

CV = 23.4 %

Supplementary Table S9. ANOVA statistics for the number of fruits

<u>Source</u>	<u>DF</u>	<u>SS (Adj)</u>	<u>MS (Adj)</u>	<u>F-Value</u>	<u>p-Value</u>
Treatments	7	129.10	18.44	3.635	*0.0082
Residual	24	121.80	5.074		
Total	31	250.90			

* Significance ($P < 0.05$) at 95 % of confidence level.

CV = 15.8 %

Supplementary Table S10. ANOVA statistics for fruit fresh weight

<u>Source</u>	<u>DF</u>	<u>SS (Adj)</u>	<u>MS (Adj)</u>	<u>F-Value</u>	<u>p-Value</u>
Treatments	7	13403.0	1215.0	1.528	0.2053
Residual	24	30068.0	1953.0		
Total	31	43470.0			

No significant ($p < 0.05$) at 95% of confidence level.

CV = 15.3%

Supplementary Table S11. ANOVA statistics for fruit dry weight

<u>Source</u>	<u>DF</u>	<u>SS (Adj)</u>	<u>MS (Adj)</u>	<u>F-Value</u>	<u>p-Value</u>
Treatments	7	495.5	70.78	2.483	*0.0453
Residual	24	684.3	28.51		
Total	31	1180.0			

* Significance ($P < 0.05$) at 95 % of confidence level.

CV = 18.5 %

Supplementary Table S12. ANOVA statistics for fruit diameter

Source	DF	SS (Adj)	MS (Adj)	F-Value	p-Value
Treatments	7	11.41	1.631	1.565	0.2063
Residual	24	25.66	1.069		
Total	31	37.07			

No significant ($p < 0.05$) at 95% of confidence level.

CV = 5.0 %