

## Supplementary Materials

**Combined effect of the potassium dose and plant biofertilization by *Acinetobacter calcoaceticus* on the growth, mineral content, nutritional quality, antioxidant activity and metabolomic features of tomatillo fruits (*Physalis ixocarpa* Brot.).**

### *Plants*

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## SUPPLEMENTARY TABLES

**Table S1.** Color parameters (CIELAb) for the tomatillo fruits (*Physalis ixocarpa* Brot. cv. “cáscara morada”) in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTM2 at different doses of potassium.

Treatment <sup>1</sup>	L*	a*	b*
KF100	55.5 ± 1.34 <sup>ab</sup>	-5.9 ± 0.91 <sup>ab</sup>	24.3 ± 2.16 <sup>a</sup>
KF75	55.9 ± 2.88 <sup>ab</sup>	-5.6 ± 1.05 <sup>a</sup>	24.1 ± 2.62 <sup>a</sup>
KF50	56.3 ± 1.59 <sup>a</sup>	-6.9 ± 1.21 <sup>ab</sup>	27.8 ± 3.08 <sup>a</sup>
KF0	53.4 ± 2.73 <sup>ab</sup>	-7.2 ± 0.78 <sup>ab</sup>	25.8 ± 3.67 <sup>a</sup>
KB100	54.2 ± 3.10 <sup>ab</sup>	-7.2 ± 0.56 <sup>ab</sup>	26.9 ± 2.10 <sup>a</sup>
KB75	53.8 ± 2.84 <sup>ab</sup>	-6.7 ± 1.09 <sup>ab</sup>	24.6 ± 1.26 <sup>a</sup>
KB50	51.1 ± 1.44 <sup>b</sup>	-7.7 ± 0.78 <sup>b</sup>	25.9 ± 2.07 <sup>a</sup>
KB0	54.7 ± 3.86 <sup>ab</sup>	-6.7 ± 1.63 <sup>ab</sup>	24.8 ± 3.60 <sup>a</sup>

<sup>1</sup>KF#: Treatments with chemical fertilization only; KB#: Treatments with chemical fertilization and inoculation with *A. calcoaceticus* UTM2; #: potassium fertilization dose (%) based on the recommended dose for tomatillo cultivation [19]. Different superscript letters indicate a significant difference between the treatments according to the HSD Tukey test (p < 0.05, n = 3).

**Table S2.** Mineral-element content (g/kg dw) in tomatillo fruits (*Physalis ixocarpa* Brot. cv. “cáscara morada”) in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 at different doses of potassium.

<b>Treatment<sup>1</sup></b>	<b>K</b>	<b>P</b>	<b>Ca</b>	<b>Na</b>	<b>Mg</b>	<b>Mn</b>
KF100	17.1 ± 5.21 <sup>a</sup>	1.43 ± 0.10 <sup>a</sup>	0.03 ± 0.03 <sup>b</sup>	0.83 ± 0.10 <sup>d</sup>	2.6 ± 0.15 <sup>a</sup>	0.018 ± 0.003 <sup>a</sup>
KF75	18.6 ± 38 <sup>a</sup>	1.40 ± 0.08 <sup>a</sup>	0.09 ± 0.11 <sup>ab</sup>	1.33 ± 0.04 <sup>bc</sup>	2.7 ± 0.09 <sup>a</sup>	0.020 ± 0.003 <sup>a</sup>
KF50	24.2 ± 3.90 <sup>a</sup>	1.34 ± 0.28 <sup>a</sup>	0.16 ± 0.08 <sup>ab</sup>	1.32 ± 0.03 <sup>bc</sup>	2.5 ± 0.25 <sup>a</sup>	0.017 ± 0.002 <sup>a</sup>
KF0	18.8 ± 2.57 <sup>a</sup>	1.38 ± 0.22 <sup>a</sup>	0.28 ± 0.08 <sup>a</sup>	1.52 ± 0.33 <sup>b</sup>	2.8 ± 0.22 <sup>a</sup>	0.017 ± 0.003 <sup>a</sup>
KB100	18.4 ± 1.68 <sup>a</sup>	1.48 ± 0.25 <sup>a</sup>	0.04 ± 0.08 <sup>b</sup>	1.22 ± 0.11 <sup>bcd</sup>	2.6 ± 0.36 <sup>a</sup>	0.020 ± 0.002 <sup>a</sup>
KB75	17.4 ± 1.42 <sup>a</sup>	1.45 ± 0.05 <sup>a</sup>	0.19 ± 0.07 <sup>ab</sup>	0.90 ± 0.17 <sup>cd</sup>	2.7 ± 0.37 <sup>a</sup>	0.011 ± 0.010 <sup>a</sup>
KB50	19.9 ± 1.29 <sup>a</sup>	1.76 ± 0.45 <sup>a</sup>	0.23 ± 0.05 <sup>ab</sup>	2.26 ± 0.18 <sup>a</sup>	3.4 ± 0.54 <sup>a</sup>	0.023 ± 0.005 <sup>a</sup>
KB0	17.0 ± 1.55 <sup>a</sup>	1.65 ± 0.18 <sup>a</sup>	0.04 ± 0.03 <sup>b</sup>	0.87 ± 0.08 <sup>d</sup>	2.9 ± 0.18 <sup>a</sup>	0.016 ± 0.001 <sup>a</sup>

<sup>1</sup>KF#: Treatments with chemical fertilization only; KB#: Treatments with chemical fertilization and inoculation with *A. calcoaceticus* UTMR2; #: potassium fertilization dose (%) based on the recommended dose for tomatillo cultivation [19]. Different superscript letters indicate a significant difference between the treatments according to the HSD Tukey test ( $p < 0.05$ ,  $n = 3$ ).

**Table S3.** Two-way analysis of variance (ANOVA) for the relevant parameters of tomatillo plants (*Physalis ixocarpa* Brot. cv. "cáscara morada") in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 at different doses of potassium.

SV	DF	Mean squares						
		[K]	[P]	[Ca]	[Na]	[Mg]	Chlorophyll	Dry weight
K dose	3	16.61ns (0.07)	1.89*** (0.0001)	13.33*** (0.0001)	6.20*** (0.0001)	6.56*** (0.0001)	470.84* (0.0112)	329.60*** (0.0001)
Inoculation	1	7.62ns (0.27)	0.13*** (0.0008)	8.02** (0.0025)	0.03ns (0.7426)	2.50*** (0.0001)	4108.16*** (0.0001)	766.14*** (0.0001)
K dose*Inoculation	3	53.47** (0.001)	0.29*** (0.0001)	4.88** (0.0020)	11.02*** (0.0001)	2.21*** (0.0001)	615.87*** (0.0038)	199.17*** (0.0001)
Error	16							
Total	23							

SV: sources of variation; DF: degrees of freedom; value in parenthesis, level of significance; ns: non-significant value of F ( $P > 0.05$ ), \*: significant F value ( $P \leq 0.05$ ), \*\*: highly significant value of F ( $P \leq 0.01$ ), \*\*\*: very highly significant value of F ( $P \leq 0.001$ ).

**Table S4.** Two-way analysis of variance (ANOVA) for the relevant parameters of tomatillo fruits (*Physalis ixocarpa* Brot. cv. “cáscara morada”) in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 at different doses of potassium.

SV	DF	Mean squares					
		Yield index	Maturity index	Protein	Fiber	Fat	FRAP
K dose	3	0.088*** (0.0001)	7.46*** (0.0001)	1.15*** (0.0001)	0.52*** (0.0001)	0.13*** (0.0001)	106770.47*** (0.0001)
Inoculation	1	0.00003ns (0.911)	0.26*** (0.0036)	0.19*** (0.0061)	1.11*** (0.0001)	0.13*** (0.0001)	25200.72*** (0.0001)
K dose*Inoculation	2	0.213*** (0.0001)	8.91*** (0.0001)	0.63*** (0.0001)	0.29*** (0.0014)	0.04*** (0.0027)	414287.64*** (0.0001)
Error	16						
Total	23						

SV: sources of variation; DF: degrees of freedom; value in parenthesis: level of significance; ns: non-significant value of F ( $P > 0.05$ ), \*: significant F value ( $P \leq 0.05$ ), \*\*: highly significant value of F ( $P \leq 0.01$ ), \*\*\*: very highly significant value of F ( $P \leq 0.001$ ).

**Table S5.** dMRM, mass spectrometric and quantification conditions for each phenolic compound in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 in tomatillo fruits (*Physalis ixocarpa* Brot. cv. “cáscara morada”) at 75% of the potassium recommended dose [19].

Compound	dMRM transition		Mass spectrometric conditions				Quantification conditions		
	Precursor ion	Production	Retention time	Collision energy	Fragmentor	Polarity	Quantification range (μM)	Regression type	R <sup>2</sup>
Shikimic acid	173.1	111.1	0.49	10	100	Negative	0.5 - 19	Quadratic	0.99
Gallic acid	169.0	125.2	1.4	10	100	Negative	1 - 19	Quadratic	0.99
L-Phenylalanine	166.1	131.0	1.92	10	100	Positive	0.25 - 19	Quadratic	0.99
Protocatechuic acid	153.0	109.1	2.5	10	100	Negative	0.25 - 19	Quadratic	0.99
4-Hydroxybenzoic acid	137.1	92.8	3.76	10	100	Negative	0.25 - 19	Quadratic	0.99
Gentisic acid	153.0	109.0	3.83	10	100	Negative	0.25 - 19	Quadratic	0.99
4-Hydroxyphenylacetic acid	107.1	77.0	4.72	20	140	Positive	0.25 - 19	Quadratic	0.99
(-)-Epigallocatechin	305.1	125.0	4.83	20	140	Negative	1 - 17	Quadratic	0.99
(+)-Catechin	291.0	138.9	5.07	10	100	Positive	0.5 - 19	Quadratic	0.99
Vanillic acid	169.0	93.0	5.12	10	100	Positive	0.25 - 19	Quadratic	0.99
Scopolin	355.1	193.0	5.25	20	100	Positive	0.25 - 19	Quadratic	0.99
Chlorogenic acid	355.1	163.0	5.34	10	100	Positive	0.25 - 19	Quadratic	0.99
Caffeic acid	181.0	163.	5.38	10	100	Positive	0.5 - 19	Quadratic	0.99
Malvin	655.1	331.1	5.82	40	100	Positive	0.5 - 19	Quadratic	0.99
Kuromanin	449.0	286.9	6.34	30	100	Positive	0.5 - 19	Quadratic	0.99
Procyanidin B2	577.1	425.1	6.4	10	100	Negative	1 - 19	Quadratic	0.99
Vanillin	153.0	124.9	6.52	10	100	Positive	0.25 - 19	Quadratic	0.99
Keracyanin	595.2	287.1	6.88	20	100	Positive	0.5 - 19	Quadratic	0.99
(-)-Epicatechin	291.0	138.8	6.96	10	100	Positive	0.5 - 19	Quadratic	0.99
4-Coumaric acid	165.0	147.0	7.21	10	100	Positive	0.25 - 19	Quadratic	0.99
Mangiferin	423.0	302.8	7.32	10	100	Positive	0.5 - 19	Quadratic	0.99

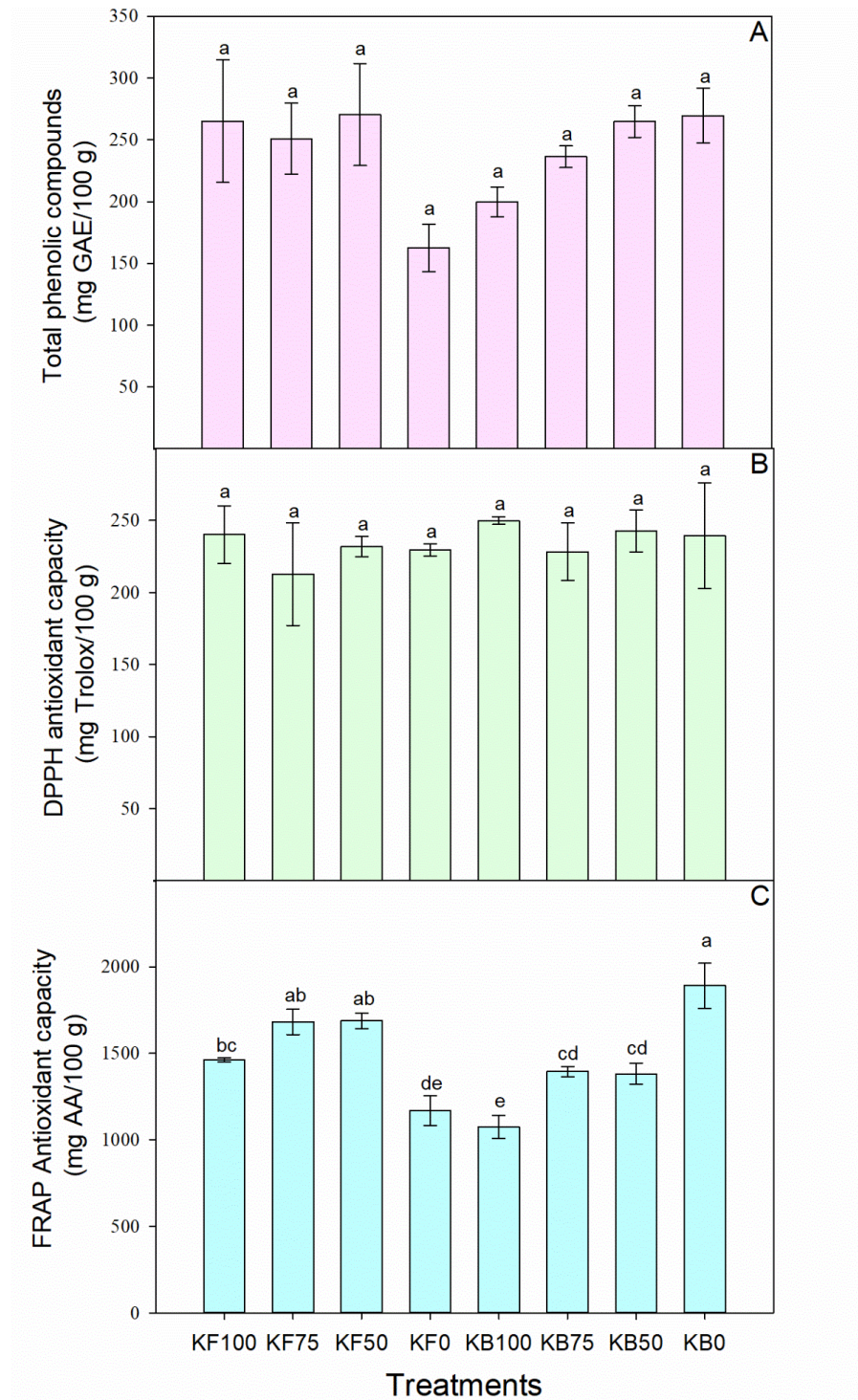
Umbelliferone	163.0	107.0	7.64	30	100	Positive	0.25 - 19	Quadratic	0.99
(-)-Gallocatechin gallate	458.9	139.0	7.95	20	80	Positive	1 - 19	Quadratic	0.99
Scopoletin	193.0	133.0	8.4	10	100	Positive	0.25 - 19	Quadratic	0.99
Ferulic acid	195.1	145.0	8.6	20	100	Positive	0.25 - 19	Quadratic	0.99
Quercetin 3,4-di-O-glucoside	627.0	302.9	8.77	10	100	Positive	0.5 - 19	Quadratic	0.99
3-Coumaric acid	165.05	147.04	8.81	10	100	Positive	0.5 - 19	Quadratic	0.99
Salicylic acid	137.0	93	9.15	10	100	Negative	0.5 - 19	Quadratic	0.99
Sinapic acid	225.1	207.1	9.16	10	100	Positive	0.25 - 19	Quadratic	0.99
Epicatechin gallate	443.1	123.0	9.83	10	100	Positive	1 - 19	Quadratic	0.99
Ellagic acid	300.5	145.0	9.98	30	170	Negative	1 - 19	Quadratic	0.99
Myricitrin	465.0	318.9	10.03	10	100	Positive	1 - 19	Quadratic	0.99
Pelargonidin	271.1	121	10.22	20	10	Positive	1 - 19	Quadratic	0.97
Quercetin 3-D-galactoside	465.0	302.9	10.26	10	100	Positive	0.25 - 19	Quadratic	0.99
Rutin	611.0	302.9	10.35	10	100	Positive	0.25 - 19	Quadratic	0.99
<i>p</i> -Anisic acid	153.1	109.0	10.45	5	120	Positive	0.25 - 19	Quadratic	0.99
Quercetin 3-glucoside	465.0	303.0	10.57	10	100	Positive	0.25 - 19	Quadratic	0.99
Luteolin 7-O-glucoside	449.0	287.0	10.77	10	100	Positive	0.5 - 19	Quadratic	0.99
Malvidin	331.1	287.1	11.14	20	100	Positive	1 - 17	Quadratic	0.96
2,4-Dimethoxy-6-methylbenzoic acid	197.0	179.0	11.41	5	80	Positive	0.25 - 19	Quadratic	0.99
Penta-O-galloyl-B-D-glucose	771.1	153.0	11.68	20	100	Positive	0.5 - 19	Quadratic	0.99
Kaempferol 3-O-glucoside	449.0	286.9	11.91	10	100	Positive	0.25 - 19	Quadratic	0.99
Quercitrin	449.1	303.1	11.95	10	100	Positive	0.5 - 19	Quadratic	0.99
Naringin	273.0	153.0	12.13	10	120	Positive	0.25 - 19	Quadratic	0.99
Myricetin	317.0	179.0	12.29	10	100	Negative	0.5 - 15	Quadratic	0.99
Hesperidin	609.1	301.1	12.68	20	100	Negative	0.5 - 19	Quadratic	0.99
<i>trans</i> -Resveratrol	229.1	135.0	12.69	10	100	Positive	0.5 - 19	Quadratic	0.99
Rosmarinic acid	361.1	163.0	12.8	10	100	Positive	0.5 - 19	Quadratic	0.99

Secoisolariciresinol	363.2	137.1	13.02	20	100	Positive	0.5 - 19	Quadratic	0.99
Phloridzin	435.0	272.9	13.04	10	100	Negative	0.25 - 19	Quadratic	0.99
<i>trans</i> -Cinnamic acid	149.1	131.0	14.08	10	100	Positive	0.25 - 19	Quadratic	0.99
Psoralen	187.0	131.1	14.99	20	100	Positive	0.25 - 19	Quadratic	0.99
Quercetin	302.9	153.1	15.18	35	100	Positive	1 - 19	Quadratic	0.99
Luteolin	287.1	153.0	15.28	30	100	Positive	0.5 - 19	Quadratic	0.99
Angelicin	187.0	131.1	15.75	20	100	Positive	0.5 - 19	Quadratic	0.99
Naringenin	271.0	151	16.79	10	100	Negative	0.5 - 19	Quadratic	0.99
Apigenin	271.0	153.0	17.45	30	100	Positive	0.5 - 19	Quadratic	0.99
Matairesinol	359.2	137.1	17.55	10	100	Positive	0.25 - 19	Quadratic	0.99
Kaempferol	287.1	153.0	17.81	30	100	Positive	0.25 - 19	Quadratic	0.99
Hesperetin	303.1	177.1	18.06	20	100	Positive	0.25 - 19	Quadratic	0.99
Podophyllotoxin	415.1	397.1	19.01	10	100	Positive	0.25 - 19	Quadratic	0.99
Methyl cinnamate	163.1	131.0	21.46	6	100	Positive	0.25 - 1	Quadratic	0.99
Nordihydroguaiaretic acid	303.0	193.1	22.72	10	100	Positive	0.5 - 19	Quadratic	0.99
Chrysin	255.1	153.0	22.89	40	100	Positive	0.25 - 19	Quadratic	0.99
Kaempferide	301.0	258.2	24.38	20	100	Positive	0.5 - 19	Quadratic	0.99
Emodin	269.0	225.0	27.45	20	150	Negative	1 - 17	Quadratic	0.99
Chrysophanol	255.1	153.0	31.34	40	100	Positive	0.25 - 19	Quadratic	0.99

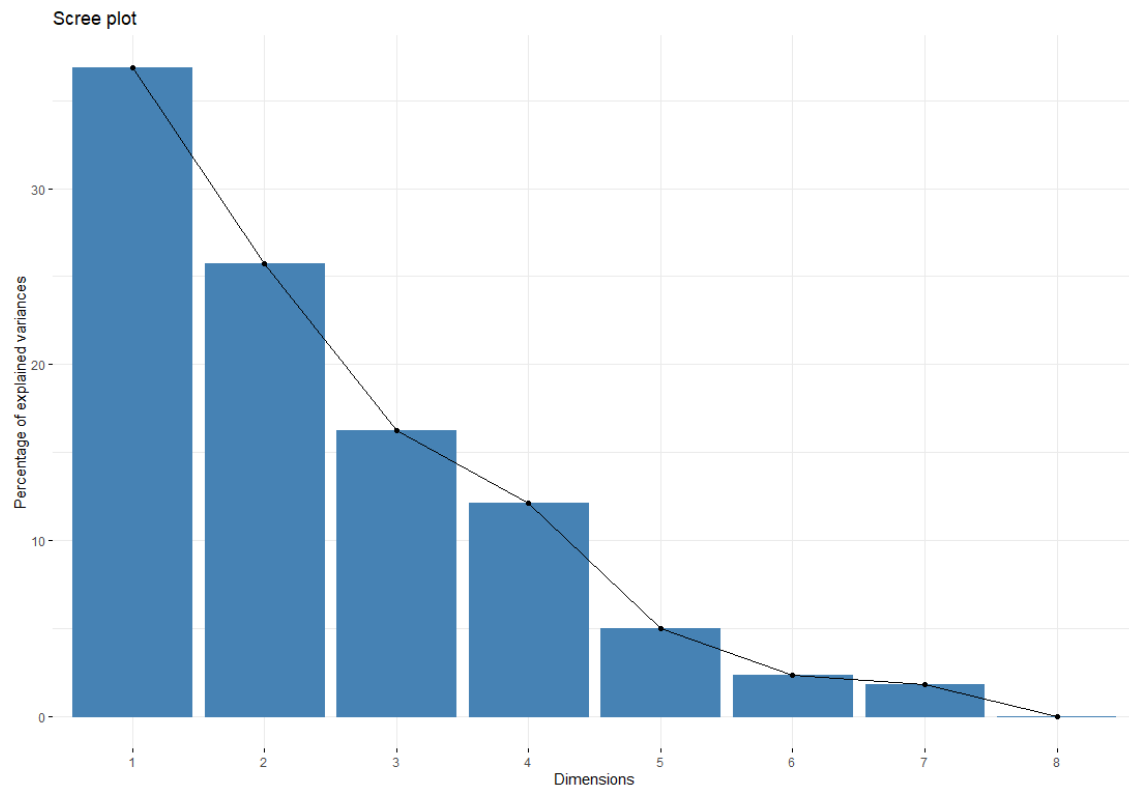
The retention time variation allowed for the search of the compounds were 2 min in each case. The cell accelerator voltage was 7 V for each compound. Dilutions were made if the concentration of some compounds were higher than the linearity range.



## SUPPLEMENTARY FIGURES



**Figure S1.** Phenols content and antioxidant capacity in tomatillo fruits (*Physalis ixocarpa* Brot. cv. “cáscara morada”) in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 at different doses of potassium. KF#: Treatments with chemical fertilization only; KB#: Treatments with chemical fertilization and inoculation with *Acinetobacter calcoaceticus* UTMR2; #: potassium fertilization dose (%) based on the recommended dose for tomatillo cultivation [19]. Different superscript letters indicate a significant difference between the treatments. GAE: gallic acid equivalent; AA: ascorbic acid.



**Figure S2.** Scree plot for the percentage of coverage of the PCA analysis in the evaluation of the biofertilizing effect of *Acinetobacter calcoaceticus* UTMR2 in tomatillo plants (*Physalis ixocarpa* Brot. cv. "cáscara morada") at different doses of potassium.