

Purple Nonsulfur Bacteria *Rhodopseudomonas palustris* Improve Soil Phosphorus Availability and Yield of Lemon Balm (*Melissa officinalis* L.) in Alluvial Soils via Plant and Ratoon Seasons



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Table S1. Effects of phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* on alluvial soil for farming lemon balm in the second season.

Treatment	pHH ₂ O	pHKCl	EC	N _{total}	P _{total}	NH ₄ ⁺	Al-P	Fe-P	Ca-P	K ⁺
	-	-	mS cm ⁻¹	%		mg kg ⁻¹				
100% P	6.02 ^e	4.55 ^{abc}	0.345 ^a	0.467	0.102	2.10 ^b	154.7 ^a	472.5 ^a	252.2 ^a	0.192 ^{bcd}
75% P	5.91 ^e	4.50 ^{bc}	0.317 ^b	0.369	0.105	1.82 ^c	152.4 ^a	433.7 ^b	248.7 ^a	0.188 ^{cd}
50% P	5.91 ^e	4.47 ^c	0.310 ^b	0.481	0.096	1.77 ^c	138.1 ^b	426.9 ^b	201.1 ^b	0.182 ^{cd}
25% P	5.60 ^d	4.54 ^{abc}	0.308 ^b	0.457	0.101	1.75 ^c	123.0 ^d	403.9 ^c	181.7 ^{bc}	0.174 ^{de}
75% P + P-PNSB	6.63 ^a	6.60 ^{ab}	0.297 ^b	0.467	0.092	2.82 ^a	130.1 ^c	430.8 ^b	182.2 ^{bc}	0.235 ^a
50% P + P-PNSB	6.26 ^b	4.56 ^{abc}	0.265 ^c	0.462	0.098	1.90 ^{bc}	112.3 ^e	387.8 ^d	164.9 ^e	0.214 ^{ab}
25% P + P-PNSB	6.23 ^b	4.52 ^{bc}	0.255 ^{cd}	0.471	0.101	1.77 ^c	110.3 ^e	328.9 ^d	159.9 ^e	0.198 ^{bc}
0% P + P-PNSB	5.37 ^a	4.58 ^{ab}	0.254 ^{cd}	0.434	0.102	1.72 ^c	102.5 ^f	309.0 ^f	117.3 ^f	0.154 ^a
0% P	5.28 ^a	4.64 ^a	0.235 ^d	0.462	0.104	1.70 ^c	111.0 ^e	322.5 ^{ef}	130.2 ^e	0.125 ^f
Level of significance	*	*	*	ns	ns	*	*	*	*	*
CV (%)	1.71	1.25	4.57	21.6	6.32	7.04	1.69	2.20	3.20	6.75

Note: In the same column, data followed by the same letters are not different significantly according to Duncan test at 5% significance.

*: different at 5% significance; ns: not significance; P-PNSB: the mixture of the four phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* TLS06, VNW02, VNW64 and VNS89; EC: Electricity conductivity.

Table S2. Effects of phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* on N and K uptake of lemon balm in two seasons.

Treatment	Content (%)				Uptake (mg kg ⁻¹)			
	N		K		N		K	
	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2	Season 1	Season 2
100% P	0.218 ^{bc}	0.441 ^c	1.40 ^e	2.63 ^d	99.0 ^b	260.4 ^b	633.4 ^d	1555.5 ^c
75% P	0.196 ^{cd}	0.378 ^{de}	1.28 ^d	1.96 ^e	82.8 ^c	205.4 ^e	541.6 ^e	1063.5 ^e
50% P	0.175 ^{de}	0.364 ^{de}	1.25 ^d	1.83 ^e	69.0 ^{cd}	160.5 ^e	494.4 ^f	808.6 ^f
25% P	0.167 ^{def}	0.343 ^{ef}	1.21 ^{de}	1.78 ^e	48.8 ^d	137.8 ^f	426.0 ^g	713.9 ^f
75% P + P-PNSB	0.252 ^a	0.546 ^a	1.87 ^a	4.24 ^a	117.4 ^a	320.2 ^a	868.8 ^a	2493.5 ^a
50% P + P-PNSB	0.231 ^{ab}	0.497 ^b	1.73 ^b	3.93 ^b	108.6 ^{ab}	251.5 ^b	812.1 ^b	1987.2 ^b
25% P + P-PNSB	0.224 ^{abc}	0.399 ^d	1.46 ^c	2.89 ^e	106.8 ^{ab}	182.3 ^d	693.4 ^c	1320.9 ^d
0% P + P-PNSB	0.147 ^{ef}	0.341 ^{ef}	1.14 ^e	1.35 ^f	15.5 ^e	51.8 ^g	117.3 ^b	205.4 ^g
0% P	0.136 ^e	0.313 ^f	0.980 ^f	0.977 ^g	12.2 ^e	37.4 ^g	87.9 ^b	117.2 ^g
Level of significance	*	*	*	*	*	*	*	*
CV (%)	9.08	5.62	3.95	6.16	10.8	6.23	4.68	9.21

Note: * In the same column, data followed by the same letters are not different significantly according to Duncan test at 5% significance.
 *: different at 5% significance; ns: not significance; P-PNSB: the mixture of the four phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* TLS06, VNW02, VNW64 and VNS89.

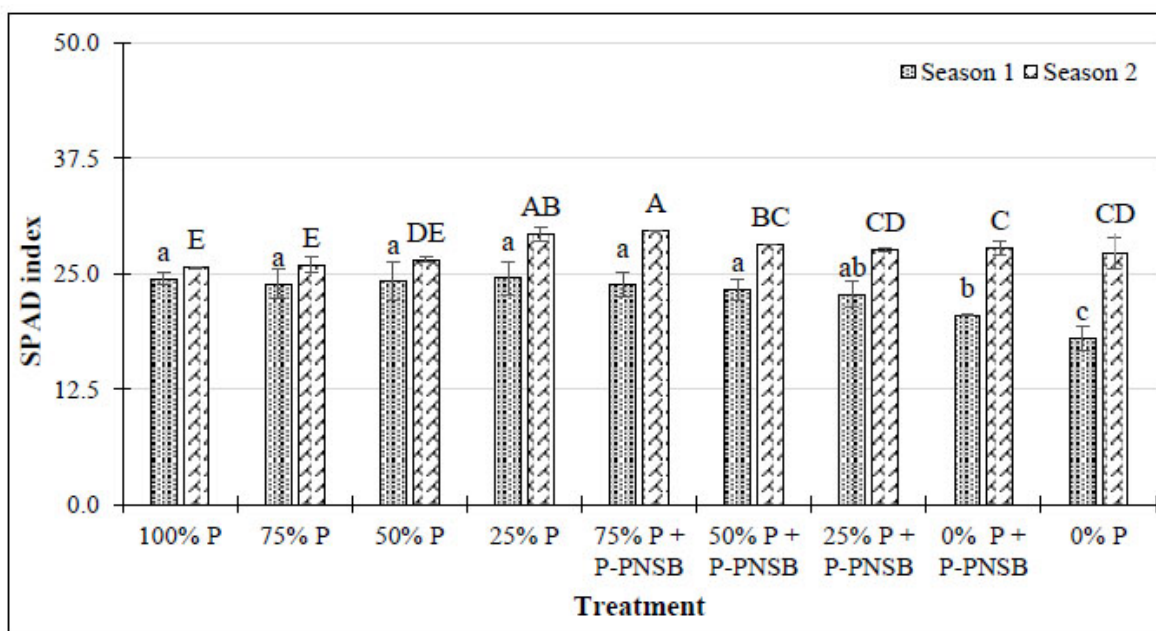


Fig. (1). Effects of phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* on SPAD indices of lemon balm in two seasons.

Lower-case and upper-case letters show significant different between treatments at 5% in the seasons 1 and 2, respectively; P-PNSB: the mixture of the four phosphorus-solubilizing purple nonsulfur bacteria *Rhodopseudomonas palustris* TLS06, VNW02, VNW64 and VNS89

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