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Weiwei Wang
Northwest University, China

Bo Fu
Northwest University, China

Changhui Li
Qinghai University, China

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Isolation and characteristics of Hydrogen-oxidizing bacteria in theleguminous rhizosphere in grassland of Sanjiangyuan region

Weiwei Wang¹, Bo Fu¹ and Changhui Li²

¹Department of Biology, Northwest University, Xi'an, Shaanxi, 710069, P.R.China, E-mail: wwwang@nwu.edu.cn.

²Agriculture and Animal Husbandry College, Qinghai University, Xining, Qinghai Province.

Key words : leguminous Rhizosphere, Sanjiangyuan region, hydrogen-oxidizing bacteria, isolation, characteristics

Introduction Dong and collaborators, theorized for the first time that H₂ released from root nodules can promote the growth of microbes around the root, as well as promote the growth of plants, and called this the "hydrogen fertilizer theory" (Dong Z *et al.*, 2003). Isolating hydrogen-oxidizing bacteria in different leguminous soil rhizospheres will significantly aid future studies of populations of this new group.

Material and methods Eight different leguminous rhizosphere soils (W, D, AI, AII, AIII, BI, BII and BIII) from the grassland of Sanjiangyuan Region were enriched for 15d at room temperature at 4.16×10^5 mol/L⁻¹ H₂ concentration. Then mineral salt agar medium (MSA) and H₂ treatment system (CHEN X D *et al.*, 2007) were used to isolate and culture the hydrogen-oxidizing bacteria for about 1 week.

Results Sixty three bacterium strains were isolated from 8 different soil samples and the ability to take up hydrogen were measured for these strains. Data showed that 26 bacterium strains had strong ability to take up hydrogen and grow autotrophically (Table 1). Colony form and physiological biochemistry characteristic were studied. Among these 26 hydrogen-oxidizing bacteria 7 strains were classified to species (Table 2).

Table 1 The result of oxidized H₂.

Strains	H ₂ consumption (10 ⁻⁴ mol · L ⁻¹)	Strains	H ₂ consumption (10 ⁻⁴ mol · L ⁻¹)	Strains	H ₂ consumption (10 ⁻⁴ mol · L ⁻¹)
W-4	6.82	BI-8	3.86	AIII-4	1.73
W-3	6.46	AI-9	3.50	AIII-3	1.64
BI-9	5.91	AI-8	3.36	AIII-9	1.45
BI-2	5.90	AI-5	3.18	W-9	1.39
AI-4	5.48	BII-3	2.89	D-7	0.94
BIII-2	4.63	BI-3	2.38	BIII-4	0.84
AII-6	4.52	AI-6	2.35	W-7	0.83
AII-1	4.36	W-1	2.27	BII-9	0.81
D-5	3.87	AI-3	1.74	blank	0.06

Conclusions This experiment not only used H₂ treatment system but also improved it. Physiological biochemistry characteristics were studied, and the 26 hydrogen-oxidizing bacteria were classified into the suitable species.

References

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- Chen X D, Wang W W, Guo L W, *et al.*, Isolation, screening and characterization of hydrogen-oxidizing bacteria in soybean rhizosphere [J]. *Chinese Journal of Applied Ecology*, 2007, 15(9): 2069-2074.

Table 2 Classification.

Strains	Species
BIII-2	<i>Staphylococcus</i>
BIII-4	<i>Pimelobacter</i>
A-3	<i>Aeromicrobium</i>
W-9	<i>Xanthobacter</i>
BII-9	<i>Xanthobacter</i>
AIII-9	<i>Xanthobacter</i>
AII-6	<i>A.gromonas</i>