

# Advancements in Exploiting *Sporosarcina Pasteurii* as Sustainable Construction Material: A Review

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## 1. Supplementary Materials

**Table S1.** Selective examples of literature employing *S. Pasteurii* for soil stabilization via surface percolation and mixing techniques.

Method	Characterization						Treat. Time (Days)	Comments and results	Ref.
	SEM	EDS	XRD	CaCO <sub>3</sub> content	Mechanical test (MPa)	Permeability reduction			
Surface Percolation	X	X	X	5.6-33.2	4.8-11.5		4	<ul style="list-style-type: none"> <li>• 92 hours treatment + 3 weeks curing</li> <li>• CaCO<sub>3</sub> crystal morphology were similar for technical and analytical grade cementation solution.</li> </ul>	[74]
	X			13 7.5	0.5-2.5 0.5-11.3			fine-grained: stiffness 166-1056 MPa medium-grained: 153-1974 MPa natural sand-gravel mixture: 355-1243 MPa	[99]
	X	X		5.7-6.9	0.57		14	<ul style="list-style-type: none"> <li>• 6 treatment cycles</li> <li>• CaCO<sub>3</sub> distribution was better along the sample with fewer fine particulates</li> </ul>	[46]
	X				X			<ul style="list-style-type: none"> <li>• the resistance of treated samples to cyclic stress improved</li> <li>• The relative density increased</li> </ul>	[134]
	X	X		2.5-16 1.5-8	0.2-2.3 0.4-1.5	X	16	MICP: $E_{50} = 20-250$ MPa EICP: $E_{50} = 50-200$ MPa	[43]
	X	X	X	22	14		14	<ul style="list-style-type: none"> <li>• 32 treatment cycle</li> <li>• CaCO<sub>3</sub> content, dry density, void ratio, and porosity were determined by XCT</li> </ul>	[52]
				X			12	<ul style="list-style-type: none"> <li>• CaCO<sub>3</sub> production rates is higher in samples treated with CaCl<sub>2</sub> and Ca(CH<sub>3</sub>COO)<sub>2</sub> than Ca(NO<sub>3</sub>)<sub>2</sub></li> </ul>	[71]
Sprayed	X				X		14	<ul style="list-style-type: none"> <li>• sand-steel interface shear strength increased 3 to 7 times</li> </ul>	[102]
	X			65	0.4		6	<ul style="list-style-type: none"> <li>• soil's resistance to rainfall simulation improved</li> </ul>	[75]

Mixed			X	3.6-4.2		30	<ul style="list-style-type: none"> <li>• CaCO<sub>3</sub> content = 270-310 kg/m<sup>3</sup></li> <li>• mechanical Characterisation done by three-point loading text (flexural strength)</li> </ul>	[73]
			X	0.1-0.2		10	<ul style="list-style-type: none"> <li>• CaCO<sub>3</sub> content = 19.7-82.3 kg/m<sup>3</sup></li> <li>• UCS values increased by 3 to 6 times</li> </ul>	[45]
	X	X	3.2-5.6	0.6	X	14	• CBR test values : 7.5-14 %	[2]
	X	X		X	X	21	• tensile strength increased by 12 kPa	[47]
	X	X	X			12	<ul style="list-style-type: none"> <li>• the number of crystals produced by natural bacteria in soil is more, but the size of the crystals produced by Sp. Pasteurii is significantly greater</li> </ul>	[44]
	X	X		X		5	• CBR = 49 %, moisture content=11.8 %	[7]
	X	X	14	0.8			<ul style="list-style-type: none"> <li>• The prosity of the sample reduced by 10.6%</li> <li>• Using seawater in solution improved the MICP performance</li> </ul>	[103]

\* X: Experiment has been performed