Supplementary materials for the article:

Wongdee J. et al. Enhancing The Efficiency of Soybean Inoculant for Nodulation under Multi-Environmental Stress Conditions
Pol J Microbiol. 2021, Vol. 70, No 2, 257–271.

Table SI
Chemical characterization of different soil samples used in this study.

Soil samples (Province)	Texture	pH	%OM	EC (mS/cm)	P (ppm)	K (ppm)	Ca (ppm)	SO_2^{-4} (S/kg)
Phathum Thani	Sand loam	4.4	1.83	3.30	21.96	418.56	3,878.00	725
Nakhon Ratchasima	Clay loam	6.98	0.08	1.87	157.60	227.47	430.00	51.22
Suphan Buri	Clay loam	5.22	3.556	1.91	40.702	26	1,635.8	nd
Phetchaburi	Clay loam	6.53	1.742	0.701	4.251	146.5	1,040	nd
Yasothon	Clay loam	6.95	3.336	0.294	12.402	41.5	1,416.3	nd

nd – not determined

Table SII
Growth and survival ability of isolated stress-tolerant *Bradyrhizobium* strains under *in vitro* stress conditions.

Bradyrhizobium	Growth score*						% survival of bacteria under drought stress		
	Acidity			High temperature					
	pH4	pH5	pH6.8	30°C	40°C	45°C	3% RH	22% RH	67% RH
UADA 110	1	1	3	3	1	0	7	23	100
CB1809	1	3	3	3	2	2	11	27	100
Isolate 184	1	1	3	3	1	1	7	11	85
Isolate 188	1	3	3	3	2	2	10	15	100
Isolate 193	1	2	3	3	1	1	10	20	100
Isolate 194	1	3	3	3	2	1	15	29	100
Isolate 197	1	3	3	3	2	1	9	13	94
Isolate 199	0	0	3	2	1	0	1	5	56

* – Growth was scored using a numerical rating of 0 – no growth, 1 – poor growth, 2 – well growth, and 3 – very well growth, as indicated in the belowing figures of bacterial growth (score 0, 1, 2, and 3) on the formulated medium for a) acidity, and b) high temperature stress conditions

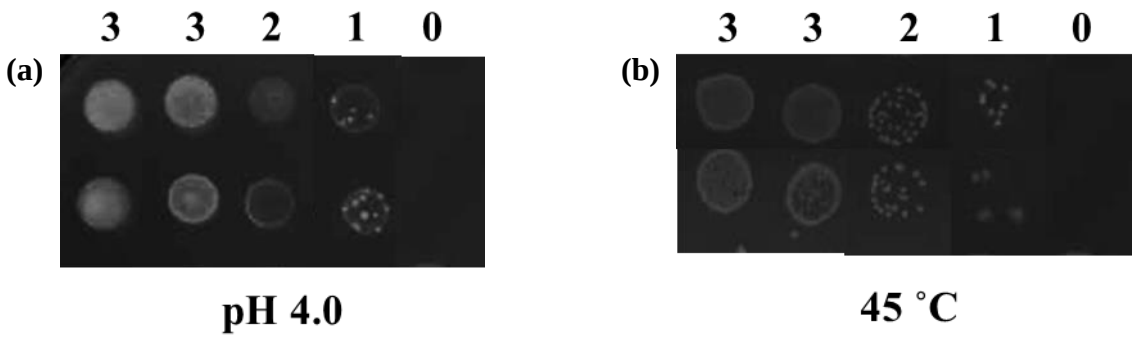


Table SIII

Stress tolerance index (STI) of soybean inoculated with and without stress-tolerant *Bradyrhizobium* grown in Leonard jars containing the sterilized sand under different stress conditions.

Conditions	Stress Tolerance Index (STI)				
	Non-inoculated	USDA 110	184	188	194
Normal	1.00 ± 0.00^{b}	1.70 ± 0.23^{a}	1.55 ± 0.40^{a}	1.52 ± 0.06^{a}	1.66 ± 0.04^{a}
Single stress					
Acidity	1.00 ± 0.00^{d}	2.31 ± 0.39^{ab}	1.97 ± 0.20^{c}	2.13 ± 0.08^{bc}	2.46 ± 0.33^{a}
Drought	0.99 ± 0.05^{c}	1.23 ± 0.11^{b}	1.05 ± 0.06^{c}	1.93 ± 0.41^{a}	2.09 ± 0.10^{a}
High temperature	0.99 ± 0.02^{d}	1.43 ± 0.14^{b}	1.46 ± 0.11^{b}	1.22 ± 0.11^{c}	1.80 ± 0.53^{a}
Mixed stress					
Acidity-drought	1.00 ± 0.00^{c}	1.67 ± 0.31^{b}	2.01 ± 0.21^{ab}	2.21 ± 0.54^{a}	2.26 ± 0.23^{a}
Acidity-high temp.	1.00 ± 0.00^{d}	1.23 ± 0.22^{bc}	1.38 ± 0.05^{ab}	1.12 ± 0.09^{cd}	1.45 ± 0.25^{a}

* – Means and standard deviations were calculated from three replicates of shoot dye weight, and values with different letters in the same row were significantly different at $p \leq 0.05$

Table SIV

Stress tolerance index (STI)* of soybean inoculated with and without stress-tolerant *Bradyrhizobium* grown in pots containing the soil under different stress conditions.

Conditions	Stress Tolerance Index (STI)			
	Non-inoculated	USDA110	188	194
Normal	1.00 ± 0.56^{c}	1.14 ± 0.11^{bc}	1.38 ± 0.09^{a}	1.22 ± 0.26^{ab}
Single stress				
Acidity	0.81 ± 0.18^{c}	1.51 ± 0.29^{b}	1.73 ± 0.39^{a}	1.59 ± 0.02^{b}
Drought	1.00 ± 0.17^{c}	1.38 ± 0.14^{ab}	1.22 ± 0.13^{bc}	1.66 ± 0.39^{a}
High temperature	1.00 ± 0.02^{a}	1.13 ± 0.06^{a}	1.16 ± 0.08^{a}	1.14 ± 0.02^{a}
Mixed stress				
Acidity-drought	1.00 ± 0.05^{d}	4.03 ± 0.27^{b}	1.83 ± 0.48^{c}	4.85 ± 1.08^{a}
Acidity-high temp.	1.00 ± 0.64^{c}	1.50 ± 0.36^{b}	2.15 ± 0.18^{a}	1.67 ± 0.16^{b}

* – Means and standard deviations were calculated from three replicates of shoot dye weight, and values with different letters in the same row were significantly different at $p \leq 0.05$

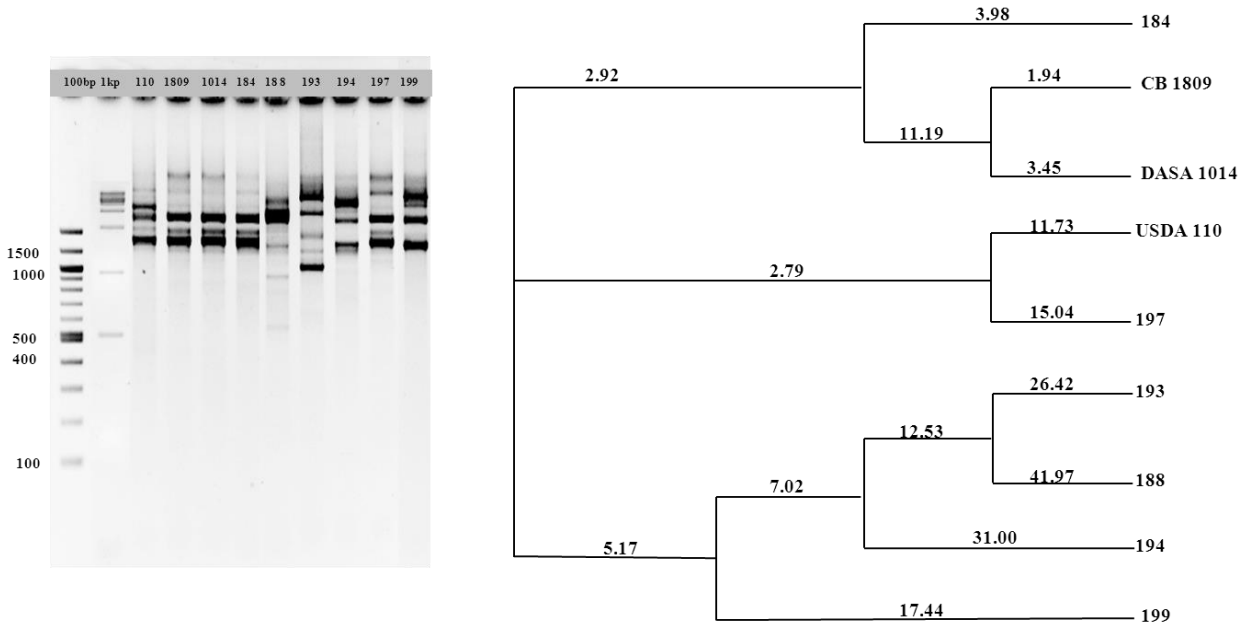
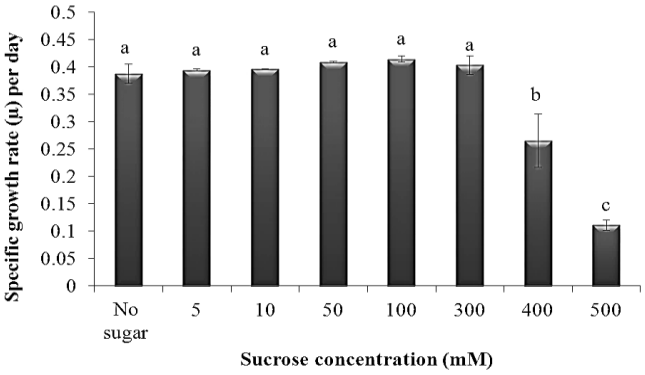
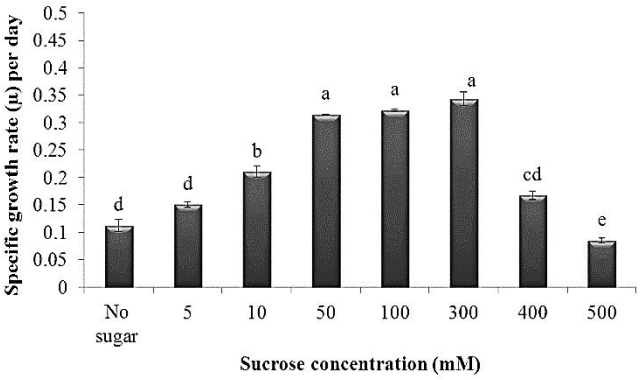


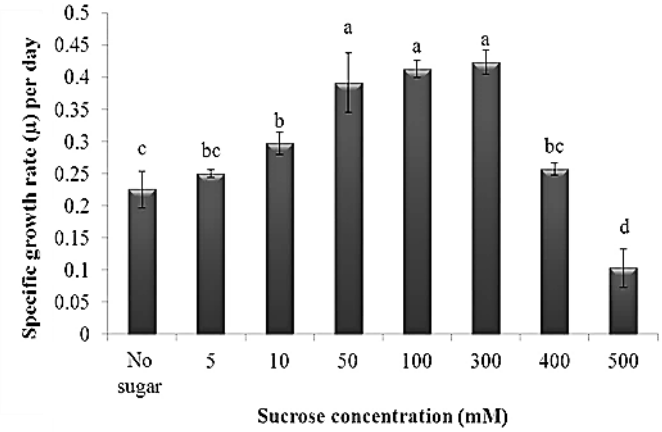
Fig. S1. DNA fingerprint polymorphism and dendrogram of stress-tolerant *Bradyrhizobium* (isolates 184, 188, 193, 194, 197, 199) and type strains based on Box-PCR analysis.



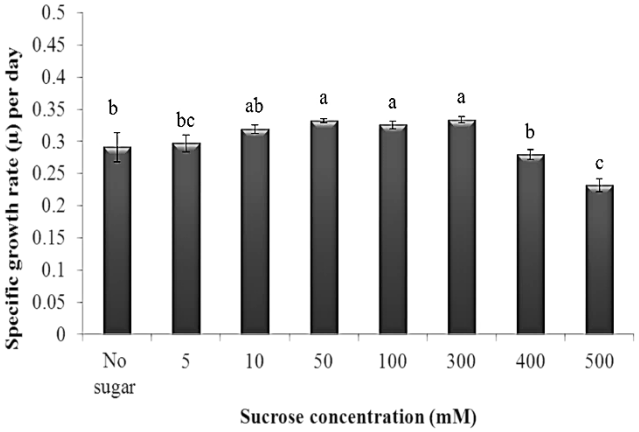
a) Normal condition



b) Acid condition



c) Drought condition



d) High temperature

Fig. S2. Specific growth rate of isolate 194 in MSM supplemented with various concentrations of sucrose under different conditions. Means and standard deviations were calculated from three replicates, and values with different letters were significantly different at $p \leq 0.05$.