

Table 1S Effect of biochar on enzymes (mean \pm SD, n = 3) of soybeans with different P efficiencies¹⁾.

Cultivar	Fertilizer (F)	Biochar(B)	SPS (10^{-2} mg (Sucrose) g^{-1} FM h^{-1})				SS (10^{-2} mg (Sucrose) g^{-1} FM h^{-1})			
			V4	R2	R4	R6	V4	R2	R4	R6
L13	F0	B0	9.66 \pm 1.12b	0.83 \pm 0.21e	0.58 \pm 0.03e	2.46 \pm 0.01e	15.05 \pm 0.62d	10.95 \pm 1.18d	1.85 \pm 0.26bc	3.31 \pm 0.24b
		B1	14.55 \pm 0.16a	1.22 \pm 0.12d	0.89 \pm 0.02d	2.74 \pm 0.09de	15.19 \pm 1.7d	12.62 \pm 0.25cd	2.05 \pm 0.26b	3.24 \pm 0.65b
		B5	13.53 \pm 0.8a	1.49 \pm 0.02c	1.22 \pm 0.24cd	2.9 \pm 0.13d	23.17 \pm 1.37ab	13.9 \pm 0.85bcd	3.19 \pm 0.07a	4.25 \pm 0.21a
		B10	12.5 \pm 0.95a	1.17 \pm 0.07d	1.18 \pm 0.03cd	3.12 \pm 0.04cd	20.83 \pm 1.87bc	13.14 \pm 0.43cd	1.07 \pm 0.12de	3.83 \pm 0.15ab
	F150	B0	8.54 \pm 0.51b	0.9 \pm 0.09e	0.86 \pm 0.01de	2.78 \pm 0.04de	18.91 \pm 0.61c	11.02 \pm 2.36d	0.84 \pm 0.06e	3.41 \pm 0.16b
		B1	12.5 \pm 0.95a	1.17 \pm 0.07d	1.18 \pm 0.03cd	3.12 \pm 0.04cd	20.83 \pm 1.87bc	13.14 \pm 0.43cd	1.07 \pm 0.12de	3.83 \pm 0.15ab
		B5	12.92 \pm 0.42a	1.33 \pm 0.03cd	1.71 \pm 0.32b	3.57 \pm 0.4b	19.61 \pm 1.07c	14.68 \pm 2.18abc	1.49 \pm 0.41cd	4.28 \pm 0.18a
		B10	13.81 \pm 1.62a	1.66 \pm 0.09ab	2.08 \pm 0.04a	4.12 \pm 0.06a	23.4 \pm 1.25ab	17.05 \pm 0.19ab	2.01 \pm 0.16b	4.45 \pm 0.12a
T3	F0	B0	17.09 \pm 1.19b	3 \pm 0.1bc	1.1 \pm 0.08f	1.81 \pm 0.13f	32.07 \pm 0.72ab	5.62 \pm 0.18f	3.23 \pm 0.42c	2.23 \pm 0.07f
		B1	18.06 \pm 0.39b	3.25 \pm 0.08b	1.33 \pm 0.04e	2.08 \pm 0.22ef	33.82 \pm 1.62ab	7.34 \pm 0.8de	3.73 \pm 0.58abc	2.87 \pm 0.05e
		B5	20.47 \pm 1.09b	4.15 \pm 0.15a	1.5 \pm 0.06de	2.46 \pm 0.06de	35.07 \pm 0.19a	8.04 \pm 0.13bcd	4.3 \pm 0.53ab	3.23 \pm 0.11d
		B10	24.85 \pm 1.92a	4.4 \pm 0.17a	1.58 \pm 0.08d	3.1 \pm 0.28bc	19.45 \pm 0.67c	8.82 \pm 0.76abc	4.52 \pm 0.1a	3.95 \pm 0.15b
	F150	B0	17.07 \pm 1.31b	2.26 \pm 0.16e	1.8 \pm 0.11c	2.73 \pm 0.22cd	30.78 \pm 0.87b	6.48 \pm 0.09ef	3.43 \pm 0.26bc	2.7 \pm 0.23e
		B1	20.01 \pm 1.12b	2.45 \pm 0.1de	2.12 \pm 0.04b	2.98 \pm 0.06bc	31.53 \pm 2.44ab	7.5 \pm 0.83cde	3.72 \pm 0.12abc	3.6 \pm 0.05c
		B5	21.02 \pm 3.31ab	2.64 \pm 0.19cde	2.21 \pm 0.05b	3.26 \pm 0.1ab	33.82 \pm 0.51ab	9.49 \pm 0.61ab	4.13 \pm 0.54abc	3.84 \pm 0.19bc
		B10	25.09 \pm 2.21a	2.84 \pm 0.33bcd	2.74 \pm 0.18a	3.6 \pm 0.16a	34.16 \pm 2.88ab	9.77 \pm 0.75a	3.48 \pm 0.37bc	4.31 \pm 0.11a

¹⁾FM–fresh mass; SPS –sucrose-phosphate synthase; SS–sucrose synthase. Different lowercase letters in a single column indicate differences ($P < 0.05$) between the treatments.

Table 2S Effect of biochar on carbohydrates (mean \pm SD, n = 3) of soybeans with different P efficiencies¹⁾.

Cultivar	Fertilizer(F)	Biochar(B)	Soluble sugar($\mu\text{g g}^{-1}\text{FM}$)				Sucrose($\mu\text{g g}^{-1}\text{FM}$)				Starch($\mu\text{g g}^{-1}\text{FM}$)			
			V4	R2	R4	R6	V4	R2	R4	R6	V4	R2	R4	R6
L13	F0	B0	407.8 \pm	177.6 \pm	250.6 \pm	677.5 \pm	70.5 \pm	12.7 \pm	10.3 \pm	27.1 \pm	114.7 \pm	44.5 \pm	45.5 \pm	89.3 \pm
			18.3ab	11.8c	18.3d	36.4a	8.8bc	0.4c	1.7b	0.6c	0.4b	6.2d	0.8bc	5.4c
		B1	397.4 \pm	191.4 \pm	313.4 \pm	720.2 \pm	69.2 \pm	13.8 \pm	9.7 \pm	28.2 \pm	125.7 \pm	54.9 \pm	46.2 \pm	98.2 \pm
			25.4ab	1.9bc	25.4c	39a	1.6bc	0.3bc	0.2b	1.8bc	11.7ab	1ab	1.6abc	9.2abc
		B5	380.4 \pm	201.4 \pm	329.6 \pm	721.9 \pm	85.6 \pm	17.7 \pm	11.4 \pm	29.1 \pm	124.8 \pm	59.7 \pm	48.9 \pm	98 \pm
			5.9bc	3.9ab	5.9bc	0.4a	5.4ab	1.8ab	1.1b	1.9bc	2.6ab	0.2a	3abc	6.9abc
	B10	401 \pm	204.1 \pm	362.7 \pm	760.2 \pm	92.5 \pm	21.8 \pm	15.4 \pm	29.8 \pm	126.5 \pm	60.3 \pm	52.3 \pm	109.6 \pm	
		41.3ab	6.9ab	41.3a	35.2a	12.3a	0.9a	0.3a	3.3bc	5.9ab	2a	6ab	6.4a	
	F150	B0	459.1 \pm	185.5 \pm	268.3 \pm	741.4 \pm	58.3 \pm	15.2 \pm	11.3 \pm	30.6 \pm	120.4 \pm	47.7 \pm	44.4 \pm	92 \pm
			17.3a	5.6c	17.3d	63.9a	5.1c	2.1bc	1.6b	1.1bc	19.2b	3.6cd	1.8c	0.2bc
		B1	464.4 \pm	192.1 \pm	305.2 \pm	771.7 \pm	80.3 \pm	16 \pm	14 \pm 0.5a	36.2 \pm	126.6 \pm	52.8 \pm	48.2 \pm	96.2 \pm
			45.9a	7.1bc	45.9c	18.7a	9.1ab	2.2bc		8ab	12.3ab	0.3bc	2abc	3abc
B5		349.7 \pm	211.2 \pm	344.3 \pm	710.9 \pm	74.9 \pm	16.6 \pm	14.7 \pm	38.9 \pm	138.3 \pm	60.5 \pm	49.1 \pm	95.9 \pm	
		40.9bc	2.2a	40.9ab	107.9a	5.2bc	1.4bc	0.7a	1.6a	8.5ab	2.2a	2.4abc	6.4abc	
B10	324.5 \pm	214.3 \pm	359.1 \pm	739.7 \pm	74.8 \pm	17.5 \pm	16 \pm 1.1a	40.8 \pm	147.6 \pm	61.2 \pm	53 \pm 2.4a	105.4 \pm		
	4.9c	0.1a	4.9a	31.1a	2.8bc	3.1b		1.3a	1.5a	1.7a		7.2ab		
T3	F0	B0	437.6 \pm	220.8 \pm	390 \pm	479.7 \pm	76.6 \pm	24 \pm	11.4 \pm	25.2 \pm	116.1 \pm	74.4 \pm	49.9 \pm	31.2 \pm
			14.8a	2.9b	14.8d	30.7ab	1.1c	1.4bc	1.6c	2b	13.3a	13.8b	4.9c	5.1b
		B1	445 \pm	227.9 \pm	394.4 \pm	497.2 \pm	103.8 \pm	27.4 \pm	14.4 \pm	32.1 \pm	121.5 \pm	91 \pm	53.4 \pm	32.9 \pm
			33.3a	14.9b	33.3d	24.4ab	2.7ab	0.9b	1.9abc	1.8ab	21.6a	7.7ab	0.7ab	0.3b
		B5	479 \pm	255.1 \pm	425.4 \pm	577.7 \pm	117.7 \pm	28 \pm	12.7 \pm	32.8 \pm	121.9 \pm	92.1 \pm	54.8 \pm	40.6 \pm
			40.8a	10.3a	40.8abc	48ab	8.7a	2.5b	2.4bc	7.3ab	5a	4.4ab	2.8ab	1.5ab
	B10	512.4 \pm	268.3 \pm	437.9 \pm	648.1 \pm	122.8 \pm	38.5 \pm	16.4 \pm	36.8 \pm	132.5 \pm	102.8 \pm	56.3 \pm	48.8 \pm	
		61.9a	3.1a	61.9ab	139.7a	12.8a	3.5a	1.8ab	7.1a	5.7a	1.1a	0.7a	10.7a	
	F150	B0	430.1 \pm	218.8 \pm	389.7 \pm	445.2 \pm	90.9 \pm	15.9 \pm	14.1 \pm	25.1 \pm	131.1 \pm	80.4 \pm	45 \pm	29.9 \pm
			59.8a	5.5b	59.8d	53.8b	8.7bc	1.1c	2.5abc	2.1b	8.9a	8.4b	0.6bc	1.4b
		B1	450 \pm	217.1 \pm	403.2 \pm	451.9 \pm	106.6 \pm	22 \pm	18.1 \pm	31.4 \pm	132.1 \pm	81.6 \pm	49.9 \pm	39.4 \pm
			53.7a	3.5b	53.7cd	66.1b	11.8ab	2.1bc	1.9a	5.7ab	1.1a	3ab	0.2bc	0.7ab
B5		461.9 \pm	214.5 \pm	413.3 \pm	546.7 \pm	107.2 \pm	25.9 \pm	17.8 \pm	35.3 \pm	146.6 \pm	83.9 \pm	45.4 \pm	40.9 \pm	
		24.9a	7.9b	24.9bcd	63ab	5.5ab	7.4bc	1.2a	1ab	21.5a	2.7ab	2.1c	1.3ab	
B10	453.3 \pm	225.2 \pm	444 \pm	580.2 \pm	121.8 \pm	29.2 \pm	18.6 \pm	36.8 \pm	138.1 \pm	102.4 \pm	46.4 \pm	42.5 \pm		
	14.2a	0.8b	14.2a	45.9ab	2.9a	7.2ab	0.4a	0.6a	6.4a	16a	0.9c	9.5ab		

¹⁾FM– fresh mass. Different lowercase letters in a single column indicate differences ($P < 0.05$) between the treatments.