

Supplementary Table 1. Summary of the calculated CSTV of P adjusted to 90% of relative yield grouped by different soil layers and adjusted models, with all summer crops on medium STP field trial established in a subtropical Oxisol at the Candói city, Paraná State, Brazil.

Soil layer	n	p-value	AIC	CSTV of P	LCI	UCI	n	p-value	AIC	CSTV of P	LCI	UCI	n	p-value	AIC	CSTV of P	LCI	UCI
cm	-	-	-	-----mg dm ⁻³ -----			-	-	-	-----mg dm ⁻³ -----			-	-	-	-----mg dm ⁻³ -----		
	Soybean 2019/2020						Soybean 2021/2022						Corn 2022/2023					
Cate and Nelson (1965)																		
0–20	11	-	60.9	4.8	3.7	6.0	11	-	83.1	7.7	6.6	10.8	11	-	66.4	4.6	1.9	6.0
0–10	11	-	60.9	7.9	5.8	10.2	11	-	81.3	15.4	11.1	19.3	11	-	62.3	7.5	4.2	10.3
10–20	11	-	61.9	1.6	1.5	1.8	11	-	82.2	2.7	2.4	2.9	11	-	68.2	0.5	0.3	3.0
ALCC																		
0–20	11	0.645	-	-	-	-	11	0.052	-	-	-	-	11	0.427	-	-	-	-
0–10	11	0.720	-	-	-	-	11	0.054	-	-	-	-	11	0.393	-	-	-	-
10–20	11	0.216	-	-	-	-	11	0.016	81.2	2.6	2.5	2.7	11	0.306	-	-	-	-
Mitscherlich																		
0–20	11	1.000	-	-	-	-	11	0.578	-	-	-	-	11	0.259	-	-	-	-
0–10	11	1.000	-	-	-	-	11	0.049	80.8	15.6	12.2	21.1	11	0.162	-	-	-	-
10–20	11	1.000	-	-	-	-	11	0.013	78.0	2.6	2.4	3.1	11	0.302	-	-	-	-
Linear-plateau																		
0–20	11	0.687	-	-	-	-	11	0.155	-	-	-	-	11	0.502	-	-	-	-
0–10	11	0.350	-	-	-	-	11	0.116	-	-	-	-	11	0.328	-	-	-	-
10–20	11	0.442	-	-	-	-	11	0.008	74.5	2.4	2.3	2.4	11	0.551	-	-	-	-
Quadratic-plateau																		
0–20	11	0.682	-	-	-	-	11	0.167	-	-	-	-	11	0.540	-	-	-	-
0–10	11	0.308	-	-	-	-	11	0.130	-	-	-	-	11	0.380	-	-	-	-
10–20	11	0.450	-	-	-	-	11	0.074	-	-	-	-	11	0.578	-	-	-	-

ALCC = Arcsine Logarithm Calibration Curve; n: number of observations; *p*-value <0.05 was considered **significant**; LCI = lower confidence interval;

UCI = upper confidence interval; AIC = Akaike information criterion.

Supplementary Table 2. Summary of the calculated critical soil test value (CSTV) of P adjusted to 90% of relative yield (RY) grouped by different soil layers and adjusted models, combining all summer crops evaluated on high soil test-P (STP) field trial established in a subtropical Oxisol at the Pinh o city, Paran  State, Brazil.

Soil layer	n	<i>p</i> -value	AIC	CSTV of P	LCI	UCI	n	<i>p</i> -value	AIC	CSTV of P	LCI	UCI	n	<i>p</i> -value	AIC	CSTV of P	LCI	UCI
cm				-----mg dm ⁻³ -----						-----mg dm ⁻³ -----							-----mg dm ⁻³ -----	
	Soybean 2019/2020						Soybean 2021/2022						Soybean 2022/2023					
Cate and Nelson (1965)																		
0–20	11	-	64.5	8.8	8.6	10.6	11	-	49.3	13.1	11.5	14.4	11	-	62.2	11.9	10.3	16.7
0–10	11	-	64.5	13.6	13.1	16.7	11	-	51.4	18.9	16.5	22.5	11	-	62.2	17.5	15.7	28.2
10–20	11	-	62.7	3.5	3.3	4.1	11	-	50.4	5.2	4.3	5.9	11	-	63.3	4.7	4.7	5.7
ALCC																		
0–20	11	0.274		-	-	-	11	0.584		-	-	-	11	0.787		-	-	-
0–10	11	0.323		-	-	-	11	0.512		-	-	-	11	0.766		-	-	-
10–20	11	0.277		-	-	-	11	0.970		-	-	-	11	0.761		-	-	-
Mitscherlich																		
0–20	11	1.000		-	-	-	11	1.000		-	-	-	11	0.528		-	-	-
0–10	11	1.000		-	-	-	11	0.329		-	-	-	11	0.556		-	-	-
10–20	11	1.000		-	-	-	11	0.812		-	-	-	11	1.000		-	-	-
Linear-plateau																		
0–20	11	0.433		-	-	-	11	0.157		-	-	-	11	0.979		-	-	-
0–10	11	0.488		-	-	-	11	0.268		-	-	-	11	0.955		-	-	-
10–20	11	0.160		-	-	-	11	0.283		-	-	-	11	Not converge		-	-	-
Quadratic-plateau																		
0–20	11	Not converge		-	-	-	11	0.146		-	-	-	11	0.786		-	-	-
0–10	11	Not converge		-	-	-	11	0.324		-	-	-	11	Not converge		-	-	-
10–20	11	0.224		-	-	-	11	0.281		-	-	-	11	Not converge		-	-	-

ALCC = Arcsine Logarithm Calibration Curve; n: number of observations; *p*-value <0.05 was considered **significant**; Not converge: When the model did not converge, producing no CSTV; LCI = lower confidence interval; UCI = upper confidence interval; AIC = Akaike information criterion.