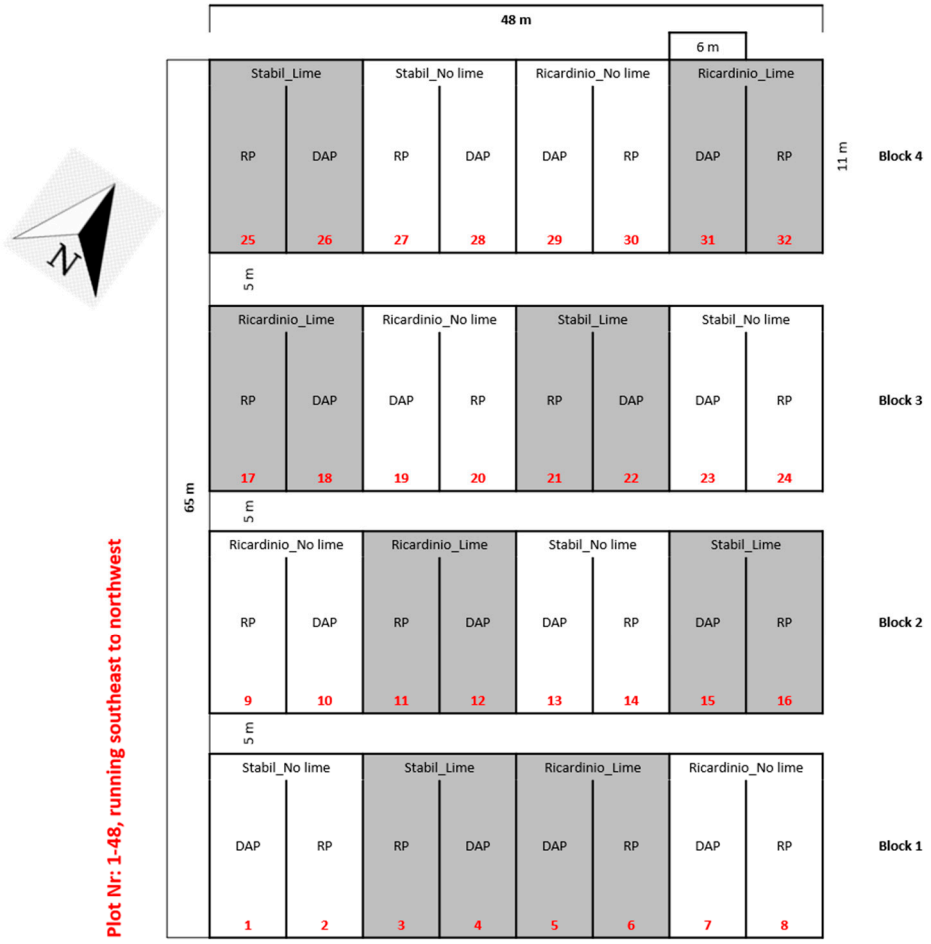

Figure S1. Experimental design in 2020. RP, rock phosphate; DAP, diammonium phosphate; with (Lime) and without (No lime) lime application. Main-plot factor is given on the top and sub-plot factor is presented below.

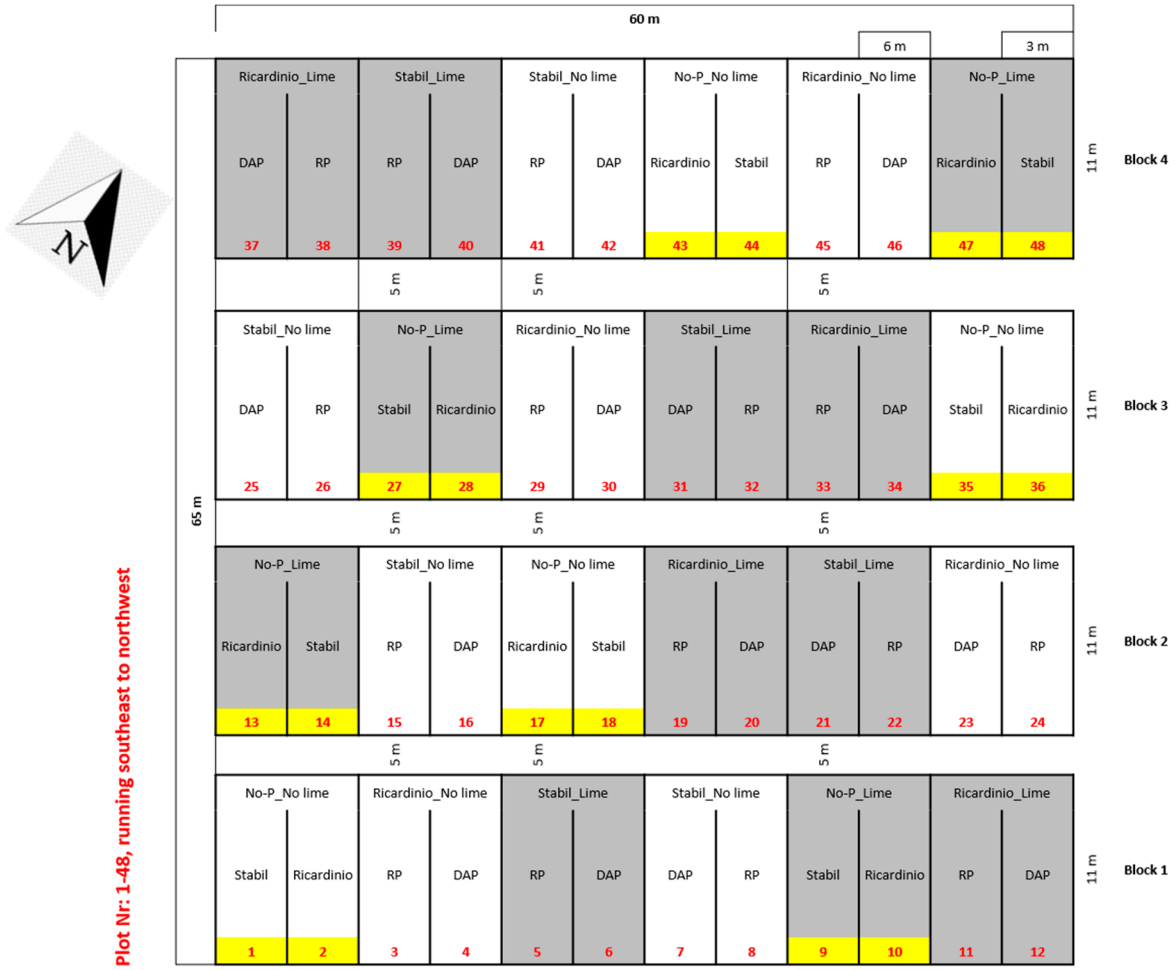

Figure S2. Experiment design in 2021.

Figure S2. Experimental design in 2021. No-P, no P-fertilizer applied; RP, rock phosphate; DAP, diammonium phosphate; with (Lime) and without (No lime) lime application. Main-plot factor is given on the top and sub-plot factor is presented below.

Table S1. Simple means for interactions of P-fertilizer (Pf), cultivar (Cul), lime application (Lime) on different traits in 2020 and at different stages.

Treatment			LAI									PAR			Biomass		P concentration
												%			kg DM ha^{-1}		g P kg^{-1}
Lime	**Cul**	**Pf**	**15**	**20**	**34**	**48**	**62**	**76**	**90**	**104**	**118**	**65**	**93**	**118**	**Six-leaf stage**	**Harvest**	**Six-leaf stage**
No lime	Stabil	RP	0.01	0.03	0.16	0.33	1.07	3.56	4.26	3.74	4.05	22.6	75.9	88.1	151	10728	2.80
		DAP	0.02	0.03	0.07	0.79	2.68	5.16	4.51	4.22	4.22	49.5	91.2	94.0	460	16631	3.38
	Ricardinio	RP	0.02	0.04	0.14	0.26	0.77	2.77	3.28	3.30	3.37	27.3	78.8	89.1	111	11352	2.45
		DAP	0.02	0.04	0.10	0.72	2.15	4.21	3.81	3.52	4.13	45.0	91.1	93.2	412	15478	3.10
Lime	Stabil	RP	0.02	0.04	0.11	0.22	1.07	3.45	3.72	3.41	3.94	33.9	76.8	89.4	99	12578	2.41
		DAP	0.02	0.03	0.08	0.75	2.14	3.85	3.47	3.54	3.59	38.9	89.2	92.1	431	15926	3.75
	Ricardinio	RP	0.02	0.03	0.12	0.27	1.12	3.18	3.12	2.78	3.74	28.2	75.5	89.1	122	10641	2.44
		DAP	0.02	0.03	0.06	0.60	2.03	3.68	4.04	3.50	3.42	45.2	86.3	91.6	364	14272	3.25

Table S2. Simple means for interactions of P-fertilizer (Pf), cultivar (Cul), lime application (Lime) on different traits in 2021 and at different stages.

Treatment			PAR	Biomass		P concentration	P content		PUE	
			%	kg DM ha^{-1}		g P kg^{-1}	mg P $plant^{-1}$		%	
Lime	**Cul**	**Pf**	**99**	**Six-leaf stage**	**Harvest**	**Six-leaf stage**	**Six-leaf stage**	**Harvest**	**Six-leaf stage**	**Harvest**
No lime	Stabil	No-P	85.4	882	12796	2.39	20.21	176.89	-	-
		RP	85.5	182	8996	2.04	3.21	126.65	0.50	18.52
		DAP	94.4	1357	16634	4.16	46.42	215.30	7.16	32.30
	Ricardinio	No-P	81.1	136	7559	1.89	2.35	106.56	-	-
		RP	82.1	180	7863	1.98	3.20	122.12	0.48	18.43
		DAP	96.1	1344	15053	3.85	48.43	214.22	6.89	29.25
Lime	Stabil	No-P	82.0	193	8663	2.26	3.85	125.18	-	-
		RP	87.6	151	8986	2.16	3.09	138.80	0.43	18.89
		DAP	92.1	1028	13681	3.79	35.55	204.48	5.26	28.57
	Ricardinio	No-P	81.9	167	7685	2.08	3.25	99.09	-	-
		RP	83.4	150	8011	2.00	2.66	116.14	0.40	17.64
		DAP	89.2	945	11323	4.65	31.89	180.33	5.22	27.34

Table S3. ANOVA for the effects of P-fertilizer (Pf), cultivar (Cul), lime application (Lime), and their interactions on LAI at different DAS in 2020. ns: not significant at $\alpha = 0.05$.

DAS	**15**	**20**	**34**	**48**	**62**	**76**	**90**	**104**	**118**
Pf	ns	ns	<0.001	<0.001	<0.001	<0.001	ns	0.044	ns
Cul	ns	ns	ns	ns	ns	0.035	ns	ns	ns
Lime	ns	ns	ns	ns	ns	ns	ns	ns	ns
Pf × Cul	ns	ns	ns	ns	ns	ns	ns	ns	ns
Pf × Lime	ns	ns	ns	ns	ns	0.039	ns	ns	ns
Cul × Lime	ns	0.006	ns	ns	ns	ns	ns	ns	ns
Pf × Cul × Lime	ns	ns	ns	ns	ns	ns	ns	ns	ns

Table S4. ANOVA for the effects of P-fertilizer (Pf), cultivar (Cul), lime application (Lime), and their interactions on the percentage of canopy absorbed PAR (%) at 65, 93, and 118 DAS in 2020, and at 99 DAS in 2021. ns: not significant at $\alpha = 0.05$.

Year	**2020**			**2021**
DAS	**65**	**93**	**118**	**99**
Pf	<0.001	<0.001	0.005	<0.001
Cul	ns	ns	ns	ns
Lime	ns	ns	ns	ns
Pf × Cul	ns	ns	ns	ns
Pf × Lime	ns	ns	ns	ns
Cul × Lime	ns	ns	ns	ns
Pf × Cul × Lime	ns	ns	ns	ns