Descriptives statistics

Table S1. Descriptive statistics (mean ± common SE, median, standard deviation, minimum and maximum values) for the two consecutive years of experimentation regarding the plant height, Leaf Area Index, Leaf greenness index (SPAD), Assimilation rate, Transpiration rate, Stomatal conductance, Intercellular COS, seeds per pod, pods per plant, seed yield, Phosphorus Use Efficiency and Water Use Efficiency.

Year		Plant Height (cm)	Leaf Area Index	Leaf Greenness Index (SPAD)	Assimilation rate (µmol CO_2 m^{-2} s^{-1})	Transpiration rate (µmol CO_2 m^{-2} s^{-1})	Stomatal conductance (µmol m^{-2} s^{-1})	Intercellular CO_2 (µmol CO_2 m^{-2} s^{-1})	Seeds per pod	Pods per plant	Seed Yield (kg ha^{-1})	Phosphorus Use Efficiency	Water Use Efficiency
2020-2021	Mean	65.40±4.20	2.38±0.17	40.62±0.57	5.58±0.33	1.92±0.10	0.05±0.00	179.79±6.94	3.50±0.16	25.19±1.14	204.72±26.01	69.23±12.88	12.14±1.54
	Median	66.70	2.34	41.47	5.22	2.08	0.05	176.17	3.00	26.50	172.25	54.09	10.22
	Std. Deviation	33.61	1.39	4.59	1.85	0.56	0.02	39.26	0.63	4.58	104.05	51.52	6.17
	Minimum	12.80	0.22	30.03	2.65	0.89	0.01	105.00	3.00	16.00	95.50	13.05	5.66
	Maximum	107.67	5.82	49.43	9.54	2.92	0.10	285.67	5.00	31.00	377.50	180.68	22.39
2021-2022	Mean	60.62±4.14	1.79±0.13	38.10±1.20	3.70±0.28	0.72±0.04	0.04±0.00	232.60±8.90	3.81±0.14	16.00±0.66	177.96±12.90	69.65±14.11	7.99±0.58
	Median	64.36	1.73	41.17	3.20	0.66	0.03	233.33	4.00	16.50	169.59	56.26	7.61
	Std. Deviation	33.15	1.01	9.63	2.27	0.35	0.02	71.24	0.54	2.66	51.62	56.45	2.32
	Minimum	13.00	0.40	17.40	0.45	0.23	0.01	105.67	3.00	11.00	112.17	14.71	5.03
	Maximum	107.00	3.81	51.27	9.15	1.92	0.09	378.33	5.00	21.00	334.17	205.37	15.03

Table S2. Descriptive statistics (mean ± common SE, median, standard deviation, minimum and maximum values) for the two fertilization treatments regarding the plant height, Leaf Area Index, Leaf greenness index (SPAD), Assimilation rate, Transpiration rate, Stomatal conductance, Intercellular CO_S, seeds per pod, pods per plant, seed yield, Phosphorus Use Efficiency and Water Use Efficiency.

Fertilizer Treatments		Plant Height (cm)	Leaf Area Index	Leaf Greenness Index (SPAD)	Assimilation rate (µmol CO_2 m^{-2} s^{-1})	Transpiration rate (µmol CO_2 m^{-2} s^{-1})	Stomatal conductance (µmol m^{-2} s^{-1})	Intercellular CO_2 (µmol CO_2 m^{-2} s^{-1})	Seeds per pod	Pods per plant	Seed Yield (kg ha^{-1})	Phosphorus Use Efficiency	Water Use Efficiency
0 kg ha^{-1} P_2O_5	Mean	62.09±4.24	2.11±0.16	39.27±39.27	4.76±0.31	1.16±0.09	0.04±0.002	205.3365±9.41	3.69±0.17	21.00±1.57	183.50±16.65	112.77±10.24	9.50±0.92
	Median	62.80	2.25	41.20	4.41	0.96	0.04	199.00	4.00	19.00	169.58	104.22	8.30
	Std. Deviation	33.95	1.30	7.63	2.21	0.69	0.02	65.25	0.70	6.28	66.63	40.95	3.67
	Minimum	12.80	0.22	17.40	1.25	0.23	0.01	105.00	3	11	95.50	58.69	5.66

	Maximum	107.67	5.82	51.27	9.54	2.92	0.10	339.67	5	31	334.17	205.37	17.44
60 kg ha^{-1} P_2O_5	Mean	63.91±4.12	2.07±0.15	39.44±0.96	3.88±0.34	1.08±0.11	0.04±0.00	224.65±9.83	3.63±0.13	20.19±1.44	199.18±24.11	26.11±3.16	10.63±1.55
	Median	68.50	2.27	41.47	3.65	0.82	0.03	212.34	4.00	19.00	165.42	21.69	8.01
	Std. Deviation	32.95	1.19	7.66	2.35	0.74	0.02	68.08	0.50	5.76	96.44	12.64	6.21
	Minimum	13.00	0.23	18.93	0.45	0.30	0.01	106.67	3.00	12.00	99.50	13.05	5.03
	Maximum	107.00	4.57	50.67	9.15	2.74	0.09	378.33	4.00	31.00	377.50	49.49	22.39

Table S3. Descriptive statistics (mean ± common SE, median, standard deviation, minimum and maximum values) for the two faba bean cultivars regarding the plant height, Leaf Area Index, Leaf greenness index (SPAD), Assimilation rate, Transpiration rate, Stomatal conductance, Intercellular CO_2 concentration, seeds per pod, pods per plant, seed yield, Phosphorus Use Efficiency and Water Use Efficiency.

Cultivars		**Plant Height (cm)**	**Leaf Area Index**	**Leaf Greenness Index (SPAD)**	**Assimilation rate (μmol CO_2 m^{-2} s^{-1})**	**Transpiration rate (μmol CO_2 m^{-2} s^{-1})**	**Stomatal conductance (μmol m^{-2} s^{-1})**	**Intercellular CO_2 (μmol CO_2 m^{-2} s^{-1})**	**Seeds per pod**	**Pods per plant**	**Seed Yield (kg ha^{-1})**	**Phosphorus Use Efficiency**	**Water Use Efficiency**
KK-14	Mean	62.37±4.18	2.08±0.15	39.68±0.95	4.15±0.32	1.14±0.10	0.04±0.00	215.43±10.18	3.69±0.15	19.38±1.08	177.29±21.67	61.86±12.53	9.20±1.23
	Median	66.50	2.26	41.25	3.88	0.94	0.04	207.84	4.00	19.00	148.59	53.53	7.44
	Std. Deviation	33.41	1.16	7.62	2.21	0.72	0.02	70.53	0.60	4.33	86.66	50.14	4.90
	Minimum	13.00	0.22	17.40	0.74	0.23	0.01	105.00	3.00	12.00	95.50	14.71	5.03
	Maximum	107.00	4.90	51.27	8.99	2.74	0.09	378.33	5.00	27.00	369.00	205.37	21.89
Polycarpi	Mean	63.64±4.19	2.10±0.17	39.04±0.96	4.50±0.35	1.11±0.10	0.04±0.00	214.56±9.25	3.63±0.15	21.81±1.79	205.39±19.27	77.02±14.15	10.93±1.30
	Median	67.60	2.27	41.47	4.29	0.91	0.03	200.00	4.00	21.50	191.42	66.64	8.91
	Std. Deviation	33.50	1.33	7.66	2.42	0.71	0.02	64.11	0.62	7.15	77.08	56.61	5.20
	Minimum	12.80	0.27	18.93	0.45	0.30	0.01	106.67	3.00	11.00	99.50	13.05	5.90
	Maximum	107.67	5.82	50.67	9.54	2.92	0.10	342.67	5.00	31.00	377.50	180.68	22.39

Table S4. Analysis of variance results (significance of the effects) for testing the effects (main and interactions) of Year (Y), Fertilization treatment (T), Cultivar (V), and Growth Stages (S) on the measured plant characteristics.

	df	PH	LAI	SPAD	c_i	E	A	g_s	SP	PP	SY	WUE	PUE
Year	1	*	*	*	*	**	**	*	NS	*	NS	NS	NS
Year*Block	6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Treatment	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**
Year*Treatment	1	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS	NS
Year*Treatment*Block	6	*	NS	*	NS	NS	NS	NS	NS	NS	**	**	NS
Variety	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	*	NS
Year*Variety	1	*	NS	*	NS	NS	NS	NS	NS	*	*	**	*
Treatment*Variety	1	*	NS	NS	NS	*	NS	*	NS	NS	NS	NS	NS
Year*Treatment*Variety	1	NS	NS	NS	NS	NS	NS	*	*	NS	*	**	*
Year*Treatment*Variety * Block	12	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-
Growth Stage	3	**	**	**	*	NS	*	**	-	-	-	-	-
Year*Growth Stage	3	**	**	**	NS	*	NS	NS	-	-	-	-	-
Treatment*Growth Stage	3	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-
Variety*Growth Stage	3	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-
Year*Treatment*Growth Stage	3	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-
Treatment*Variety*Growth Stage	3	NS	*	NS	NS	NS	NS	NS	-	-	-	-	-
Year*Variety*Growth Stage	3	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-

* Significant at 0.05 significance level, ** Significant at 0.01 significance level, NS, non significant ($p>0.05$). df: degrees of freedom, PH: Plant Height, LAI: Leaf Area Index, SPAD: chlorophyll content, ci: intercellular CO_2, E: Transpiration rate, A: Assimilation rate of CO_2, g_s: stomatal conductance, PP: Pods/Plant, SP: Seeds/Pod, SY: Seed Yield, WUE: Water Use Efficiency, PUE: Phosphorous Use Efficiency.

Table S5. Mean values of plant height, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the four growth stages.

Plant Height (cm)									
Years	**Cultivars**	**Growth Stages**							
		Before Anthesis		**Beginning of anthesis**		**Full Bloom**		**Physiological maturity of plants**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	17.05ef†	18.78e	49.00d	56.60d	91.45bc	96.60abc	95.66abc	100.25a
	Polycarpi	16.82f	17.05ef	50.90d	55.00d	96.80abc	90.30c	99.08ab	95.00abc
LSD_{AxBxC}					7.89				
2021-2022	KK-14	14.05ef	15.75e	42.42d	45.27d	78.40c	80.46c	96.30ab	99.95a
	Polycarpi	15.55ef	17.30e	44.76d	49.23d	85.05bc	85.10bc	100.25a	100.00a
LSD_{AxBxC}					12.72				

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the four growth stages (before anthesis, beginning of the anthesis, full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test (p = 0.05).

Table S6. Mean values of Leaf Area Index, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the four growth stages.

Leaf Area Index									
Years	**Cultivars**	**Growth Stages**							
		Before Anthesis		**Beginning of anthesis**		**Full Bloom**		**Physiological maturity of plants**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	0.72g†	0.42gh	3.90ab	2.81cde	3.31abc	3.38abc	2.08f	2.15ef
	Polycarpi	0.55g	0.39gh	2.94cd	3.92a	3.95a	3.24bc	2.38def	1.95f
LSD_{AxBxC}					0.68				
2021-2022	KK-14	0.87c	0.87c	2.34ab	2.60ab	2.93a	2.94a	0.96c	0.96c
	Polycarpi	0.71cd	1.01c	2.45ab	2.80ab	2.82ab	2.92a	0.79c	0.67cd
LSD_{AxBxC}					0.55				

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the four growth stages (before anthesis, beginning of the anthesis, full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test (p = 0.05).

Table S7. Mean values of Leaf Greenness Index, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the four growth stages.

Leaf Greenness Index (SPAD)									
Years	**Cultivars**	**Growth Stages**							
		Before Anthesis		**Beginning of anthesis**		**Full Bloom**		**Physiological maturity of plants**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	44.3a†	43.4ab	40.5abcd	41.1abcd	41.2abcd	44.8a	39.0cd	37.4de
	Polycarpi	43.8a	43.2abc	37.6de	39.1bcd	44.7a	43.0abc	32.5e	33.5e
LSD_{AxBxC}					4.38				
2021-2022	KK-14	47.2a	46.3ab	40.3c	39.5c	41.8bc	41.7bc	22.5de	23.2d
	Polycarpi	44.3abc	46.0ab	41.1bc	42.7abc	42.4abc	43.5abc	24.5d	21.8de
LSD_{AxBxC}					5.23				

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the four growth stages (before anthesis, beginning of the anthesis, full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S8. Mean values of Intercellular CO_2 concentration, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two growth stages.

Intercellular CO_2 concentration (c_i – μmol CO_2 m^{-2} s^{-1})					
Years	**Cultivars**	**Growth Stages**			
		Full bloom		**Physiological maturity of plants**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	161.0b†	188.9ab	183.2ab	166.7b
	Polycarpi	213.8a	164.1b	193.8ab	166.5b
LSD_{AxBxC}			40.08		
2021-2022	KK-14	189.2bc	281.5a	147.9c	211.4bc
	Polycarpi	220.3ab	282.0a	177.3bc	211.2bc
LSD_{AxBxC}			64.36		

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the two growth stages (full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S9. Mean values of transpiration rate, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two growth stages.

Transpiration rate (E – μmol CO_2 m^{-2} s^{-1})					
Years	**Cultivars**	**Growth Stages**			
		Full bloom		**Physiological maturity of plants**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	1.84b†	2.32a	1.66b	1.96ab
	Polycarpi	2.30a	2.10ab	2.03ab	1.12c
LSD_{AxBxC}			0.45		
2021-2022	KK-14	0.67ab	0.54ab	0.82ab	0.66ab
	Polycarpi	0.54ab	0.53ab	0.89a	0.44b
LSD_{AxBxC}			0.41		

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the two growth stages (full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test (p = 0.05).

Table S10. Mean values of plants' Assimilation rate, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two growth stages.

Assimilation rate (A – μmol CO_2 m^{-2} s^{-1})					
Years	**Cultivars**	**Growth Stages**			
		Before Anthesis		**Beginning of anthesis**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	6.31ab†	6.68a	4.75ab	5.59ab
	Polycarpi	7.05a	5.36ab	5.19ab	3.70b
LSD_{AxBxC}			2.7		
2021-2022	KK-14	5.53a	3.03ab	3.17ab	1.65b
	Polycarpi	4.68a	3.73ab	3.60ab	1.35b
LSD_{AxBxC}			2.6		

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the two growth stages (full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test (p = 0.05).

Table S11. Mean values of stomatal conductance, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022), the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two growth stages.

Stomatal Conductance (gs – μmol m^{-2} s^{-1})					
Years	**Cultivars**	**Growth Stages**			
		Before Anthesis		**Beginning of anthesis**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**	**0 kg ha^{-1} P_2O_5**	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	0.05c†	0.06b	0.04d	0.05c
	Polycarpi	0.07a	0.05c	0.06b	0.02e
LSD_{AxBxC}			0.01		
2021-2022	KK-14	0.04a	0.03b	0.02c	0.01d
	Polycarpi	0.03b	0.03b	0.02c	0.01d
LSD_{AxBxC}			0.01		

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5), the two growth stages (full bloom and physiological maturity of plants) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S12. Mean values of seeds per pod, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022) and the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5).

Seeds per pod			
Years	**Cultivars**	**P rates**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	3.25a†	3.75a
	Polycarpi	3.75a	3.25a
LSD_{AxB}		1.3	
2021-2022	KK-14	4.25a	3.50b
	Polycarpi	3.50b	4.00ab
LSD_{AxB}		0.7	

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S13. Mean values of pods per plant, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022) and the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5).

Pods per plant			
Years	**Cultivars**	**P rates**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	21b†	23ab
	Polycarpi	30a	28ab
LSD_{AxB}		8	
2021-2022	KK-14	18a	16a
	Polycarpi	16a	15a
LSD_{AxB}		3.5	

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S14. Mean values of seed yield, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022) and the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5).

Seed Yield (kg ha^{-1})			
Years	**Cultivars**	**P rates**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	1147b†	2291a
	Polycarpi	2360a	2390a
LSD_{AxB}		244.05	
2021-2022	KK-14	2047a	1605c
	Polycarpi	1785b	1680bc
LSD_{AxB}		141.56	

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S15. Mean values of Water Use Efficiency, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022) and the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5).

Water Use efficiency			
Years	**Cultivars**	**P rates**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	6.80b†	13.58a
	Polycarpi	13.99a	14.17a
LSD_{AxB}		0.84	
2021-2022	KK-14	9.18a	7.20b
	Polycarpi	8.01ab	7.54b
LSD_{AxB}		1.36	

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Table S16. Mean values of Phosphorus Use Efficiency, for the two faba bean cultivars (KK-14 and Polycarpi) during the two years of experimentation (2020-2021 and 2021-2022) and the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5).

Phosphorus Use efficiency			
Years	**Cultivars**	**P rates**	
		0 kg ha^{-1} P_2O_5	**60 kg ha^{-1} P_2O_5**
2020-2021	KK-14	70.5b†	30.0c
	Polycarpi	145.0a	31.3c
LSD_{AxB}		8.76	
2021-2022	KK-14	125.8a	21.0c
	Polycarpi	109.6b	22.0c
LSD_{AxB}		3.98	

† Means in the same year followed by the same letter do not differ significantly between the two fertilization treatments (0 kg ha^{-1} P_2O_5 and 60 kg ha^{-1} P_2O_5) and the two genotypes (KK-14 and Polycarpi), according to the LSD test ($p = 0.05$).

Anova Tables

Table S17. Analysis of variance for the parameter of plant height.

Plant Height				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	730.862	1	730.862	0.036
Error a	605.759	6	100.960	0.678
Treatment	105.524	1	105.524	0.433
Year*Treatment	1.536	1	1.536	0.923
Error b	897.725	6	149.621	0.002
Variety	51.106	1	51.106	0.145
Year*Variety	105.415	1	105.415	0.045
Treatment * Variety	109.076	1	109.076	0.042
Year*Treatment * Variety	55.335	1	55.335	0.131
Error c	252.199	12	21.017	0.660
GrowthStage	135146.161	3	45048.720	0.000
Year*GrowthStage	823.326	3	274.442	0.000
Treatment * GrowthStage	97.604	3	32.535	0.308
Variety * GrowthStage	27.023	3	9.008	0.798
Year*Treatment * GrowthStage	19.449	3	6.483	0.866
Treatment * Variety * GrowthStage	66.021	3	22.007	0.483
Year*Variety * GrowthStage	16.801	3	5.600	0.889
Error d	1997.415	75	26,632	
Total	141108.340	127	73461.248	

†df: degrees of freedom

Table S18. Analysis of variance for the parameter of Leaf Area Index (LAI).

Leaf Area Index				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	11.151	1	11.151	0.015
Error a	5.919	6	0.986	0.092
Treatment	0.058	1	0.058	0.681
Year*Treatment	0.741	1	0.741	0.173
Error b	1.858	6	0.310	0.271
Variety	0.009	1	0.009	0.842
Year*Variety	0.090	1	0.090	0.526
Treatment * Variety	0.203	1	0.203	0.347
Year*Treatment * Variety	0.039	1	0.039	0.675
Error c	2.545	12	0.212	0.722
GrowthStage	137.107	3	45.702	0.000
Year*GrowthStage	11.507	3	3.836	0.000
Treatment * GrowthStage	0.333	3	0.111	0.768
Variety * GrowthStage	0.260	3	0.087	0.828
Year*Treatment * GrowthStage	0.089	3	0.030	0.959
Treatment * Variety * GrowthStage	2.616	3	0.872	0.036
Year*Variety * GrowthStage	0.284	3	0.095	0.808
Error d	21.909	75	,292	
Total	196.718	127	64.532	

†df: degrees of freedom

Table S19. Analysis of variance for the parameter of Leaf Greenness Index (SPAD).

Leaf Greeness Index (SPAD)				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	202.407	1	202.407	0.008
Error a	80.006	6	13.334	0.764
Treatment	0.887	1	0.887	0.856
Year*Treatment	0.220	1	0.220	0.928
Error b	148.314	6	24.719	0.042
Variety	13.416	1	13.416	0.215
Year*Variety	40.036	1	40.036	0.043
Treatment * Variety	0.205	1	0.205	0.874
Year*Treatment * Variety	2.301	1	2.301	0.597
Error c	93.766	12	7.814	0.781
GrowthStage	4629.480	3	1543.160	0.000
Year*GrowthStage	1123.685	3	374.562	0.000
Treatment * GrowthStage	10.535	3	3.512	0.827
Variety * GrowthStage	52.433	3	17.478	0.226
Year*Treatment * GrowthStage	4.828	3	1.609	0.938
Treatment * Variety * GrowthStage	18.280	3	6.093	0.672
Year*Variety * GrowthStage	63.429	3	21.143	0.156
Error d	883.730	75	11,783	
Total	7367.956	127	14.056	

†df: degrees of freedom

Table S20. Analysis of variance for the parameter Assimilation rate of CO_2 (A).

Assimilation rate (A)				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	80.140	1	80.140	0.000
Error a	21.947	6	3.658	0.640
Treatment	7.499	1	7.499	0.250
Year*Treatment	6.862	1	6.862	0.252
Error b	29.789	6	4.965	0.129
Variety	3.364	1	3.364	0.272
Year*Variety	1.026	1	1.026	0.563
Treatment * Variety	2.777	1	2.777	0.344
Year*Treatment * Variety	6.814	1	6.814	0.142
Error c	28.370	12	2.364	0.873
GrowthStage	57.201	3	19.067	0.008
Year*GrowthStage	0.266	1	0.266	0.805
Treatment * GrowthStage	15.849	3	5.283	0.312
Variety * GrowthStage	22.122	3	7.374	0.178
Year*Treatment * GrowthStage	0.238	1	0.238	0.815
Treatment * Variety * GrowthStage	1.651	3	0.550	0.943
Year*Variety * GrowthStage	0.330	1	0.330	0.783
Error d	211.925	49	4,325	
Total	498.170	95	4477.578	

†df: degrees of freedom

Table S21. Analysis of variance for the parameter of intercellular CO_2 concentration.

Intercellular CO_2 (ci)				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	20004.213	1	20004.213	0.018
Error a	14844.491	6	2474.082	0.143
Treatment	647.730	1	647.730	0.506
Year*Treatment	25117.099	1	25117.099	0.001
Error b	5898.091	6	983.015	0.888
Variety	470.529	1	470.529	0.690
Year*Variety	125.898	1	125.898	0.841
Treatment * Variety	11850.530	1	11850.530	0.058
Year*Treatment * Variety	198.611	1	198.611	0.801
Error c	32433.579	12	2702.798	0.733
GrowthStage	48368.470	3	16122.823	0.010
Year*GrowthStage	10796.161	1	10796.161	0.098
Treatment * GrowthStage	13658.716	3	4552.905	0.320
Variety * GrowthStage	10131.526	3	3377.175	0.454
Year*Treatment * GrowthStage	298.670	1	298.670	0.780
Treatment * Variety * GrowthStage	6324.421	3	2108.140	0.647
Year*Variety * GrowthStage	58.389	1	58.389	0.902
Error d	186193.298	49	3799,863	
Total	387420.421	95	3901751.769	

†df: degrees of freedom

Table S22. Analysis of variance for the parameter of stomatal conductance.

Stomatal conductance (g_s)				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	0.010	1	0.010	0.000
Error a	0.003	6	0.000	0.409
Treatment	0.001	1	0.001	0.206
Year*Treatment	0.000056	1	0.000056	0.692
Error b	0.002	6	0.000	0.459
Variety	0.00000699	1	0.00000699	0.892
Year*Variety	0.000025	1	0.000025	0.788
Treatment * Variety	0.002	1	0.002	0.019
Year*Treatment * Variety	0.002	1	0.002	0.030
Error c	0.004	12	0.000	0.244
GrowthStage	0.009	3	0.003	0.000
Year*GrowthStage	0.00000625	1	0.00000625	0.882
Treatment * GrowthStage	0.001	3	0.000	0.480
Variety * GrowthStage	0.000	3	0.000063	0.877
Year*Treatment * GrowthStage	0.000024	1	0.000024	0.766
Treatment * Variety * GrowthStage	0.001	3	0.000	0.387
Year*Variety * GrowthStage	0.000	1	0.000	0.458
Error d	0.014	49	0.000	
Total	0.049	95	0.02	

†df: degrees of freedom

Table S23. Analysis of variance for the parameter of transpiration rate (E).

Transpiration rate (E)				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	26.266	1	26.266	0.000
Error a	1.895	6	0.316	0.088
Treatment	0.079	1	0.079	0.402
Year*Treatment	0.043	1	0.043	0.541
Error b	0.580	6	0.097	0.836
Variety	0.012	1	0.012	0.814
Year*Variety	0.001	1	0.001	0.942
Treatment * Variety	1.313	1	1.313	0.016
Year*Treatment * Variety	0.757	1	0.757	0.060
Error c	2.615	12	0.218	0.130
GrowthStage	1.118	3	0.373	0.056
Year*GrowthStage	1.328	1	1.328	0.003
Treatment * GrowthStage	0.668	3	0.223	0.199
Variety * GrowthStage	0.180	3	0.060	0.730
Year*Treatment * GrowthStage	0.044	1	0.044	0.575
Treatment * Variety * GrowthStage	0.329	3	0.110	0.503
Year*Variety * GrowthStage	0.126	1	0.126	0.344
Error d	6.777	49	0,138	
Total	44.130	95	31.364	

†df: degrees of freedom

Table S24. Analysis of variance for the parameter of seeds per pod.

Seeds per pod				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	0.781	1	0.781	0.194
Error a	2.188	6	0.365	0.380
Treatment	0.031	1	0.031	0.750
Year*Treatment	0.031	1	0.031	0.750
Error b	1.688	6	0.281	0.543
Variety	0.031	1	0.031	0.761
Year*Variety	0.031	1	0.031	0.761
Treatment * Variety	0.031	1	0.031	0.761
Year*Treatment * Variety	2.531	1	2.531	0.016
Error c	3.875	12	0.323	
Total	11.21	31	4.438	

†df: degrees of freedom

Table S25. Analysis of variance for the parameter of pods per plant.

Pod per plant				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	675.281	1	675.281	0.000
Error a	64.188	6	10.698	0.436
Treatment	5.281	1	5.281	0.480
Year*Treatment	1.531	1	1.531	0.699
Error b	55.938	6	9.323	0.536
Variety	47.531	1	47.531	0.055
Year*Variety	94.531	1	94.531	0.011
Treatment * Variety	5.281	1	5.281	0.493
Year*Treatment * Variety	19.531	1	19.531	0.199
Error c	126.625	12	10.552	
Total	1095.719	31	879.542	

†df: degrees of freedom

Table S26. Analysis of variance for the seed yield.

Seeds yield				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	5728.781	1	5728.781	0.434
Error a	48967.788	6	8161.298	0.762
Treatment	1965.959	1	1965.959	0.730
Year*Treatment	14799.741	1	14799.741	0.359
Error b	90125.603	6	15020.934	0.000
Variety	6313.508	1	6313.508	0.047
Year*Variety	11232.007	1	11232.007	0.012
Treatment * Variety	3012.820	1	3012.820	0.151
Year*Treatment * Variety	10530.633	1	10530.633	0.014
Error c	15406.215	12	1283.851	
Total	208083.055	31	78049.532	

†df: degrees of freedom

Table S27. Analysis of variance for the parameter of Water Use Efficiency.

Water Use Efficiency				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	137.994	1	137.994	0.066
Error a	163.992	6	27.332	0.741
Treatment	10.131	1	10.131	0.660
Year*Treatment	44.389	1	44.389	0.371
Error b	284.984	6	47.497	0.000
Variety	24.004	1	24.004	0.022
Year*Variety	37.202	1	37.202	0.007
Treatment * Variety	12.925	1	12.925	0.077
Year*Treatment * Variety	33.027	1	33.027	0.009
Error c	41.501	12	3,458	
Total	790.149	31	3832.502	

†df: degrees of freedom

Table S28. Analysis of variance for the parameter of Phosphorus Use Efficiency (PUE).

Phosphorus Use Efficiency				
Source of variance	**Sum of Squares**	**df†**	**Mean Square**	**Sig.**
Year	1.410	1	1.410	0.961
Error a	3316.476	6	552.746	0.790
Treatment	60075.159	1	60075.159	0.000
Year*Treatment	732.292	1	732.292	0.447
Error b	6632.718	6	1105.453	0.080
Variety	1839.737	1	1839.737	0.063
Year*Variety	4136.839	1	4136.839	0.010
Treatment * Variety	1573.788	1	1573.788	0.082
Year*Treatment * Variety	4080.326	1	4080.326	0.010
Error c	5237.365	12	436,447	
Total	87626.109	31	510544.749	

†df: degrees of freedom