

Table S1. *p*-values from the linear models fitted for the dependent variables evaluated at cover crop termination. Significant *p*-values are marked in bold ($p \leq 0.05$).

Variable	Cover crop (CC)	Year (Y)	Block	CC \times Y
Cover crop biomass	<0.001	0.398	0.010	0.927
Weed biomass	<0.001	0.001	0.892	0.084
N concentration	<0.001	<0.001	0.038	0.008
P concentration	<0.001	<0.001	0.010	<0.001
N accumulation	<0.001	0.023	0.181	0.901
P accumulation	<0.001	<0.001	0.006	0.013

Table S2. *p*-values from the linear models fitted for SPAD and tomato plant height at different crop stages. Significant *p*-values are marked in bold ($p \leq 0.05$).

Term	SPAD	Plant height
Cover crop (CC)	<0.001	<0.001
Tillage (T)	<0.001	0.007
Year (Y)	0.338	0.001
Stage (S) [‡]	<0.001	0.999
Block	0.219	0.125
CC \times T	<0.001	0.194
CC \times Y	0.001	<0.001
T \times Y	0.375	<0.001
CC \times S	0.133	<0.001
T \times S	0.034	0.003
Y \times S	<0.001	<0.001
CC \times T \times Y	0.024	0.001
CC \times T \times S	0.488	0.342
CC \times Y \times S	0.086	0.504
T \times Y \times S	0.419	0.643
CC \times T \times Y \times S	0.417	0.230

[‡] Stage refers to the phenological stage/timing in which SPAD and plant height were evaluated during the cropping season

Table S3. *p*-values from the linear models fitted for the dependent variables of tomato performance evaluated after cover crop termination. NUtE is Nitrogen Utilization Efficiency index. Significant *p*-values are marked in bold (*p*≤0.05).

Variable	Cover crop (CC)	Tillage (T)	Year (Y)	Block	CC × T	CC × Y	T × Y	CC × T × Y
Potential yield	<0.001	<0.001	<0.001	0.053	0.023	0.008	0.006	0.150
Unmarketable yield	<0.001	0.075	<0.001	0.048	<0.001	0.653	0.021	0.797
Total fresh yield	<0.001	<0.001	<0.001	0.017	0.003	0.007	0.003	0.074
No. mark. and green fruits	<0.001	0.001	0.007	0.357	0.257	0.011	0.781	0.057
No. unmarketable fruits	<0.001	0.001	<0.001	0.167	0.005	0.954	0.368	0.749
Total dry yield	<0.001	<0.001	0.002	0.015	0.005	0.007	0.003	0.164
Shoot dry biomass	<0.001	<0.001	<0.001	0.134	<0.001	<0.001	<0.001	<0.001
Weed dry biomass	0.176	0.226	<0.001	0.114	0.002	0.114	<0.001	0.452
Fruit dry matter content	<0.001	0.001	<0.001	0.225	0.179	0.689	0.733	0.004
Fruit N concentration	<0.001	0.002	0.001	0.013	0.572	<0.001	0.212	0.812
Shoot N concentration	<0.001	0.099	<0.001	0.044	0.382	0.655	0.369	0.082
Fruit P concentration	0.434	0.800	<0.001	0.002	0.784	0.162	0.538	0.859
Shoot P concentration	<0.001	<0.001	0.077	<0.001	0.882	0.025	0.506	0.083
Fruit N accumulation	<0.001	<0.001	<0.001	0.016	0.004	0.002	0.017	0.161
Shoot N accumulation	<0.001	<0.001	<0.001	0.051	<0.001	<0.001	<0.001	0.001
NUtE	<0.001	0.740	<0.001	0.179	0.187	0.001	0.369	0.828
Fruit P accumulation	<0.001	0.018	0.051	0.002	<0.001	0.021	0.001	0.101
Shoot P accumulation	0.024	0.005	<0.001	0.026	<0.001	<0.001	0.001	<0.001

Table S4. Effects (emmean \pm standard error) of tillage system, cover crop and year on tomato fruit number, fruit dry matter content, fruit and shoot P concentration (Pconc) and accumulation (Pacc).

<i>Term</i>	Marketable and green fruits		Unmarketable fruits		Fruit dry Matter content		Pconc fruit		Pconc shoot		Pacc fruit		Pacc shoot[‡]	
	No m ⁻²		No m ⁻²		g 100 g ⁻¹		g 100 g ⁻¹		g 100 g ⁻¹		kg ha ⁻¹		kg ha ⁻¹	
	Emmean	\pm SE	Emmean	\pm SE	Emmean	\pm SE	Emmean	\pm SE	Emmean	\pm SE	Emmean	\pm SE	Emmean	\pm SE
<i>Year</i>														
2020	50.29 b	\pm 4.61	71.91 a	\pm 7.50	7.91 a	\pm 0.10	0.44 a	\pm 0.01	0.20 a	\pm 0.01	9.95 a	\pm 0.81	1.69 b	\pm 0.09
2021	70.04 a	\pm 6.04	5.52 b	\pm 0.58	6.09 b	\pm 0.07	0.27 b	\pm 0.01	0.22 a	\pm 0.01	8.09 a	\pm 0.62	4.20 a	\pm 0.22
<i>Tillage</i>														
CT	71.55 a	\pm 6.27	44.78 a	\pm 5.84	6.80 b	\pm 0.08	0.35 a	\pm 0.01	0.18 b	\pm 0.01	10.13 a	\pm 0.76	3.19 a	\pm 0.18
NT	48.78 a	\pm 4.29	32.66 b	\pm 4.72	7.20 a	\pm 0.09	0.36 a	\pm 0.01	0.24 a	\pm 0.01	7.91 b	\pm 0.68	2.70 b	\pm 0.15
<i>Cover crop</i>														
Rye	45.28 b	\pm 5.72	25.53 b	\pm 4.64	7.17 ab	\pm 0.12	0.36 a	\pm 0.01	0.22 a	\pm 0.01	7.01 b	\pm 0.74	2.82 a	\pm 0.23
S. clover	86.34 a	\pm 10.34	60.80 a	\pm 10.87	6.69 c	\pm 0.12	0.34 a	\pm 0.01	0.16 b	\pm 0.01	11.89 a	\pm 1.27	3.16 a	\pm 0.24
Mixture	66.56 ab	\pm 7.85	41.07 ab	\pm 7.37	6.77 bc	\pm 0.12	0.36 a	\pm 0.01	0.22 a	\pm 0.01	11.32 a	\pm 1.24	3.31 a	\pm 0.25
Control	42.49 b	\pm 5.43	27.47 b	\pm 5.58	7.37 a	\pm 0.13	0.36 a	\pm 0.01	0.24 a	\pm 0.01	5.86 b	\pm 0.67	2.49 a	\pm 0.22

Emmeans with different letters are statistically different ($p \leq 0.05$); [‡] post hoc test shows no significant differences between cover crops;

S. clover: squarrose clover; CT: conventional tillage; NT: no-till

Figure S1. Effects of the interaction of cover crop and year (A) and cover crop and tillage system (B) on the number of marketable and green fruits, and unmarketable tomato fruits, respectively. In each interaction, different letters indicate significant differences ($p \leq 0.05$); S. clover: squarrose clover; CT: conventional tillage; NT: no-till. Figure S1B: post hoc test shows no significant differences between treatments.

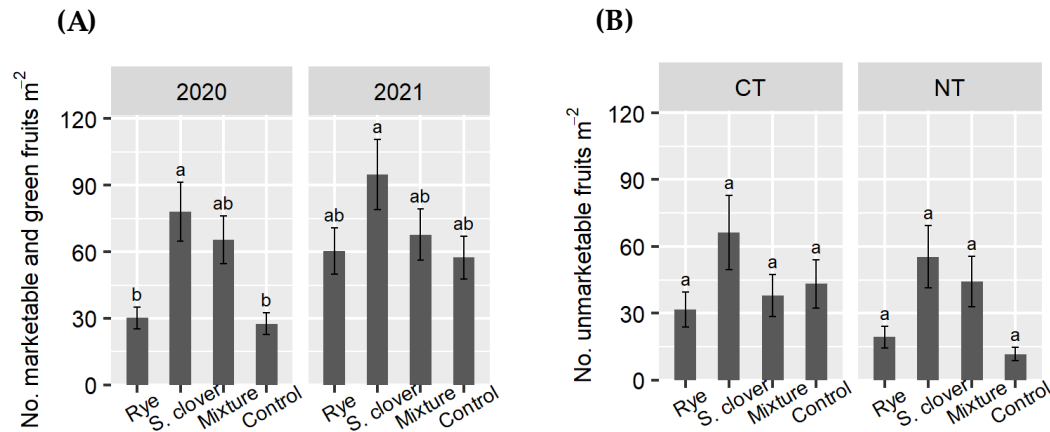


Figure S2. Effects of the interaction of tillage system and year (A), cover crop and year (B) and cover crop and tillage system (C) on P accumulation in tomato shoots and fruits. In each interaction, different letters indicate significant differences ($p \leq 0.05$); S. clover: squarrose clover; CT: conventional tillage; NT: no-till.

