

**Table S1.** Weed infestation of spring barley. Interaction between tillage and N fertilization and year and N fertilization.

Factors	Weed density in spring	Weed density in summer	Weed biomass [g]
CT <sup>#</sup>			
40 N	–	11.2	8.0
80 N	–	9.4	6.3
120 N	–	9.6	6.9
CTc			
40 N	–	17.8	10.9
80 N	–	15.1	10.2
120 N	–	13.0	8.1
RTc			
40 N	–	20.3	19.1
80 N	–	17.4	19.2
120 N	–	17.2	26.9
NTc			
40 N	–	32.3	36.7
80 N	–	24.9	41.0
120 N	–	19.4	31.2
2010			
40 N	–	21.0	21.3
80 N	–	17.8	29.5
120 N	–	14.2	22.4
2011			
40 N	–	19.4	13.2
80 N	–	14.0	12.9
120 N	–	14.8	10.7
2012			
40 N	–	20.8	21.6
80 N	–	18.3	15.0
120 N	–	15.4	21.6
Tillage × fertilization	–	NS	NS
Fertilization × year	–	NS	NS

<sup>#</sup>CT—conventional tillage. CTc—conventional tillage + cover crop. RTc—reduced tillage + cover crop. and NTc – no-tillage + cover crop. NS not significant

**Table S2.** Selected properties of spring barley canopy architecture. Interaction between tillage and N fertilization and year and N fertilization.

Factors	LAI	Barley tillers	Barley density [no·m <sup>-2</sup> ]	Barley length [cm]
CT <sup>#</sup>				
40 N	1.22	2.53	294	52.5
80 N	1.43	2.69	286	53.6
120 N	1.67	2.69	311	55.8
CTc				
40 N	1.18	2.54	269	51.2
80 N	1.53	2.57	288	52.6
120 N	1.41	2.65	317	53.5
RTc				
40 N	1.15	2.74	214	49.4
80 N	1.37	2.88	242	50.7
120 N	1.39	3.12	248	51.5
NTc				
40 N	0.87	2.41	197	37.5
80 N	1.07	2.75	240	39.7
120 N	1.19	2.80	264	40.6
2010				
40 N	0.91 b	2.80 b	200	45.0
80 N	1.07 b	2.96 ab	214	46.5
120 N	1.02 b	2.98 ab	233	47.1
2011				
40 N	1.40 a	2.19 d	248	40.5
80 N	1.59 a	2.27 cd	278	40.9
120 N	1.59 a	2.24 cd	317	42.9
2012				
40 N	1.01 b	2.63 b	282	58.2
80 N	1.39 a	2.99 ab	300	59.3
120 N	1.64 a	3.23 a	294	61.1
Tillage x fertilization	NS	NS	NS	NS
Fertilization x year	**	*	NS	NS

<sup>#</sup> CT—conventional tillage. CTc—conventional tillage + cover crop. RTc—reduced tillage + cover crop. and NTc – no-tillage + cover crop. \*\* The means in a column followed by different letters show the significant differences ( $p < 0.05$ ) as per the Tukey test. Significance set at as follows: \*\*  $p < 0.01$ ; \*  $p < 0.05$ ; and NS not significant.

**Table S3.** Effect size for Analysis of Variance (ANOVA)

Factors	Effect	Df	MS	F - value	P - value
<b>Weed density in spring</b>	Year	2	3758.7	13.2	<0.001
	Tillage	3	6488.0	22.7	<0.001
	Year × tillage	6	5462.9	19.1	<0.001
	Error	72	285.4		
<b>Weed density in summer</b>	Year	2	42.6	0.2	0.85
	Error I	6	262.3		
	Tillage	3	1129.4	8.8	< 0.001
	Year × tillage	6	850.3	6.6	< 0.001
	Error II	18	128.3		
	Fertilization N	2	293.4	6.6	0.003
	Year × fertilization N	4	18.5	0.4	0.80
	Tillage × fertilization N	6	57.2	1.3	0.28
	Year × tillage × fertilization N	12	71.1	1.6	0.12
	Error III	48	44.4		
<b>Weed biomass [g]</b>	Year	2	1336.6	2.5	0.16
	Error I	6	544.5		
	Tillage	3	4813.8	12.3	< 0.001
	Year × tillage	6	3770.9	9.6	< 0.001
	Error II	18	391.4		
	Fertilization N	2	6.9	0.04	0.96
	Year × fertilization N	4	215.7	1.4	0.26
	Tillage × fertilization N	6	138.2	0.9	0.52
	Year × tillage × fertilization N	12	294.2	1.9	0.06
	Error III	48	157.6		
<b>LAI</b>	Year	2	2.585	20.5	0.02
	Error I	6	0.126		
	Tillage	3	0.816	6.6	0.003
	Year × tillage	6	0.412	3.3	0.02
	Error II	18	0.123		
	Fertilization N	2	0.969	21.7	< 0.001
	Year × fertilization N	4	0.238	5.3	0.001
	Tillage × fertilization N	6	0.061	1.4	0.25
	Year × tillage × fertilization N	12	0.289	0.6	0.79
	Error III	48	0.045		
<b>Barley tillers</b>	Year	2	5.883	61.1	< 0.001
	Error I	6	0.096		
	Tillage	3	0.589	6.5	0.003
	Year × tillage	6	0.526	5.8	0.002
	Error II	18	0.090		
	Fertilization N	2	0.741	8.5	< 0.001
	Year × fertilization N	4	0.257	2.9	0.03
	Tillage × fertilization N	6	0.074	0.8	0.54
	Year × tillage × fertilization N	12	0.148	1.7	0.10
	Error III	48	0.087		
<b>Barley density [no·m<sup>-2</sup>]</b>	Year	2	61109	29.6	< 0.001
	Error I	6	2068		
	Tillage	3	35353	15.6	< 0.001
	Year × tillage	6	6526	2.9	0.038
	Error II	18	2273		
	Fertilization N	2	13247	8.4	< 0.001
	Year × fertilization N	4	2779	1.8	0.15
	Tillage × fertilization N	6	1261	0.8	0.57
	Year × tillage × fertilization N	12	1662	1.05	0.41
	Error III	48			

	Error III	48	1571		
<b>Barley length [cm]</b>	Year	2	3163.9	30.2	< 0.001
	Error I	6	104.9		
	Tillage	3	1197.8	114.7	< 0.001
	Year × tillage	6	358.9	34.4	< 0.001
	Error II	18	10.4		
	Fertilization N	2	55.5	4.4	0.007
	Year × fertilization N	4	1.8	0.2	0.950
	Tillage × fertilization N	6	4.8	0.5	0.824
	Year × tillage × fertilization N	12	8.3	0.8	0.639
	Error III	48	10.2		