Supplementary Materials

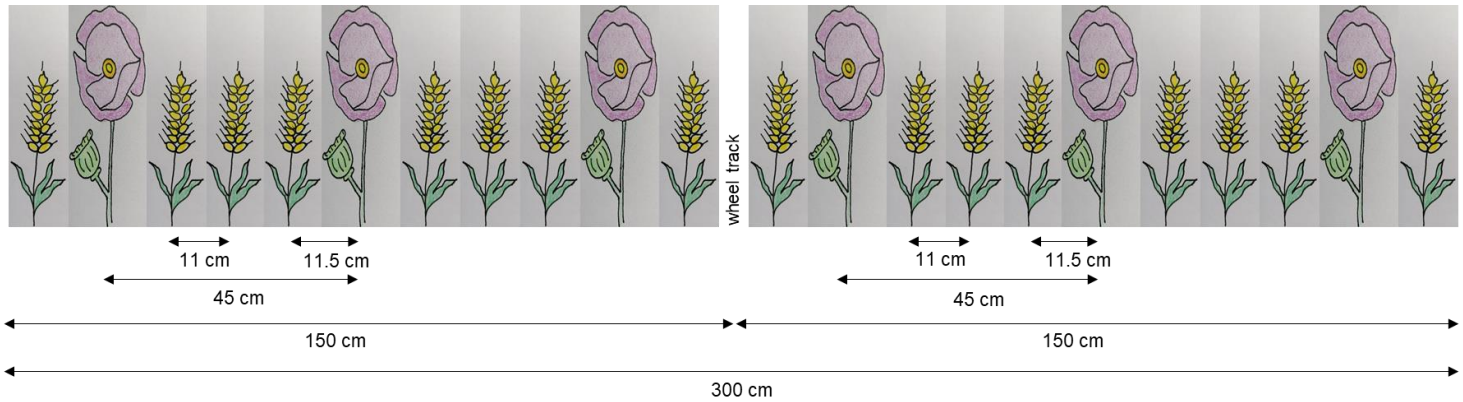


Figure S1. Sowing pattern of poppy and its intercropping partners at Campus Klein-Altendof 2019 and 2020. 2018 the row distance between poppy plants was 50 cm. White clover was sown accordingly to spring barley.

Table S1 Barley yield data from sole cropping of three different seeding densities (B1 (only in 2019 and 2020), B2, B3) and intercropped with poppy (PB1, PB2, PB3) at Campus Klein-Altendorf 2018-2020.

Year	Sample	Straw yield (kg ha^{-1})	Thousand grain mass (g)	Ears m^{-2}	Grain number per ear
2018	B2	5,814 ± 971 a	39.94 ± 5.65 a	756 ± 132 a	14.8 ± 2.8 a
	B3	4,675 ± 377 a	38.24 ± 2.37 a	713± 108 a	12.9 ± 0.8 a
	MB2	2,325 ± 937 b	39.23 ± 7.43 a	273 ± 72 b	11.3 ± 4.2 a
	MB3	2,555 ± 340 b	33.34 ± 2.48 a	293 ± 66 b	10.9 ± 1.8 a
2019	B1	5,849 ± 821 a	32.16 ± 1.54 a	529 ± 98 ab	11.9 ± 1.3 a
	B2	5,305 ± 722 a	35.82 ± 3.69 a	578 ± 113 ab	11.3 ± 1.5 a
	B3	5,443 ± 914 a	35.02 ± 3.91 a	682 ± 151 a	12.5 ± 0.8 a
	MB1	4,166 ± 628 ab	30.71 ± 0.98 a	360 ± 50 b	10.6 ± 1.3 a
	MB2	3,037 ± 604 b	30.30 ± 3.61 a	337 ± 41 b	10.9 ± 0.9 a
	MB3	3,544 ± 904 b	31.66 ± 3.80 a	503 ± 156 ab	10.7 ± 1.0 a
2020	B1	4,238 ± 729 a	39.66 ± 3.03 a	419 ± 86 a	15.2 ± 1.8 a
	B2	4,067 ± 495 a	38.64 ± 1.58 a	461 ± 44 a	12.5 ± 0.7 a
	B3	3,872 ± 496 a	33.85 ± 3.79 ab	512 ± 108 a	12.3 ± 1.5 a
	MB1	2,748 ± 1103 a	30.61 ± 2.40 b	463 ± 59 a	15.0 ± 4.0 a
	MB2	3,918 ± 13 a	31.34 ± 1.24 b	452 ± 22 a	12.0 ± 1.9 a
	MB3	4,061 ± 925 a	34.75 ± 2.91 ab	558 ± 133 a	10.8 ± 3.8 a

Table S2. Dry matter (g m^{-2}) of poppy, white clover and spring barley as sole crops (P, C1, C2, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB2, PB3) at Campus Klein-Altendorf 2018. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	Dry matter of poppy (g m^{-2})						
	29.05.18	07.06.18	14.06.18	19.06.18	25.06.18	05.07.18	17.07.18
	BBCH 14	BBCH 30	BBCH 51	BBCH 63	BBCH 65	BBCH 74	BBCH 85
P	70.00 ± 22.55 a	219.00 ± 54.22 a	363.70 ± 82.58 a	458.78 ± 151.02 a	635.58 ± 170.64 a	788.15 ± 156.90 a	941.53 ± 67.89 ab
PC1	66.75 ± 23.89 a	209.50 ± 54.84 a	360.85 ± 16.37 a	360.90 ± 131.32 a	734.33 ± 168.10 a	713.73 ± 276.47 a	743.58 ± 242.05 abc
PC2	115.50 ± 25.28 a	205.25 ± 63.77 a	323.98 ± 44.82 a	453.18 ± 121.80 a	786.23 ± 184.02 a	844.00 ± 90.28 a	1086.90 ± 176.27 a
PB2	64.25 ± 16.46 a	209.00 ± 68.29 a	376.15 ± 110.49 a	420.05 ± 57.80 a	687.68 ± 146.38 a	704.48 ± 183.59 a	718.83 ± 123.55 bc
PB3	89.25 ± 28.18 a	197.00 ± 75.06 a	352.63 ± 84.34 a	395.58 ± 18.19 a	748.15 ± 306.03 a	776.65 ± 274.85 a	596.70 ± 121.77 c
	Dry matter of white clover (g m^{-2})						
C1	25.50 ± 24.50 a	68.75 ± 28.72 a	141.35 ± 37.59 a	148.40 ± 92.82 a	453.63 ± 75.18 a	674.83 ± 118.87 a	
C2				53.55 ± 62.19 ab	34.18 ± 15.69 c	149.75 ± 42.61 c	400.18 ± 143.80 a
PC1	28.00 ± 25.81 a	165.75 ± 112.99 a	85.73 ± 33.11 a	165.30 ± 50.55 a	190.90 ± 82.72 b	342.05 ± 73.72 b	398.23 ± 159.87 a
PC2				10.55 ± 6.32 b	5.48 ± 8.33 c	19.28 ± 4.15 c	17.68 ± 14.18 b
	Dry matter of spring barley (g m^{-2})						
B2		51.50 ± 12.22 ab	105.13 ± 12.30 a	167.13 ± 15.66 a	424.65 ± 17.81 a	654.95 ± 23.52 a	1086.78 ± 25.23 a
B3		67.00 ± 11.18 a	108.75 ± 14.00 a	232.58 ± 14.00 a	337.58 ± 22.33 ab	516.35 ± 25.04 a	949.03 ± 48.57 ab
PB2		22.00 ± 10.56 b	40.05 ± 10.67 b	65.33 ± 12.42 b	183.98 ± 13.27 bc	199.08 ± 14.83 b	452.88 ± 22.47 bc
PB3		36.75 ± 11.58 ab	64.15 ± 11.41 ab	96.88 ± 11.87 b	142.85 ± 13.45 c	218.25 ± 17.09 b	366.87 ± 25.04 c

Table S3. Dry matter (g m^{-2}) of poppy, white clover and spring barley as sole crops (P, C1, C2, B1, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB1, PB2, PB3) at Campus Klein-Altendorf 2019. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	Dry matter of poppy (g m^{-2})					
	22.05.19	30.05.19	11.06.19	17.06.19	02.07.19	22.07.19
	BBCH 16	BBCH 30	BBCH 51	BBCH 59	BBCH 77	BBCH 81
P	121.58 ± 35.53 a	163.78 ± 23.25 a	386.45 ± 111.06 a	549.25 ± 63.71 a	1144.73 ± 138.29 a	1260.80 ± 215.65 a
PC1	77.85 ± 17.07 a	140.89 ± 45.94 ab	341.95 ± 109.27 ab	600.83 ± 133.69 a	995.30 ± 149.05 a	955.13 ± 378.24 a
PC2	97.70 ± 38.77 a	168.15 ± 15.70 a	373.55 ± 56.58 a	614.15 ± 123.67 a	1028.28 ± 160.28 a	1054.48 ± 165.11 a
PB1	65.20 ± 27.08 a	119.10 ± 18.56 ab	221.90 ± 68.08 abc	324.10 ± 99.17 b	454.30 ± 82.77 b	343.14 ± 104.39 b
PB2	90.58 ± 17.68 a	124.35 ± 46.00 ab	182.23 ± 53.56 bc	220.00 ± 50.25 b	389.13 ± 66.26 b	343.63 ± 103.13 b
PB3	85.23 ± 5.28 a	94.55 ± 8.19 b	144.50 ± 13.72 c	211.58 ± 69.71 b	285.03 ± 113.01 b	241.48 ±149.35 b
	Dry matter of white clover (g m^{-2})					
C1		41.05 ± 20.58 a	211.63 ± 22.86 a	259.58 ± 89.81 a	427.05 ± 47.62 a	481.00 ± 135.43 a
C2		11.93 ± 3.68 ab	99.70 ± 47.84 b	133.58 ± 20.64 b	287.38 ± 64.74 b	441.10 ± 76.78 a
PC1		25.45 ± 17.60 ab	51.13 ± 26.78 b	104.20 ± 41.48 b	194.05 ± 76.12 b	138.00 ± 38.27 b
PC2		8.57 ± 4.24 b	39.30 ± 8.85 b	42.58 ± 41.09 b	67.80 ± 27.23 c	71.70 ± 23.99 b
	Dry matter of spring barley (g m^{-2})					
B1	50.35 ± 13.42 a	122.55 ± 17.26 ab	422.00 ± 128.85 a	502.65 ± 187.22 ab	970.73 ± 135.55 a	1.373.15 ± 427.52 a
B2	65.20 ± 24.94 a	147.33 ± 34.07 ab	378.63 ± 109.85 ab	528.03 ± 52.27 ab	886.90 ± 48.49 ab	1.134.55 ± 241.20 a
B3	75.13 ± 35.00 a	160.50 ± 33.44 a	445.63 ± 65.62 a	604.43 ± 68.58 a	958.83 ± 174.47 a	1.107.40 ± 287.07 a
PB1	65.33 ± 30.57 a	89.60 ± 10.14 b	203.58 ± 50.59 b	313.55 ± 17.20 b	566.80 ± 235.09 b	871.80 ± 133.19 a
PB2	53.20 ± 12.40 a	120.75 ± 36.75 ab	331.25 ± 88.35 ab	432.03 ± 109.07 ab	762.33 ± 116.35 ab	790.23 ± 248.71 a
PB3	84.98 ± 21.95 a	130.60 ± 38.32 ab	411.65 ± 106.33 ab	520.90 ± 122.47 ab	742.50 ± 142.44 ab	813.00 ± 31.44 a

Table S4. Dry matter (g m^{-2}) of poppy, white clover and spring barley as sole crops (P, C1, C2, B1, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB1, PB2, PB3) at Campus Klein-Altendorf 2020. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	Dry matter of poppy (g m^{-2})					
	08.05.20	19.05.20	30.05.20	09.06.20	18.06.20	06.07.20
	BBCH 17	BBCH 30	BBCH 51	BBCH 60	BBCH 69	BBCH 85
P	29.40 ± 9.34 a	129.38 ± 47.94 a	319.15 ± 118.85 a	712.40 ± 209.02 a	893.98 ± 176.29 a	1.728.85 ± 502.22 a
PC1	20.45 ± 8.63 a	64.38 ± 22.52 a	202.25 ± 55.60 a	410.43 ± 88.92 a	692.03 ± 194.92 a	1.157.18 ± 200.36 a
PC2	36.23 ± 18.90 a	119.13 ± 56.04 a	297.60 ± 79.39 a	503.63 ± 189.30 a	783.90 ± 303.22 a	1.431.5 ± 304.07 a
PB1	35.20 ± 13.90 a	126.5 ± 74.64 a	342.30 ± 96.13 a	717.20 ± 149.83 a	913.38 ± 204.09 a	1.588.08 ± 240.54 a
PB2	25.40 ± 13.08 a	86.05 ± 20.75 a	333.70 ± 114.84 a	597.08 ± 211.35 a	930.48 ± 176.80 a	1.417.78 ± 247.90 a
PB3	25.43 ± 15.43 a	101.23 ± 91.85 a	214.35 ± 57.65 a	500.28 ± 245.50 a	680.45 ± 113.33 a	1.302.95 ± 224.11 a
	Dry matter of white clover (g m^{-2})					
C1	6.45 ± 2.88 a	21.05 ± 16.63 a	139.15 ± 72.68 a	242.20 ± 144.20 a	532.13 ± 188.34 a	581.30 ± 133.70 a
C2				7.80 ± 1.47 b	48.00 ± 13.73 bc	226.10 ± 69.63 b
PC1	5.38 ± 1.95 a	22.98 ± 6.97 a	52.30 ± 27.40 a	140.43 ± 11.33 ab	293.48 ± 136.42 ab	307.80 ± 44.14 b
PC2				3.00 ± 0.28 b	9.77 ± 3.70 c	7.78 ± 8.56 c
	Dry matter of spring barley (g m^{-2})					
B1		6.25 ± 1.72 ab	41.65 ± 5.33 abc	99.75 ± 14.40 ab	213.75 ± 51.00 ab	759.10 ± 215.38 a
B2		9.53 ± 3.60 ab	55.65 ± 2.00 a	99.88 ± 13.29 ab	336.63 ± 73.33 a	619.55 ± 98.78 a
B3		11.63 ± 2.33 a	44.80 ± 25.71 ab	120.78 ± 14.77 a	318.90 ± 57.93 a	708.90 ± 99.08 a
PB1		3.95 ± 0.81 b	15.45 ± 9.68 c	16.78 ± 5.49 d	60.75 ± 21.26 c	278.53 ±176.16 b
PB2		4.80 ± 2.68 b	15.95 ± 6.77 c	44.33 ± 32.60 cd	132.90 ± 85.79 bc	275.00 ± 137.70 b
PB3		7.83 ± 2.93 ab	26.90 ± 9.07 bc	67.45 ± 14.47 bc	164.50 ± 50.19 bc	225.11 ± 59.19 b

Table S5. Leaf Area Indices of spring barley as sole crop sown at three different seeding densities (B1, B2, B3) and intercropped with poppy (PB1, PB2, PB3) at Campus Klein-Altendorf 2019 and 2020. Lower case letters indicate significant differences between treatments in each year and at each developmental stage (ANOVA + Tukey-HSD, $p<0.05$).

Year	treatment/ BBCH	Leaf Area Indices of spring barley at the respective developmental stage (BBCH)			
2019	BBCH poppy	30	51	59	77
	BBCH barley	22	33	49	75
	B1	2.2 ± 0.6 a	3.1 ± 1.5 a	3.4 ± 1.4 a	1.7 ± 0.1 a
	B2	2.7 ± 0.9 a	3.5 ± 1.2 a	3.5 ± 0.5 a	1.7 ± 0.6 a
	B3	2.4 ± 0.5 a	4.2 ± 0.8 a	4.2 ± 1.1 a	2.1 ± 0.6 a
	PB1	1.3 ± 0.7 a	2.0 ± 0.4 a	2.3 ± 0.5 a	1.2 ± 0.6 a
	PB2	1.8 ± 0.6 a	3.3 ± 1.0 a	2.9 ± 0.6 a	1.4 ± 0.2 a
	PB3	1.7 ± 0.5 a	3.5 ± 1.2 a	3.8 ± 1.0 a	1.5 ± 0.4 a
2020	BBCH poppy	30	51	60	69
	BBCH barley	12	22	23	30
	B1	0.1 ± 0.0 ab	0.6 ± 0.3 bc	1.3 ± 0.1 ab	2.4 ± 0.5 ab
	B2	0.2 ± 0.1 ab	0.9 ± 0.0 ab	1.3 ± 0.1 ab	3.5 ± 0.7 a
	B3	0.2 ± 0.1 a	0.9 ± 0.1 a	1.5 ± 0.2 a	3.3 ± 0.8 a
	PB1	0.1 ± 0.0 b	0.3 ± 0.2 c	0.3 ± 0.1 d	0.8 ± 0.4 c
	PB2	0.1 ± 0.1 b	0.3 ± 0.1 c	0.6 ± 0.4 cd	1.6 ± 0.8 bc
	PB3	0.2 ± 0.1 ab	0.5 ± 0.2 c	0.9 ± 0.2 bc	1.8 ± 0.5 bc

Table S6. Leaf Area Indices of white clover as sole crop sown at two different seeding dates (C1, C2) and intercropped with poppy (PC1, PC2) at Campus Klein-Altendorf 2019 and 2020. Lower case letters indicate significant differences between treatments in each year and at each developmental stage (ANOVA + Tukey-HSD, $p<0.05$).

Year	treatment/ BBCH	Leaf Area Indices of white clover at the respective developmental stage (BBCH)			
2019	BBCH poppy	30	51	69	77
	BBCH C1	3	4	6	7
	BBCH C2	1	3	4	5
	C1	0.30 ± 0.14 a	1.78 ± 0.34 a	1.96 ± 0.62 a	2.42 ± 0.64 a
	C2	0.14 ± 0.04 ab	0.89 ± 0.29 b	1.31 ± 0.29 ab	1.88 ± 0.30 ab
	PC1	0.12 ± 0.06 ab	0.49 ± 0.26 bc	0.82 ± 0.52 bc	1.24 ± 0.36 bc
	PC2	0.07 ± 0.06 b	0.32 ± 0.06 c	0.27 ± 0.15 d	0.55 ± 0.14 c
2020	BBCH poppy	30	51	69	77
	BBCH C1	3	4	6	7
	BBCH C2	1	3	4	5
	C1	0.24 ± 0.12 a	1.21 ± 0.81 a	2.07 ± 1.31 a	4.36 ± 1.72 a
	C2			0.11 ± 0.05 b	0.40 ± 0.16 b
	PC1	0.23 ± 0.08 a	0.37 ± 0.25 a	1.53 ± 0.10 ab	2.05 ± 0.73 b
	PC2			0.03 ± 0.02 b	0.05 ± 0.01 b

Table S7. Nitrogen content (%) in the dry biomass of poppy, white clover and spring barley as sole crops (P, C1, C2, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB2, PB3) at Campus Klein-Altendorf 2018. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	Nitrogen content of poppy (%)					
	29.05.18	14.06.18	19.06.18	25.06.18	05.07.18	17.07.18
	BBCH 14	BBCH 51	BBCH 63	BBCH 65	BBCH 74	BBCH 85
P	3.40 ± 0.16 a	2.38 ± 0.15 a	2.26 ± 0.44 a	1.55 ± 0.36a	1.73 ± 0.35 a	1.47 ± 0.15 a
PC1	3.00 ± 0.28 a	1.77 ± 0.38 bc	1.91 ± 0.27 a	1.40 ± 0.38 a	1.82 ± 0.28a	1.54 ± 0.33 a
PC2	3.02 ± 0.22 a	2.22 ± 0.11 ab	2.13 ± 0.19 a	1.40 ± 0.26 a	1.74 ± 0.42 a	1.50 ± 0.27 a
PB2	3.15 ± 0.58 a	2.04 ± 0.25 abc	1.87 ± 0.15 a	1.32 ± 0.22 a	1.59 ± 0.32 a	1.53 ± 0.25 a
PB3	3.20 ± 0.32 a	1.66 ± 0.14c	1.91 ± 0.18 a	1.34 ± 0.30a	1.53 ± 0.39 a	1.44 ± 0.19 a
	Nitrogen content of white clover (%)					
C1		3.31 ± 0.16 a	3.06 ± 0.21 a	2.96 ± 0.32 b	2.46 ± 0.22 a	
C2		3.11 ± 0.44 a	3.04 ± 1.03 a	3.92 ± 0.38 a	2.21 ± 0.41 a	2.25 ± 0.73 a
PC1			2.41 ± 0.31 a	2.91 ± 0.18 b	1.93 ± 0.38 a	2.00 ± 0.03 a
PC2			2.65 ± 1.31 a	3.00 ± 0.35 b	1.84 ± 0.48 a	1.13 ± 0.20 b
	Nitrogen content of spring barley (%)					
B2		4.09 ± 0.66 a	3.65 ± 1.01a	2.83 ± 0.81 a	2.36 ± 0.73 a	1.67 ± 0.48 a
B3		3.22 ± 0.62 ab	3.04 ± 0.53 a	2.51 ± 0.71 a	2.15 ± 0.70 a	1.64 ± 0.39 a
PB2		3.14 ± 0.56 ab	2.65 ± 0.41 a	2.30 ± 0.74 a	2.20 ± 0.79 a	1.73 ± 0.39 a
PB3		2.35 ± 0.57 b	2.30 ± 0.30 a	1.71 ± 0.18 a	1.70 ± 0.17 a	1.42 ± 0.11 a

Table S8. Nitrogen content (%) in the dry biomass of poppy, white clover and spring barley as sole crops (P, C1, C2, B1, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB1, PB2, PB3) at Campus Klein-Altendorf 2019. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	Nitrogen content of poppy (%)						
	22.05.19	30.05.19	11.06.19	17.06.19	02.07.19	22.07.19	07.08.19
	BBCH 16	BBCH 30	BBCH 51	BBCH 59	BBCH 77	BBCH 81	BBCH 89
P	3.56 ± 0.51 ab	3.13 ± 0.32 a	2.79 ± 0.24 a	2.28 ± 0.22 a	1.52 ± 0.21 a	1.67 ± 0.26 a	1.34 ± 0.12 a
PC1	3.28 ± 0.86 ab	2.59 ± 0.22 ab	2.65 ± 0.23 a	2.34 ± 0.22 a	1.58 ± 0.30 a	1.84 ± 0.36 a	1.50 ± 0.16 a
PC2	4.37 ± 0.48 a	2.68 ± 0.26 ab	2.72 ± 0.16 a	2.23 ± 0.20 a	1.75 ± 0.51 a	1.84 ± 0.19 a	1.52 ± 0.18 a
PB1	2.88 ± 0.78 ab	2.04 ± 0.32 bc	2.11 ± 0.19 b	1.88 ± 0.42 ab	1.27 ± 0.17 a	1.83 ± 0.26 a	1.22 ± 0.14 a
PB2	2.87 ± 1.01 ab	1.70 ± 0.28 c	2.14 ± 0.23 b	1.71 ± 0.14 b	1.29 ± 0.53 a	1.68 ± 0.44 a	1.30 ± 0.21 a
PB3	2.49 ± 1.00 b	1.64 ± 0.51 c	2.01 ± 0.25 b	1.58 ± 0.07 b	1.31 ± 0.30 a	1.93 ± 0.27 a	1.26 ± 0.10 a
	Nitrogen content of white clover (%)						
C1		3.48 ± 0.82 a	3.63 ± 0.84 a	3.34 ± 0.21 a	2.70 ± 0.26 a	2.68 ± 0.20 a	3.21 ± 0.24 a
C2		2.90 ± 0.80 a	2.65 ± 0.78 a	3.20 ± 0.67 a	2.56 ± 0.36 a	2.62 ± 0.26 ab	3.02 ± 0.72 a
PC1		2.39 ± 0.97 a	3.34 ± 0.21 a	2.89 ± 0.43 a	2.09 ± 0.37 a	2.22 ± 0.07 bc	2.98 ± 0.32 a
PC2		2.40 ± 0.75 a	3.20 ± 0.67 a	3.10 ± 0.46 a	2.20 ± 0.21 a	2.18 ± 0.21 c	2.86 ± 0.23 a
	Nitrogen content of spring barley (%)						
B1	5.05 ± 1.22 a	3.17 ± 1.09 a	2.48 ± 0.48 a	2.15 ± 0.19 a	1.39 ± 0.87 a	1.38 ± 0.24 a	1.32 ± 0.05 a
B2	5.24 ± 0.41 a	3.07 ± 0.21 a	2.64 ± 0.45 a	2.16 ± 0.56 a	1.15 ± 0.55 a	1.33 ± 0.33 a	1.13 ± 0.31 a
B3	4.42 ± 0.22 a	2.55 ± 1.33 a	2.56 ± 0.28 a	1.80 ± 0.18 a	1.61 ± 1.06 a	1.38 ± 0.36 a	1.12 ± 0.11 a
PB1	5.43 ± 0.71 a	3.29 ± 0.57 a	2.65 ± 0.19	2.48 ± 0.29 a	1.65 ± 1.09 a	1.30 ± 0.12 a	1.43 ± 0.31 a
PB2	4.67 ± 0.50 a	2.65 ± 0.51 a	2.48 ± 0.36 a	2.14 ± 0.14 a	1.52 ± 1.65 a	1.38 ± 0.20 a	1.41 ± 0.23 a
PB3	4.42 ± 0.34 a	2.60 ± 1.01 a	2.05 ± 0.46 a	2.26 ± 0.09 a	1.58 ± 0.85 a	1.31 ± 0.14 a	1.33 ± 0.19 a

Table S9. Nitrogen content (%) in the dry biomass of poppy, white clover and spring barley as sole crops (P, C1, C2, B1, B2, B3) and in poppy-clover intercropping (PC1, PC2) and poppy-barley intercropping (PB1, PB2, PB3) at Campus Klein-Altendorf 2020. Lower case letters indicate significant differences between treatments at each developmental stage of poppy (ANOVA + Tukey-HSD, $p<0.05$).

Treatment	**Nitrogen content of poppy (%)**				
	19.05.20	30.05.20	09.06.20	18.06.20	06.07.20
	BBCH 30	BBCH 51	BBCH 60	BBCH 69	BBCH 85
P	3.83 ± 0.20 a	2.99 ± 0.41 a	2.27 ± 0.21 a	2.12 ± 0.35 ab	2.83 ± 1.22 a
PC1	3.72 ± 0.27 a	2.41 ± 0.11 b	2.09 ± 0.10 a	2.24 ± 0.27 ab	2.51 ± 0.32 a
PC2	3.53 ± 0.70 a	2.67 ± 0.10 ab	1.93 ± 0.22 a	2.78 ± 0.57 a	2.23 ± 0.17 a
PB1	3.60 ± 0.89a	2.62 ± 0.21 ab	2.18 ± 0.17 a	2.00 ± 0.20 b	1.95 ± 0.23 a
PB2	3.63 ± 0.38 a	2.42 ± 0.15 b	2.77 ± 0.84 a	1.97 ± 0.25 b	2.08 ± 0.21 a
PB3	3.59 ± 1.11 a	2.25 ± 0.09 b	2.37 ± 0.44 a	2.12 ± 0.16 ab	2.23 ± 0.73 a
	Nitrogen content of white clover (%)				
C1	3.37 ± 0.99 a	3.31 ± 0.55 a	3.30 ± 0.67 b	1.75 ± 0.61 b	3.50 ± 0.25 ab
C2			5.09 ± 0.39 a	3.79 ± 0.69 a	4.19 ± 0.33 a
PC1	3.31 ± 0.55 a	3.04 ± 1.09 a	3.15 ± 0.11 b	1.92 ± 0.54 b	3.00 ± 0.40 b
PC2			3.01 ± 0.06 b	1.16 ± 0.59 b	2.09 ± 0.46 a
	Nitrogen content of spring barley (%)				
B1	5.40 ± 0.35 a	4.53 ± 0.47 a	4.18 ± 0.46 a	4.00 ± 0.34 a	3.33 ± 0.34 a
B2	5.35 ± 0.41 a	3.93 ± 0.27 ab	3.79 ± 0.44 ab	3.36 ± 0.70 ab	2.82 ± 0.44 a
B3	5.17 ± 1.00 a	3.95 ± 0.36 ab	3.62 ± 0.25 ab	2.84 ± 0.31 b	2.55 ± 0.27 a
PB1	4.19 ± 0.81 a	3.88 ± 0.27 ab	2.62 ± 0.43 c	3.33 ± 0.34 ab	2.45 ± 0.26 a
PB2	4.49 ± 0.78 a	3.30 ± 0.68bc	3.19 ± 0.44 bc	2.82 ± 0.44 b	2.41 ± 0.13 a
PB3	4.75 ± 0.39 a	2.84 ± 0.30 c	3.30 ± 0.30 abc	2.55 ± 0.27 b	2.01 ± 0.30 a