Table S1. Dry matter yield of *Festulolium braunii* [dt·ha^{-1}].

Fertilization		2013			2014			Average total yield 2013-2014
		I cut	II cut	Total yield	I cut	II cut	Total yield	
MgO	0	69.8a	16.9a	86.8a	43.9b	24.5a	68.4a	77.6a
[kg·ha^{-1}]	25	76.0a	15.4a	91.4a	47.8a	22.5a	70.3a	80.8a
N	0	53.0c	12.8b	65.8c	12.3c	19.3c	31.6d	48.7c
[kg·ha^{-1}]	60	71.1b	14.1ab	85.2b	46.6b	21.3bc	67.9c	76.5b
	120	83.0ab	18.2ab	101.2a	59.1a	23.9b	82.9b	92.1a
	180	84.4a	19.6a	104.0a	65.3a	29.6a	94.9a	99.5a
Average		72.9	16.2	89.1	45.8	23.5	69.3	79.2

Table S2. Dry matter yield of *Lolium multiflorum* [dt·ha^{-1}].

Fertilization		2013			2014			Average total yield 2013-2014
		I cut	II cut	Total yield	I cut	II cut	Total yield	
MgO	0	69.1a	13.8a	82.9a	45.7b	17.3a	63.1b	73.0a
[kg·ha^{-1}]	25	69.1a	13.2a	82.3a	55.1a	17.9a	73.0a	77.7a
N	0	50.5b	10.8b	61.3b	18.9c	14.1b	33.0c	47.1b
[kg·ha^{-1}]	60	75.9a	13.4ab	89.3a	51.3b	15.7b	67.0b	78.2a
	120	74.9a	13.8ab	88.7a	67.8a	18.7ab	86.5a	87.6a
	180	75.2a	16.0a	91.3a	63.6a	22.0a	85.6a	88.4a
Average		69.1	13.5	82.6	50.4	17.6	68.0	75.3

Table S3. The leaf area index of *Festulolium braunii* [LAI].

Fertilization		I cut 2013	I cut 2014	Average 2013-2014	II cut 2013	II cut 2014	Average 2013-2014
MgO	0	3.0a	1.8a	2.4a	0.6a	1.1a	0.9a
[kg·ha^{-1}]	25	3.2a	1.9a	2.5a	0.6a	1.3a	1.0a
N	0	0.9b	0.3c	0.6c	0.3a	0.9b	0.6b
[kg·ha^{-1}]	60	4.0a	2.7a	3.4a	0.5a	0.9b	0.7b
	120	3.2a	1.7b	2.4b	0.8a	1.0b	0.9b
	180	4.2a	2.9a	3.5a	0.9a	1.9a	1.4a
Average		3.08	1.88	2.47	0.62	1.18	0.92

Table S4. The leaf area index of *Lolium multiflorum* [LAI].

Fertilization		I cut 2013	I cut 2014	Average 2013-2014	II cut 2013	II cut 2014	Average 2013-2014
MgO	0	2.9a	2.3a	2.6a	0.6a	1.3a	0.9a
[kg·ha^{-1}]	25	3.4a	2.2a	2.8a	0.7a	1.4a	1.0a
N	0	2.0b	0.7b	1.4b	0.4b	1.1a	0.8b
[kg·ha^{-1}]	60	3.0ab	2.4a	2.7a	0.5b	1.2a	0.9b
	120	3.7a	2.8a	3.2a	0.7b	1.4a	1.0ab
	180	3.8a	3.0a	3.4a	1.0a	1.6a	1.3a
Average		3.13	2.23	2.68	0.65	1.33	0.98

Table S5. Chlorophyll content [SPAD] of *Festulolium braunii* and *Lolium multiflorum*, average in 2013-2014.

Fertilization		I cut	II cut	I cut	II cut
		Festulolium braunii		*Lolium multiflorum*	
MgO	0	431.0a	342.7a	392.5b	342.3a
[kg·ha^{-1}]	25	474.0a	340.1a	462.6a	342.9a
N	0	327.9b	335.1a	369.0b	326.6a
[kg·ha^{-1}]	60	433.5a	328.4a	405.2b	338.6a
	120	514.8a	340.5a	440.3ab	336.0a
	180	533.9a	361.6a	495.8a	369.3a
Average		452.5	341.4	427.6	342.6

Table S6. Chlorophyll a, b, a+b and carotenoids content of *Festulolium braunii* [mg·g^{-1} FM], average in 2013-2014.

Fertilization		**I cut**	**II cut**	**I cut**	**II cut**	**I cut**	**II cut**	**I cut**	**II cut**
		Chl a		Chl b		Chl a+ b		Carot	
MgO	0	1.58a	0.86a	0.46b	0.33a	2.04a	1.19a	5.76a	3.89a
[kg·ha^{-1}]	25	1.83a	0.85a	0.55a	0.32a	2.38a	1.17a	5.98a	3.95a
N	0	1.24b	0.81a	0.34c	0.30a	1.58b	1.11a	4.00c	3.61b
[kg·ha^{-1}]	60	1.61ab	0.80a	0.48bc	0.32a	2.09ab	1.12a	5.25bc	3.65ab
	120	1.87a	0.84a	0.54ab	0.31a	2.42a	1.16a	6.52ba	3.92ab
	180	2.10a	0.97a	0.66a	0.36a	2.76a	1.33a	7.70a	4.50a
Average		1.70	0.86	0.50	0.32	2.21	1.18	5.87	4.89

Table S7. Chlorophyll a, b, a+b and carotenoids content of *Lolium multiflorum* [mg·g^{-1} FM], average in 2013-2014.

Fertilization		**I cut**	**II cut**	**I cut**	**II cut**	**I cut**	**II cut**	**I cut**	**II cut**
		Chl a		Chl b		Chl a+ b		Carot	
MgO	0	1.47a	1.06a	0.43a	0.37a	1.90a	1.43a	5.96a	4.39a
[kg·ha^{-1}]	25	1.47a	1.08a	0.43a	0.39a	1.91a	1.47a	6.13a	4.39a
N	0	0.87c	0.92a	0.24c	0.33a	1.11c	1.25a	4.86b	3.83a
[kg·ha^{-1}]	60	1.30bc	1.12a	0.37bc	0.40a	1.67bc	1.52a	6.20ab	4.64a
	120	1.67ab	1.07a	0.49ab	0.38a	2.17ab	1.45a	5.82ab	4.29a
	180	2.04a	1.16a	0.62a	0.41a	2.66a	1.57a	7.30a	4.80a
Average		1.47	1.07	0.43	0.38	1.90	1.45	6.04	4.39

Table S8. Nitrogen content of *Festulolium braunii* [g·kg^{-1}DM] plants.

Fertilization		**I cut**			**II cut**		
		2013	**2014**	**average**	**2013**	**2014**	**average**
MgO	0	9.79a	11.99a	10.89a	11.85b	12.11a	11.98a
[kg·ha^{-1}]	25	9,75a	12,12a	10,93a	12,12a	11,45b	11,78a
N	0	6.45d	10.67d	8.56c	11.59c	10.66c	11.12c
[kg·ha^{-1}]	60	9.08c	11.53c	10.31b	11.66bc	11.90b	11.78b
	120	11.03b	12.46b	11.75ab	12.10b	12.08ab	12.09ab
	180	12.51a	13.54a	13.03a	12.60a	12.46a	12.53a
Average		9.77	12.05	10.91	11.99	11.78	11.88

Table S9. Nitrogen content of *Lolium multiflorum* [g·kg^{-1}DM] plants.

Fertilization		**I cut**			**II cut**		
		2013	**2014**	**average**	**2013**	**2014**	**average**
MgO	0	9.25a	11.71b	10.48a	9.93b	10.60b	10.27a
[kg·ha^{-1}]	25	8.21b	12.27a	10.24a	10.19a	11.06a	10.62a
N	0	7.81d	9.41c	8.61b	9.06d	9.99c	9.53c
[kg·ha^{-1}]	60	8.12c	11.73b	9.93ab	9.89c	10.75b	10.32b
	120	9.03b	13.28a	11.16a	10.31b	11.00b	10.65ab
	180	9.97a	13.55a	11.76a	10.99a	11.56a	11.27a
Average		8.73	11.99	10.36	10.06	10.83	10.44

Table S10. Protein content of *Festulolium braunii* [g·kg^{-1}DM] plants.

Fertilization		**I cut**			**II cut**		
		2013	**2014**	**average**	**2013**	**2014**	**average**
MgO	0	6.12a	7.49a	6.80a	7.41b	7.57a	7,49a
[kg·ha^{-1}]	25	6.09a	7.58a	6.83a	7.57a	7.15b	7,36a
N	0	4.03d	6.67d	5.35c	7.24c	6.66c	6,95c
[kg·ha^{-1}]	60	5.68c	7.21c	6.44b	7.29bc	7.44b	7,36b
	120	6.89b	7.79b	7.34ab	7.56b	7.55ab	7,56ab
	180	7.82a	8.46a	8.14a	7.87a	7.79a	7,83a
Average		6,11	7.53	6.82	7.49	7.36	7.43

Table S11. Protein content of *Lolium multiflorum* [g·kg^{-1}DM] plants.

Fertilization		I cut			II cut		
		2013	2014	average	2013	2014	average
MgO	0	5.78a	7.32b	6.55a	6.21b	6.62b	6.42b
[kg·ha^{-1}]	25	5.13b	7.67a	6.40a	6.37a	6.91a	6.64a
N	0	4.88d	5.88c	5.38b	5.66d	6.25c	5.95c
[kg·ha^{-1}]	60	5.08c	7.33b	6.20ab	6.18c	6.72b	6.45b
	120	5.65b	8.30a	6.97a	6.44b	6.88b	6.66ab
	180	6.23a	8.47a	7.35a	6.87a	7.23a	7.05a
Average		5.46	7.50	6.48	6.29	6.77	6.53

Table S12. Nitrate content in dry matter of 1st cut of *F. braunii* and *L. multiflorum* depending on the fertilization applied, average in 2013-2014.

Fertilization		Nitrate content [g NO_3]			
		Festulolium braunii		*Lolium multiflorum*	
		kg· DM^{-1}	6 kg DM[1]	kg· DM^{-1}	6 kg DM [1]
MgO	0	6.85	41.1	5.35	32.1
[kg·ha^{-1}]	25	6.65	39.9	4.87	29.2
N	0	4.90	29.4	3.64	21.8
[kg·ha^{-1}]	60	5.95	35.7	3.36	20.2
	120	7.20	43.2	5.02	30.1
	180	9.11	54.7	7.42	44.5

[1] in a daily dose of DM for a horse weighing 600 kg

Table S13. Nitrate reductase content of *Festulolium braunii* [nmole NO_2^- g^{-1}·h^{-1}] plants.

Fertilization		I cut			II cut		
		2013	2014	average	2013	2014	average
MgO	0	73.0a	206.5a	139.7a	39.7a	42.0a	40.8a
[kg·ha^{-1}]	25	86.7a	180.6a	133.6a	47.0a	55.6a	51.3a
N	0	30.4b	65.3a	47.9b	25.3a	32.8a	29.0b
[kg·ha^{-1}]	60	80.0ab	121.5a	100.8ab	38.6a	40.3a	39.5ab
	120	97.8ab	201.4a	149.6ab	44.3a	52.7a	48.5ab
	180	111.0a	386.0a	248.5a	65.1a	69.3a	67.2a
Average		79.80	193.55	136.70	43.33	48.78	46.05

Table S14. Nitrate reductase content of *Lolium multiflorum* [nmole NO_2^- g^{-1}·h^{-1}] plants.

Fertilization		I cut			II cut		
		2013	2014	average	2013	2014	average
MgO	0	64.3a	147.5b	105.9a	61.0a	91.8a	76.4a
[kg·ha^{-1}]	25	59.4a	248.1a	153.8a	55.2a	109.1a	82.2a
N	0	45.6a	130.7b	88.2b	40.8a	53.3a	47.0
[kg·ha^{-1}]	60	54.6a	137.9b	96.3ab	47.1a	90.0a	68.5ab
	120	55.4a	142.9b	99.2ab	64.2a	112.4a	88.3ab
	180	91.8a	379.7a	235.7a	80.3a	146.2a	113.3a
Average		61.85	197.80	129.85	58.10	100.48	79.28

Table S15. Crude fat content [%] in *Festulolium braunii* and *Lolium multiflorum* plants.

Fertilization		*Festulolium braunii*		*Lolium multiflorum*	
		I cut	II cut	I cut	II cut
MgO	0	0,877 a	1,313 a	0,677 a	1,099 a
[kg·ha^{-1}]	25	0,840 a	1,339 a	0,705 a	1,023 a
N	0	0,747 a	1,350 a	0,637 a	1,168 a
[kg·ha^{-1}]	60	0,810 a	1,313 a	0,672 a	1,085 a
	120	0,895 a	1,345 a	0,690 a	1,020 a
	180	0,983 a	1,295 a	0,765 a	0,970 a

Average	0,859	1,326	0,691	1,061	

Table S16. Fiber fraction [%] in the dry matter of *Festulolium braunii* plants, 1st cut; average in 2013-2014.

Fertilization		NDF	ADF	ADL	Cellulose	Hemicellulose
MgO	0	63.47a	38.26a	5.10a	30.37a	27.59a
[kg·ha^{-1}]	25	64.18a	41.95a	5.50a	32.45a	28.48a
N	0	62.71a	40.60a	4.88a	34.04a	30.86a
[kg·ha^{-1}]	60	64.39a	38.52a	5.09a	30.02a	31.13a
	120	64.45a	41.11a	6.06a	30.06a	21.34a
	180	63.75a	40.19a	5.17a	31.51a	28.81a
Average		63.82	40.10	5.30	31.41	28.04

Table S17. Fiber fraction [%] in the dry matter of *Festulolium braunii* plants, 2nd cut; average in 2013-2014.

Fertilization		NDF	ADF	ADL	Cellulose	Hemicellulose
MgO	0	57.70a	30.78a	4.50a	26,27a	26,91a
[kg·ha^{-1}]	25	57.13a	31.19a	4.45a	26.74a	25.93a
N	0	57.29a	31.40a	4.45a	26.94a	25.89a
[kg·ha^{-1}]	60	56.83a	30.58a	4.15a	26.43a	26.24a
	120	58.01a	30.54a	4.14a	26.39a	27.47a
	180	57.52a	31.42a	5.16a	26.26a	26.10a
Average		57.41	30.98	4.48	26.50	26.42

Table S18. Fiber fraction [%] in the dry matter of *Lolium multiflorum* plants, 1st cut; average in 2013-2014.

Fertilization		NDF	ADF	ADL	Cellulose	Hemicellulose
MgO	0	61.13a	36.90a	5.94a	27.48a	25.84a
[kg·ha^{-1}]	25	62.80a	38.74a	5.94a	25.21a	25.81a
N	0	61.19a	33.72a	6.25a	23.57a	26.72a
[kg·ha^{-1}]	60	59.69a	39.63a	5.56a	31.07a	25.81a
	120	61.98a	40.30a	5.90a	26.90a	24.92a
	180	65.02a	37.62a	6.05a	23.85a	25.86a
Average		61.97	37.82	5.94	26.35	25.83

Table S19. Fiber fraction [%] in the dry matter of *Lolium multiflorum* plants, 2nd cut; average in 2013-2014.

Fertilization		NDF	ADF	ADL	Cellulose	Hemicellulose
MgO	0	61.14a	33.22a	6.40a	26.81a	27,92a
[kg·ha^{-1}]	25	60.20a	32.78a	6.08a	26.57a	27,36a
N	0	59.20a	32.81a	6.35a	26.45a	26,01a
[kg·ha^{-1}]	60	60.57a	32.89a	6.62a	26.27a	28,39a
	120	60.43a	32.56a	5.94a	26.62a	27,87a
	180	62.48a	33.74a	6.07a	27.41a	28,29a
Average		60,67	33.0	6.24	26.69	27.64

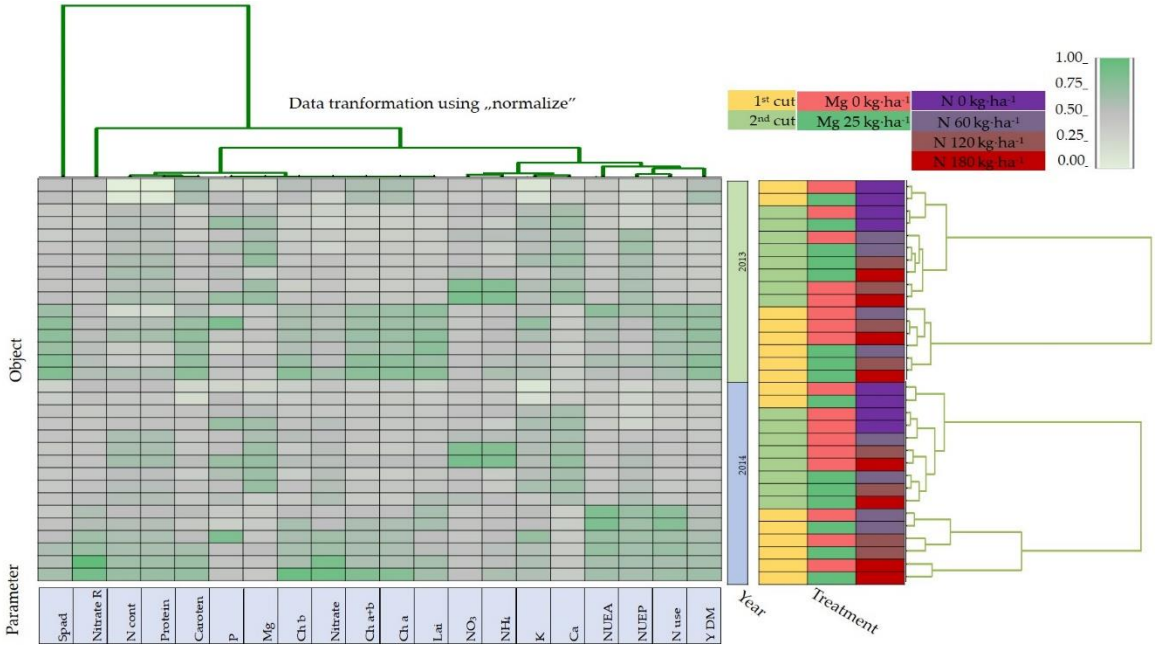
Table S20. Macroelements content in the dry matter of *Festulolium braunii* plants [g·kg^{-1}DM]

Fertilization		I cut				II cut			
		Ca	Mg	P	K	Ca	Mg	P	K
MgO	0	14.1a	1.0a	2.6a	23.4a	21.2a	1.4a	2.6a	23.9a
[kg·ha^{-1}]	25	14.2a	1.1a	2.5a	23.0a	20.8a	1.4a	2.7a	23.8a
N	0	13.6a	0.9b	2.4b	20.4a	21.0a	1.3a	2.7a	24.1a
[kg·ha^{-1}]	60	13.7a	1.0ab	2.4b	23.5a	20.4a	1.4a	2.6a	23.8a
	120	14.5a	1.1a	2.9a	24.8a	21.6a	1.5a	2.5a	24.3a
	180	14.7a	1.1a	2.5ab	24.2a	21.1a	1.3a	2.8a	23.3a
Average		14.13	1.03	2.55	23.22	21.02	1.38	2.65	23.87

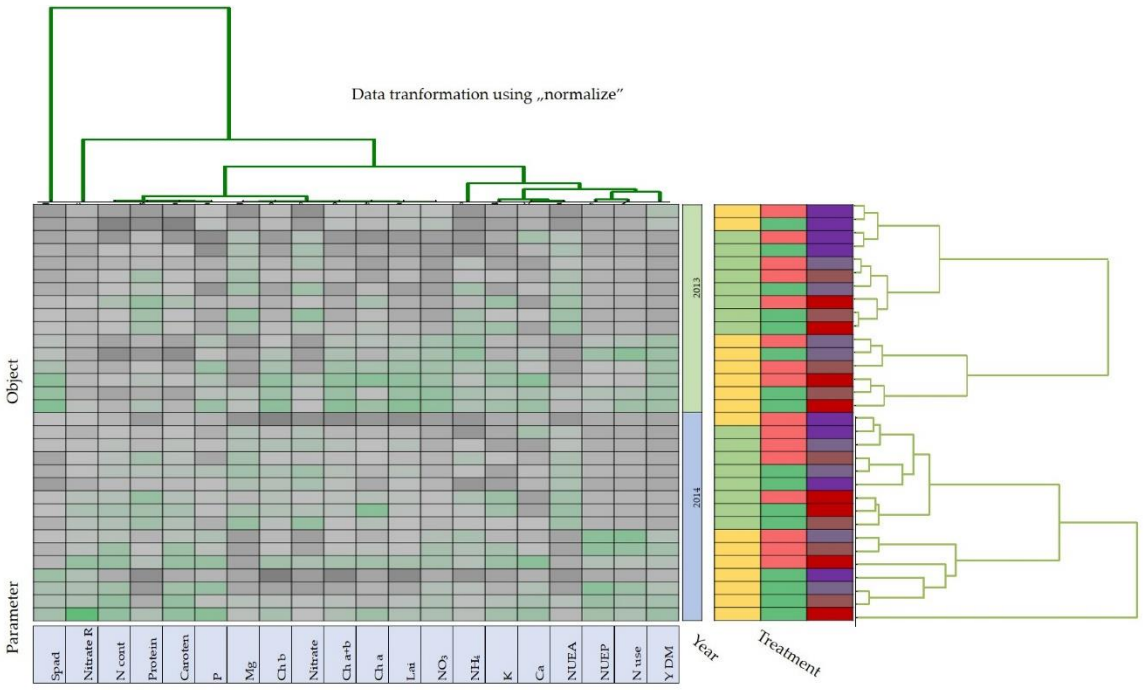
Table S21. Macroelements content in the dry matter of *Lolium multiflorum* plants [g·kg^{-1}DM]

Fertilization		I cut				II cut			
		Ca	Mg	P	K	Ca	Mg	P	K
MgO	0	15.9a	0.9b	2.4a	21.1a	19.5a	1.1a	2.6b	19.8a

[kg·ha^{-1}]	25	16.7a	1.0a	2.4a	21.5a	20.6a	1.2a	2.8a	19.8a
N	0	15.0a	0.9a	2.3a	19.6a	19.2a	1.1a	2.7a	21.0a
[kg·ha^{-1}]	60	15.8a	0.9a	2.3a	20.5a	19.1a	1.1a	2.8a	19.4a
	120	17.3a	1.0a	2.5a	21.3a	20.5a	1.2a	2.7a	19.9a
	180	16.9a	1.0a	2.6a	23.6a	21.4a	1.1a	2.6a	18.8a
Average		16.26	0.95	2.42	21.27	20.05	1.13	2.70	19.78



(**a**)



(**b**)

Figure S1 The heatmap analysis of the parameters studied in the treatments: Mg doses (0, 25 kg·ha^{-1}), N doses (0, 60, 120, 180 kg·ha^{-1}) used in *Festulolium braunii* (a) and *Lolium multiflorum* (b) plants during 2013-2014. The same color indicates a similar value of the parameter. Y DM-dry matter yield; Spad-chlorophyll content index; Lai-leaf area index; Ch a-chlorophyll a; Ch b-chlorophyll b; Ch a+b-chlorophyll a+b; Caroten-carotenoids; N cont-nitrogen content; Protein-protein content; Nitrates-nitrates content in dry matter; Nitrate R-nitrate reductase; P-P content, K-K content; Ca-Ca content, Mg-Mg content; NO_3- N-NO_3 form; NH_4- N-NH_4 form; N use-N accumulation; NUEP-physiological nitrogen use efficiency; NUEA-agricultural nitrogen use efficiency.