

CLIPPING MANAGEMENT AND ITS EFFECT ON THE COMPOSITION AND HEIGHT OF LOW-INPUT TURF

Pavel Knot

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Abstract

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The effect of mulching and mowing management on the height and the composition of low-input turf was studied in Vatin research station of fodder crops regularly in May, during years 2007–2012. The experiment was established in 2006 with using a clover-grass lawn mixture (95% grasses, 5% clover crops). The experimental plots were not fertilized and the patches were mown or mulched five times a year to a sward height of 40 mm.

The achieved results show that mulching affected the composition of the low-input turf very significantly. On the average of six-year monitoring, the representation of grasses in the sward of the mulched variant was 66.9%, which was a significantly higher share of grasses than in the mown variant (52.3%). By contrast, the share of clover crops in the mown variant (36.6%) was significantly higher than in the mulched variant (21.3%). Mulching significantly affected neither the infestation by weeds nor the total sward cover.

Mean height of the cut sward was non-significantly higher by 10.1% in the mulched variant with the sward heights being 210.9 mm in the mown variant and 232.3 mm in the mulched variant.

low-input turf, mowing, mulching, height, sward composition

Mulching becomes increasingly a standard method used for the maintenance of low-input turfs. The reason can be seen in savings, as these maintenance systems do not include the loading and haulage of the mown material or the disposal-related costs. Exact results of a long-term research into the effect of mulching on the quality of low-input turf are however not available so far. Much more data can be found about grassland and pasture swards in which the issue has been investigated for several tens of years. Gaisler *et al.* (2004), Laser (2002) and Raus *et al.* (2012) point to the effect of the number of measures taken during the year. The higher number of measures increases the species diversity of grassland swards. Kvítek *et al.* (1998) studied the effect of mulching on the increase of grass component with the decreasing representation of legumes. As compared with grassland swards, the intra- and inter-specific competition in turf swards is multiplied by substantially higher sowing rates as well as by the different response of the species

to diverse cutting height, level of fertilization and resistance to load (Lošák *et al.*, 2008). Low-input turfs are usually not fertilized. From this point of view, the mulching is beneficial as the organic matter left on the ground becomes gradually decomposed and nutrients contained therein become available to plants again. Starr and DeRoo (1981) inform that nitrogen from the grass matter remaining on the ground covers as much as 30% of annual nitrogen requirements. Kopp and Guillard (2002) claim even 50% of nitrogen supply. The amount of nitrogen in the grass matter is influenced not only by the grass species but also by the variety (Liu and Hull, 2006). Higher availability of nitrogen from the organic material left on the ground leads to a faster growth of the stand and hence to a higher weight of dry matter (Kopp and Guillard, 2002) and a greater sward height (Knot *et al.*, 2011). The cut organic matter left on the ground has a positive influence on the sward colour and lower infestation by weeds (Heckman *et al.*, 1999).

The goal of the work was to find out how the leaving of the cut grass material on the ground in the form of mulch affects the composition and height of the low-input turf.

MATERIAL AND METHODS

The polyfactorial small-plot experiment (trial plot of 3.24 m²) was established using a randomized controlled trial method in three repetitions in September 2006 at the Research Station of Fodder Crops in Vatin (MENDELÚ). The station lies in the potato-growing production region with average annual temperature of 6.1 °C and total annual precipitation amounting to 737 mm. Soil type is Eutric Cambisol. The experiment was established in 2006. Experiments were conducted during six growing seasons in the period 2007–2012.

Experimental variants:

Methods of exploitation:

1. mowing (clippings removed)
2. mulching (clippings returned).

Grass-clover lawn mixture: *Lolium perenne* 25%, *Poa pratensis* 25%, *Festuca rubra* 30%, *Festuca ovina* 5%, *Anthoxanthum odoratum* 5%, *Cynosurus cristatus* 5%, *Trifolium repens* 3%, *Lotus corniculatus* 2%.

The plots were mown with a rotary cutter Model Honda HRX537 five times a year at 40 mm cutting height in the following terms: second decade of May, second decade of June, third decade of July, second decade of September and third decade of October. The experimental plots were not fertilized during the monitored experimental period. Sward structure was assessed by using the projective dominance method before the first cut (May). The composition is expressed as a share of grasses, legumes, weeds and empty spots. Sward height was measured by means of a measuring rod before each cut. The statistical analysis was carried out using Statistica vers. 8.0. (STATSOFT, 2007). The

significance test was made by using the variance analysis and the Tukey test ($P \leq 0.05$).

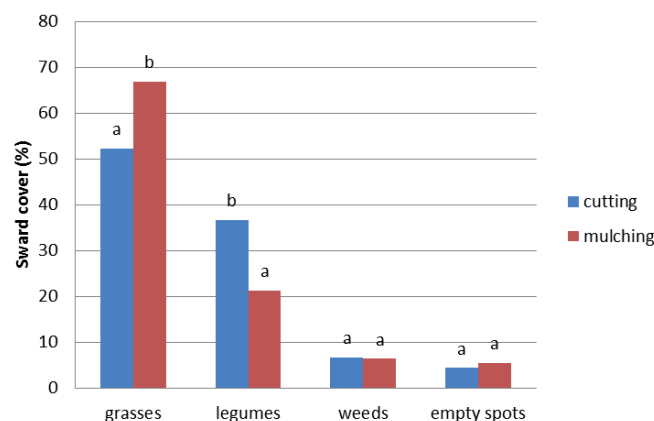
RESULTS AND DISCUSSION

Sward composition in relation to mowing and mulching

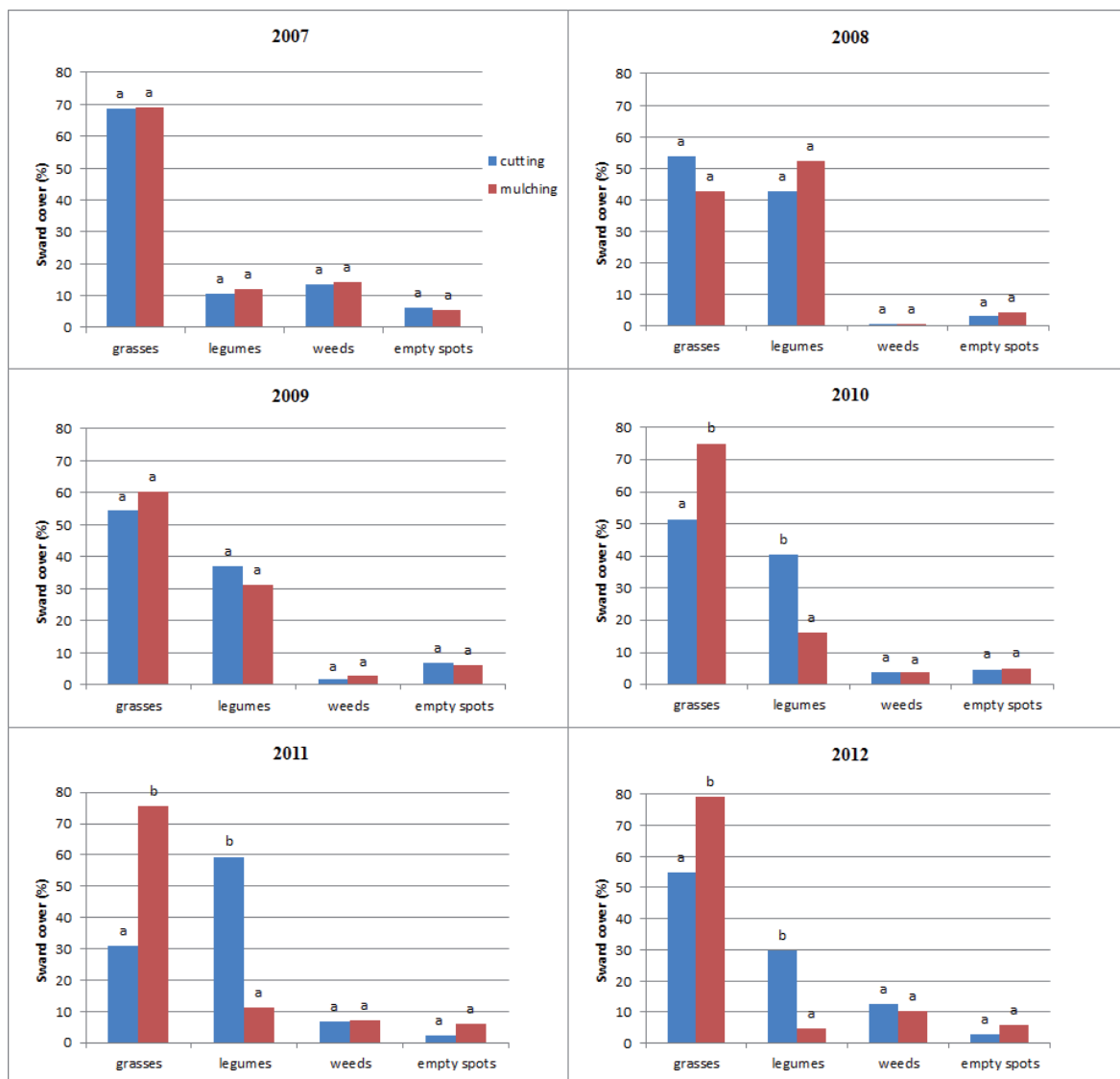
Results presented in Fig. 1 and Fig. 2 indicate that mulching had a statistically significant effect on the sward composition. On the average of six-year monitoring, the mulched variant exhibited 66.9% of grasses in the sward, which was a significantly higher value than in the mown variant (52.3%). On the other hand, the share of clover crops was significantly higher in the mown variant (36.6%) than in the mulched variant (21.3%).

From the viewpoint of individual years, it follows out from Fig. 2 that significant differences between the variants were recorded as late as in the fourth year of monitoring in spite of the fact that with the exception of year 2008, the mulched variant exhibited a higher representation of grasses in all monitored years. With the increasing age of the sward, the mulched variant exhibited the increasing share of grasses at the cost of clover crops (Fig. 3). By contrast, the share of grasses in the mown variant stabilized as early as in the second productive year with the exception of a sway in 2011 (Fig. 4). Thus, it can be assumed that mulching encourages a greater representation of grass species capable of utilizing nitrogen from the decaying grass matter by which the occurrence of clover crops is suppressed.

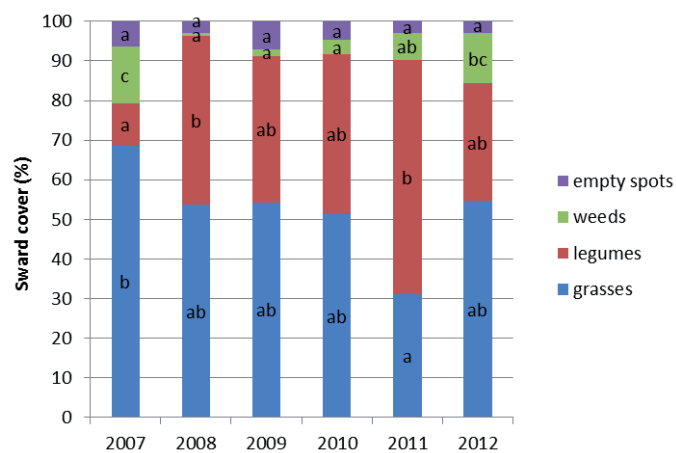
Kvítek *et al.* (1998) recorded the beneficial influence of mulching on the representation of grasses to the detriment of legumes, too. Their results, however, concerned only the grassland swards in which the mulching resulted in a lower total cover. The representation of weeds in the sward was not affected by the different method of turf maintenance and their degree of coverage recorded on the average of years was 6.6% and 6.4% in the mown and mulched variant, respectively (Fig. 1).



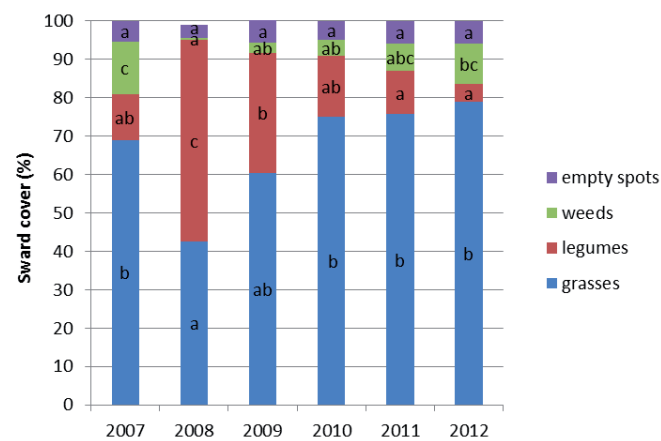
1: Effect of mowing and mulching on the composition of the low-input turf (average of years 2007–2012). Different letters indicate significant differences between the same groups ($P \leq 0.05$).



2: Effect of mowing and mulching on the composition of the low-input turf in 2007–2012. Different letters indicate significant differences between the same groups ($P \leq 0.05$).



3: Composition of the mown low-input turf in 2007–2012. Different letters indicate significant differences between the same groups ($P \leq 0.05$).



4: Composition of the mulched low-input turf in 2007–2012. Different letters indicate significant differences between the same groups ($P \leq 0.05$).



5: Total degree of coverage of the mown and mulched turf in the respective years. Different letters indicate significant differences between the same years ($P \leq 0.05$).

The assumption that mulching will lead to a higher representation of weeds in the sward was not corroborated. Heckman *et al.* (1999) describes the positive influence of mulching on the infestation of a pure meadow grass stand weeds as well. A negative influence of mulching was observed on the occurrence of empty spots where 5.4% and 4.4% of empty spots were found on the average of years in the mulched and mown variant, respectively. The difference was statistically non-significant though.

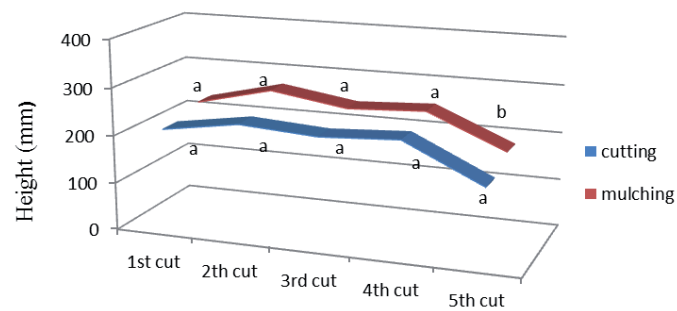
The total degree of sward coverage did not show any significant differences between the two variants (Fig. 5). In spite of that, the mulched variant exhibited in the last two years the degree of coverage decreased by 3.7% (2011) and 3.0% (2012) as compared with the mown variant.

Sward height in relation to mowing and mulching

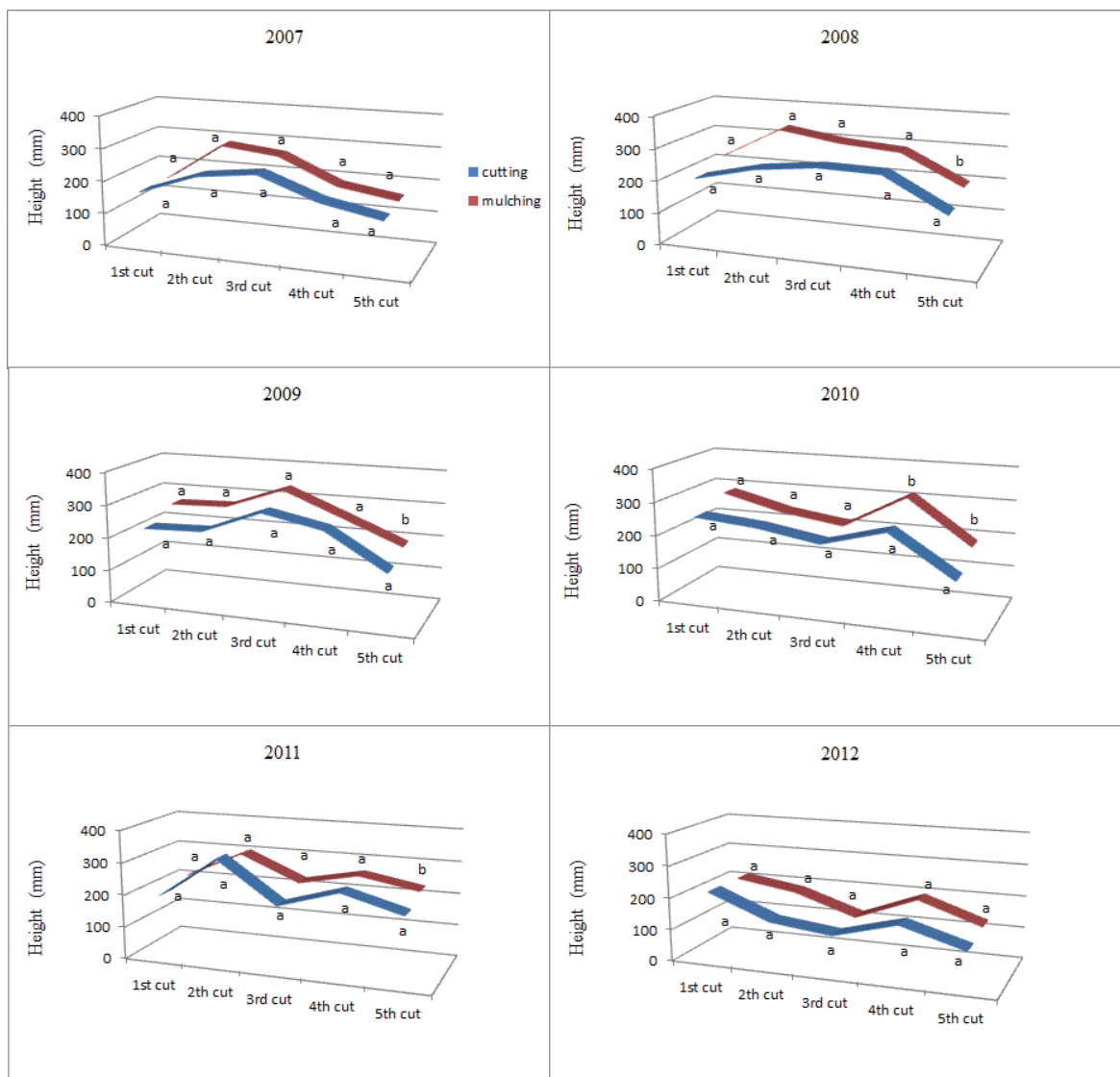
The leaving of the grass matter on the ground in the form of mulch increased the average height of the sward (Fig. 6, 7 and 8). The difference ranged on the average of years from 20 mm in the first cut up to 33.6 mm in the second cut. However, a significant

difference (25.9 mm) was recorded only in the fifth cut. In the respective years, with the exception of the first year of monitoring, significant differences were achieved in the fifth cut, too, and in the year 2010 also in the fourth cut. We can deduce from these results that nitrogen from biomass left on the ground does not play such an important role at the beginning of the growing period as it does at its end.

As to average sward height in the respective years, we can state that mulching increased the sward height significantly in 2008 by 39.9 mm and in 2009 by 25.7 mm. Although the sward height recorded in the mulched variant in the other years was greater as well, the differences were non-significant. The mean height of the cut sward recorded on the average of all years was 210.9 mm in the mown variant and 232.3 mm in the mulched variant (+10.1%). Knot *et al.* (2011) describe the encouraging influence of mulching on the sward height, too. On two sites with the pure stands of red fescue, ryegrass and meadow grass, they recorded the height of mulched swards greater by 10–15%. Since the greater height of the sward may cause problems at mowing, proper attention should be given to the date, number of cuts and selection of adequate grass mower.



6: Sward height at individual cuts of the mown and mulched turf (average of years 2007–2012). Different letters indicate significant differences between the same cuts ($P \leq 0.05$).

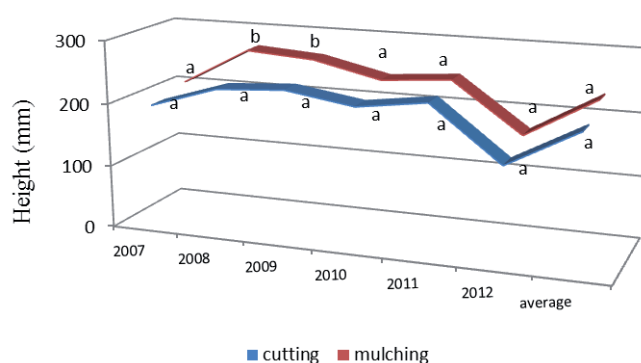


7: Sward height at individual cuts of the mown and mulched turf in 2007–2012. Different letters indicate significant differences between the same cuts ($P \leq 0.05$).

CONCLUSIONS

The goal of our research was to study the effect of mulching on the composition and sward height of the low-input turf. Results gained from

a clover-grass stand mulched 5-times a year in the period 2007–2012 show that compared to mowing, mulching very profoundly encourages the occurrence of sown grass species reducing at



8: Mean height of the mown and mulched turf in the respective years and on the average of the whole research period. Different letters indicate significant differences between the same years ($P \leq 0.05$).

the same time the occurrence of clover crops to acceptable percentage. The effect of mulching on the infestation by weeds or on the degree of sward coverage was not demonstrated.

Mulching also increased non-significantly the average cutting sward height by 10.1%. The fact has to be taken to account if this system of turf management is to be adopted.

SUMMARY

In 2007–2012, the effect of mulching and mowing on the composition and height of low-input turf was studied at the Vátn Research Station of Fodder Crops. The experiment was established in 2006 with using a clover-grass turf mixture. The patches were mown or mulched five times a year to a sward height of 40 mm. The experimental plots were not fertilized.

The achieved results indicate that mulching very significantly affects the composition of the low-input turf. On the average of six years of monitoring, the representation of grass species in the sward of mulched variant amounted to 66.9%, which was a significantly higher value than that recorded in the mown variant (52.3%). On the other hand, the share of legumes was significantly higher in the mown variant (36.6%) as compared with the mulched variant (21.3%). Mulching significantly affected neither the infestation by weeds nor the total degree of sward coverage.

Mean height of the cut sward was non-significantly greater in the mulched variant (by 10.1%) with the sward heights being 210.9 mm in the mown variant and 232.3 mm in the mulched variant.

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Address

Ing. Pavel Knot, Ph.D., Department of Animal Nutrition and Forage Production, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: knot@mendelu.cz