STUDY OF THE BEHAVIOR OF PERENNIAL RYEGRASS (*LOLIUM PERENNE* L.) IN MIXTURES OF PERENNIAL GRASSES AND LEGUMES, USED BY MOWING AND GRAZING

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Abstract

The research was carried out in the Banat plain area, characterized by the uneven distribution of rainfall during the vegetation period. The experimental device applied included three types of simple mixtures (*Lolium perenne* 50% + *Festuca pratensis* 50%, *Lolium perenne* 50% + *Trifolium repens* 50%, *Lolium perenne* 50% + *Lotus corniculatus* 50%) and a complex mixture (*Lolium perenne* 30% + *Festuca pratensis* 30% + *Trifolium repens* 20% + *Lotus corniculatus* 20%) used both by mowing and grazing directly with sheep. The fertilization was carried out uniformly, at all experimental variants (200 kg/ha of complex fertilizers was applied at the establishment, and during the vegetation a dose of N150 was applied in fractions, before the vegetation started and after each mowing or grazing cycle). The grazing variants was carried out with young males sheep of Țurcana breed. The floral composition of temporary grassland reacts differently to the valorification methods (mowing and grazing) because the morphological and eco-physical peculiarities of the grass and legume species are different. In case of simple mixtures, Lolium perenne is very competitive in blends with Festuca pratensis with a share of 52% in mowed variants, and 73% in grazing variants. Perennial grasses and legumes used for the simple and complex mixtures were: Timis 81 (*Lolium perenne*), Tampa (*Festuca pratensis*), Danitim (*Trifolium repens*), Dragotim (*Lotus corniculatus*). In the two years of production, the complex blend recorded the highest production of dry matter, in both uses, under conditions of balanced floral ratio between the component species.

Key words: *Lolium perenne*, mixtures of grasses and legumes, uses, production, floral composition

Temporary grasslands, consisting of mixtures of perennial grasses and legumes, are considered in many areas of the Earth to be high-yield feed crops, with constant and balanced production, which make the livestock feed system more efficient in any farm (Lüscher A. *et al*, 2004; Peyraud L. J. *et al*, 2009; Vliegher De. A. and Carlier L., 2007, Durand J. L. *et al*, 2015; Dragomir N., 2005). In most types of grassland mixes, perennial ryegrass (*Lolium perenne*) is considered to be a species with wide participation, both due to specific eco-physiological features and use (Louält F. *et al*, 1997; Gregis B. and Reidyb B., 2014; Gilliland J. T. *et al*, 2011; Jansone B. *et al*, 2010).

The paper highlights the production level of perennial ryegrass (*Lolium perenne*) grown in mixtures of perennial grasses and legumes and used by mowing and grazing.

MATERIAL AND METHOD

The researches were carried out at the Research Center for Grassland and Fodder Plants (USAMV Timişoara), on a cernoziom cambic soil, low gleyed, moderately decarbonated, clay-loam.

The experimental device, sown at the beginning of September, comprised the following experimental variants: A - Types of mixtures with *Lolium perenne* (a1 = *Lolium perenne* 50% + *Festuca pratensis* 50% a2 = *Lolium perenne* 50% + *Trifolium repens* 50% *Lolium perenne* 50% + *Lotus corniculatus* 50%; a4 = *Lolium perenne* 30% + *Festuca pratensis* 30% + *Trifolium repens* 20% + *Lotus corniculatus* 20%); B - Usage (b1 = by mowing; b2 = by grazing).

The fertilization was carried out uniformly, at all experimental variants, a quantity of 200 kg/ha of complex fertilizers was applied at the establishment, and during the vegetation a dose of N150 was applied, sequenced as follows: N50, in

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spring before the vegetation started; N50 after each mowing or grazing cycle.

The sowing of the mixtures of perennial grasses and legumes was done with native varieties: Timis 81 (*Lolium perenne*), Tâmpa (*Festuca pratensis*), Danitim (*Trifolium repens*), Dragotim (*Lotus corniculatus*).

The area of the experimental field, including the grazing parcels, was delimited with an electric fence, with the following technical data: for each variant harnessed by the grazing, the surface was 500 sqm, divided into 5 subplots, for making a rational grazing, and the surface of a used parcel by mowing was 100 square meters.

The grazing variants was carried out with young males sheep of Țurcana breed, weighing 20 kg, with a number of 10 rams for each experimental variant.

The average length of the grazing period was 7 days, and the duration of the grazing cycle was 34 days. On unfavorable days, animals were fed with the hay from mowing variants.

RESULTS AND DISCUSSIONS

Perennial ryegrass (*Lolium perenne*) is a perennial grass species with frequent spread in permanent grasslands in depression areas or river meadows, typical for grazing and good regeneration after mowing or grazing. Cultivated in different types of mixtures, perennial ryegrass is very competitive especially in the second year of vegetation (Dragomir N., 2005).

The results obtained in the first year of production demonstrate that perennial ryegrass, sown in different types of mixtures, can be used both by mowing and grazing. From the data presented in Table 1 it follows that there are no large differences between the two modes of production: 7.94 t/ha dry matter for use in mowing and 7.83 t/ha dry matter for grazing. The introduction of perennial ryegrass into complex mixtures of perennial grasses and legumes (*Lolium perenne* 30% + *Festuca pratensis* 30% + *Trifolium repens* 20% + *Lotus corniculatus* 20%) leads to the increase of production, compared to the culture in simple mixtures, at 9.06 t/ha in the mowed variants and 9.15 t/ha in the grazing varieties.

Table 1

Production of dry matter in mixtures of Lolium perenne, depending on uses (Production of First Year)

Variants	Uses					
	Mowing			Grazing		
	t/ha	dif. t/ha	%	t/ha	dif. t/ha	%
Lolium perenne (50%) + Festuca pratensis (50%)	7.00	-0.94	88.2	6.54	-1.29	83.5
Lolium perenne (50%) + Trifolium repens (50%)	8.20	0.26	103.2	7.39	-0.44	94.3
Lolium perenne (50%) + Lotus corniculatus (50%)	7.52	-0.42	94.7	8.23	0.40	105.1
Trifolium repens (30%) + Festuca pratensis (30%) + Trifolium repens (20%) + Lotus corniculatus (20%)	9.06	1.12	114.1	9.15	1.32	116.8
Average	7.94	-	100.0	7.83	-	100.0

In the second production year it is noted, in the case of mowing, the simple mixture consisting of 50% Lolium perenne + 50% Trifolium repens, with a production of 7.88 t/ha of dry matter, and the complex mixture with a production of 8.73 t/ha (a production increase of 15.31% higher than the average production of variants). In case of variants used in grazing, among the simple mixtures it was noted the variant with Lolium perenne 50% + Lotus corniculatus 50% (with a production of 7.66 t/ha), and the complex mixture also registered the highest production, of 8.05 t/ha (with an increase of 12.58% compared to the average results) (Table 2).

The floral structure of a temporary grassland reacts differently to the valorification method because the morphological and ecophysical particularities of the grass and legume species are different. These characteristics require choosing the most suitable types of blends, which can ensure a high level of productivity under various valorification conditions.

Table 2

Production of dry matter in mixtures of Lolium perenne, depending on uses (Production of Second Year)

Variants	Uses					
	Mowing			Grazing		
	t/ha	dif. t/ha	%	t/ha	dif. t/ha	%
Lolium perenne (50%) + Festuca pratensis (50%)	6.54	-1.03	86.39	6.00	-1.15	93.91
Lolium perenne (50%) + Trifolium repens (50%)	7.88	0.31	104.09	6.90	-0.25	96.50
Lolium perenne (50%) + Lotus corniculatus (50%)	7.16	-0.41	94.58	7.66	0.51	107.13
Trifolium repens (30%) + Festuca pratensis (30%) + T. repens (20%) + L. corniculatus (20%)	8.73	1.16	115.31	8.05	0.90	112.58
Media	7.57	-	100.0	7.15	-	100.0

The quality of a temporary grassland is due not only by its productivity but also by the share of the legumes species in floristic composition. In this respect, the types of mixtures studied have made some differences in the evolution of the floral structure, both in the way of valorification, as well as between the harvested crops or grazing cycles.

In the case of mowing, the mixture of Lolium perenne 50% + Lotus corniculatus 50% stands out, the share of the trefoil being quite high in the two mowings, 32% at the first and 28% at the second harvest. Under repeated mowing conditions, white clover has a much lower share of participation (10-15%). The complex mixture increases the legume intake to 36%, at the first harvest, and 24% to the second (Table 3).

The evolution of the floristic composition is much more balanced in the conditions of exploiting the mixtures studied through the grazing with sheeps. Thus, if the mixture of Lolium perenne 50% + Lotus corniculatus 50% retains the legume share as in the case of mowing, the 50% Lolium perenne + 50% Trifolium repens blend increases the share of white clover from 24% to the first grazing cycle at 31% at the third.

Also, the complex mixture shows a good evolution of the floristic composition in the conditions of grazing, with a share of legumes of 22-35%, higher in the last grazing cycle (Table 3).

Table 3

The floral composition of mixtures with Lolium perenne, depending on uses (Production of First Year)

Variants	Uses			
	Mowing (average)		Grazing (average)	
	G*	L*	G*	L*
Lolium perenne (50%) + Festuca pratensis (50%)	48	52 (F. prat)	68	32 (F. prat)
Lolium perenne (50%) + Trifolium repens (50%)	87	13	80	20
Lolium perenne (50%) + Lotus corniculatus (50%)	70	30	72	28
Trifolium repens (30%) + Festuca pratensis (30%) + Trifolium repens (20%) + Lotus corniculatus (20%)	73	27	72	28

G* = graminee, L* = leguminoase

In the second year of production, the evolution of the floral composition is similar to that of the first year with a 5-10% decrease of the two perennial grass species (Lolium perenne and Festuca pratensis) (Table 4). This year, the complex mixture of 30% Lolium perenne + 30% Festuca pratensis + 20% Trifolium repens + 20% Lotus corniculatus recorded a more balanced floral structure for both uses.

Table 4

The floral composition of mixtures with Lolium perenne, depending on uses (Production of Second Year)

Variants	Uses			
	Mowing (average)		Grazing (average)	
	G*	L*	G*	L*
Lolium perenne (50%) + Festuca pratensis (50%)	52	48 (F. prat)	73	27 (F. prat)
Lolium perenne (50%) + Trifolium repens (50%)	79	21	80	20
Lolium perenne (50%) + Lotus corniculatus (50%)	69	31	72	28
Trifolium repens (30%) + Festuca pratensis (30%) + Trifolium repens (20%) + Lotus corniculatus (20%)	67	33	72	28

G* = graminee, L* = leguminoase

CONCLUSIONS

Simple and complex mixtures of perennial grasses and legumes, based on *Lolium perenne*, behave differently, depending on their floral structure and the way of using the forrage.

Under climatic conditions in the Banat Plain area, the complex mixture of 30% *Lolium perenne* + 30% *Festuca pratensis* + 20% *Trifolium repens* + 20% *Lotus corniculatus* recorded the highest yields for both mowing and grazing.

In simple mixtures with Festuca pratensis, the *Lolium perenne* species is very competitive, with a proportion of participation (in the second year of production) of 52%, in mowing variants and 73% in grazed variants.

In the case of complex mixture, the floral structure of the component species remains balanced in the two years of production, regardless of how it is used.

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