

NOTABREVE

## ADAPTABILITY OF FOREIGN GRASSES AND LEGUMES IN UPLAND REGION OF BULGARIA

ADAPTABILIDAD DE GRAMÍNEAS IMPORTADAS Y CULTIVARES DE LEGUMINOSAS EN  
CONDICIONES DE SECANO EN UNA REGIÓN MONTAÑOSA DE BULGARIA

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### ADDITIONAL KEYWORDS

Grazing. Yield. Botanical composition.

### PALABRAS CLAVE ADICIONALES

Pastoreo. Rendimiento. Composición botánica.

### SUMMARY

The adaptability of cultivars of orchard grass, phalaris, tall fescue and white clover to simulated grazing was studied. Maximum dry matter productivity was obtained from phalaris cv. *Maru*.

### RESUMEN

Se estudió la adaptabilidad de variedades de *Dactylis glomerata*, *Phalaris aquatica*, *Festuca arundinacea* y *Trifolium repens* al pastoreo simulado. La máxima producción de materia seca fue obtenida en *P. aquatica* cv. *Maru*.

### INTRODUCTION

The grasses and legumes from *hot pasture*- type can be grazed by cattle or sheep during the period of July - August (and September) when the growth of other native fodder plants is stopped. This fodder species (*Roa* Tall fescue, *Grasslands Wana* Cocksfoot, *Grassland Kara* Cocksfoot, *Maru* Phalaris, *Tahora* White clover etc.)

are selected with the method of radiational mutagenesis and are very perspective (Davies, 1989; Bailey, 1990). With the pattern of drier summers and the threat of global warming these grass species and cultivars can be of great importance place in the drier regions (Anderson, 1989; Lingorski, 1994; Lodge, 1994; Gordon and Newmann, 1997). In Bulgaria such grasses and legumes never been investigated and that was the reason of this experiment making.

The object of this study was to establish the adaptability (changes of dry matter yields and botanical composition of the sward) of some foreign cultivars of perennial grass and legume species monocultures and grass-legume mixture.

### MATERIAL AND METHODS

The experiment was carried out on

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an area situated at 385 m above sea level during the period 1993-1998. The base fertilization with P- and K-fertilizers were completed along with the ploughing. In this relation were used a double superphosphate and a potassium sulphate only once during the whole experimental period-480 kg/ha of each one fertilizer, respectively.

The grass sowing was accomplished in the spring (March) of 1993. The sown species (as variants) had a 5 m<sup>2</sup> harvesting area and they were the following: 1. Orchard grass (*Dactylis glomerata*) with total origin (from Bulgaria) as a Standard; 2. Orchard grass cv. Kara (from New Zealand); 3. Orchard grass cv. Wana (from New Zealand); 4. Phalaris (*Phalaris aquatica*) cv. Maru (from New Zealand); 5. Tall fescue (*Festuca arundinacea*) cv. Roa (from New Zealand); 6. Pasture grass mixture for sheep from New Zealand (20 percent Orchard grass cv. Kara + 20 percent Orchard grass cv. Wana + 20 percent Phalaris cv. Maru + 20 percent Tall fescue cv. Roa + 20 percent White clover cv. Tahora; 7. White clover (*Trifolium repens*) cv. Tahora (from New Zealand); 8. White clover cv. Milka Pajberg (from Belgium) as a Standard 1.

The seed doses were as follows: orchard grass - 25 kg/ha, phalaris-20 kg/ha, tall fescue-25 kg/ha, white clover-10 kg/ha, and pasture grass mixture-40 kg/ha.

In the year of sowing and after that the experimental area was fertilized with ammonium nitrate as follows: the grass species and mixture - with 180 kg N/ha, and white clover varieties with 100 kg N/ha of three times equally

- before 1st, 2nd and 3rd harvesting. The effect of repeatedly simulated grazing was established with cutting by hand namely from 10 cm to 12 cm height of the sward. During the experimental period the harvest frequency was as follows: in 1993-four times, in 1994-five times, in 1995- four times, in 1996-three times, in 1997-four times, and in 1998- two times.

*Dry matter yield* (in t/ha). Was estimated by hand-cutting and weighing of fresh herbage mass from every plot; sub-samples were separated and dried in a forced-draught oven at 105°C. Botanical composition of the swards (in percent). Was established the part of sown grasses and legumes and total other plants (weeds). All data were analysed by analysis of variance.

## RESULTS AND DISCUSSION

For six years of investigation the highest dry matter yields were obtained in 2nd and 3rd year after sowing (in 1994 and 1995)-respectively from 10.29 t/ha (var.3) to 11.47 t/ha (var.4) and from 11.54 t/ha (var.3) to 14.24 t/ha (var.4) in grasses and 10.27 t/ha (var.8) - 10.56 t/ha (var.7) and 10.44 t/ha (var.7) - 12.79 t/ha (var.8) in legumes (**table I**).

In the year of sowing (1993) the grasses had almost equal dry matter yields - from 5.36 t/ha (var.3) to 5.89 t/ha (var.4). The dry matter of legumes varied in a small limits, too - from 4.20 t/ha (var.7) to 4.80 t/ha (var.8).

In the next year the differences of productivity were bigger. They had an increase from 1.92 times (var.3) to 2.07 times (var.5) in grasses and from

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2.14 times (var.8) to 2.51 times (var.7) in white clover. The higher and almost equal dry matter yields were obtained from grass mixture, phalaris and tall fescue- with 3.9, 4.1 and 7.0 percent more than the standard (var.1), respectively. The white clover cv. Tahora exceeded Standard 1 hardly - only with 2.8 percent.

In 1995 had an increase of the dry matter yields and varied from 11.54 (var.3) to 14.24 t/ha (var.4) and 10.44 t/ha (var.7)-12.79 t/ha (var.8). The highest yields were determined from phalaris and tall fescue-with 17.1 and 10.7 percent more than the standard.

In 1996 in all meadow species, the yields of grasses decreased from 2.25 times (var.4) to 2.42 times (var.3), and by the grass mixture with 2.18 times, while the yields of legumes decreased less - from 1.85 (var.7) - 2.13 times (var.8). In the same year phalaris and tall fescue had the highest yields again:

23.5 and 19.4 percent more than the standard (var.1), respectively.

In 1997 (the rainfall was 672.2 mm), the yields of all grass species increased from 1.19 (var.4) to 1.44 times (var.2) and 1.18 in the mixture, while the yields of legumes decreased hardly in comparison with 1996.

In the last year (1998) the yields of grasses and mixture were almost the same, but smaller in comparison with the preceding year, because the rainfall were only 266.9 mm and varied from 5.0 (var.6) to 5.8 t/ha (var.2), excepting phalaris cv. *Maru*. Phalaris had the maximum dry matter productivity, 6.32 t/ha, which was with 17.5 percent more than the standard. As average from the period 1993-1998 phalaris had the maximum dry matter yield compared to other grasses and especially with the standard, 12.5 percent more than orchard grass (from Bulgaria). As average from the same period white clover

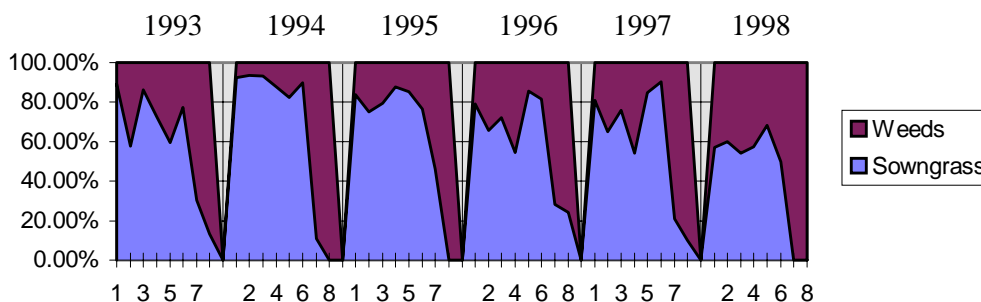
**Table I.** Dry matter production (t/ha) of grass and legume species monoculture and grass mixture, 1993 to 1998. (Producción de materia seca de especies gramíneas y leguminosas mezcladas y en monocultivo (t/ha desde 1993 a 1998).

	1993		1994		1995		1996		1997		1998		Mean	
	t/ha	p.100	t/ha	p.100	t/ha	p.100	t/ha	p.100	t/ha	p.100	t/ha	p.100	t/ha	p.100
1**	5.87	100.0	10.72	100.0	12.16	100.0	5.11	100.0	6.50	100.0	5.38	100.0	7.62	100.0
2	5.55	94.5	10.50	97.9	11.87	97.6	4.93	96.5	7.09	109.1	5.80	107.8	7.62	100.0
3	5.36	91.3	10.29	96.0	11.54	94.9	4.76	93.1	6.55	100.8	5.02	93.3	7.25	95.1
4	5.89	100.0	11.16	104.1	14.24	117.1	6.31	123.5	7.50	115.4	6.32	117.5	8.57	112.5
5	5.53	94.2	11.47	107.0	13.46	110.7	6.10	119.4	7.26	111.7	5.45	101.3	8.21	107.7
6	5.79	98.6	11.14	103.9	11.90	97.9	5.46	106.8	6.43	98.9	5.00	92.9	7.62	100.0
7	4.20	87.5	10.56	102.8	10.44	81.6	5.64	94.0	5.35	92.9	*	-	7.24	122.3
8**	4.80	100.0	10.27	100.0	12.79	100.0	6.00	100.0	5.76	100.0	*	-	5.92	100.0

\*Because of increasing of weeds the dry matter yields are not established. \*\*(St.).

LSD for dry matter yields at 5 p.100 (17,12 p.100); at 1 p.100 (23,72 p.100); at 0,1p.100 (32,72 p.100).

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**Figure 1.** Botanical composition of perennial grass and legume species and grass mixture (in p.100), 1993 to 1998. (Composición botánica de gramíneas, leguminosas y mezcla en p.100 de 1993 a 1998).

cv. *Tahora* exceeded the Standard 1 (white clover cv. *Milka Pajberg*) with 22.3 percent.

It is obvious that during the period of investigation the sowing grasses of monocultures and of grass mixture were dominated as follows: in 1993, from 57.6 (var.2) to 89.3 percent (var.1), in 1994, from 82.3 (var.5) to 93.5 percent (var.2), in 1995, from 74.6 (var.6) to 87.7 percent (var.4), in 1996, from 65.6 (var.2) to 85.6 percent

(var.5), in 1997, from 64.9 (var.2) to 89.4 percent (var.6) and in 1998, from 54.1 (var.3) to 68.2 percent (var.5) (**figure 1**). The reason of that is the fact, that these grasses have the biggest aggressiveness in comparison with the weeds in the swards.

During the complete period (1993-1998) the most weed infestation was in two white clover varieties, the areas of them were entirely occupied of the weeds (to 100 percent).

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