Yield of Different Green Forage Crops, in Pure Stand and in Mixtures

Part 1.: Spring (two roweed) Barley (*Hordeum vulgare* L.), Pea (*Pisum sativum* L.) and Vetch (*Vicia sp*. L.)

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SUMMARY

Green fodder crops in pure stand and in mixtures have a great potential and will have a great role in the nutrition for ruminants in Hungary. Therefore experiment was carried out to measure the born of green fodder crop production in the present situation of cattle husbandry. The experimental area was situated on the farm of the Department of Botany and Plant Production at the University of Kaposvár, Faculty of Animal Science. The type of the soil was brown forest soil with clay illuvitation. The small plot trials were carried out in four repetitions using conventional random adjustment. After the harvesting the yield of the plots were weighted and the dry matter content, crude protein yield crude fibber was determined by Weendei analysis. The chemical components of the variations were determined in two repetitions. The following species was used in the small plot trial: spring barley, pea and vetch. The highest green and dry matter yield was measured at the barley varieties in pure stand. Between the barley varieties Annabell gave the highest green, DM and crude protein yield. Spring Barley Annabell and pea Rubin in mixture gave the highest yield of crude protein.

KEY WORDS

green forage, mixtures, dry matter yield, crude protein yield

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INTRODUCTION

The green fodder and the green fodder mixtures had a great role in the nutrition of ruminants in Hungary some decades before (Tóth, 1964, Csomós, 1965). In the 1970s concentrated and specialized cattle farms were established using monodietical nutrition (Horn, 1972, Babinszky, 1972). From 1990 the cow population in Hungary dramatically decreased. Nowadays the numbers of cows are not more than 50% of the 1990s. During the last ten years the system of cattle farming was changed too. After the changing of the system of ownership several small farms were established, which preferred to use the green forage feeding system instead of monodietical feeding from spring till autumn (Rank, 1991).

The result of the mentioned changes was that the green forage crop feeding. – which had an important role in the 1970s- could have a renascence nowadays. New species and varieties got into the cultivation. The nutritional value of these varieties hasn't been exactly determined yet.

The issue of increasing of utilisation green forage in Hungary shows the actuality of this topic (Csizi, 1998, Antal, 2001).

AIMS

- Which species and varieties grow able successfully at this local soil an climatic condition
- Which mixtures produce higher crude protein yield in lower dry matter yield
- Which species and varieties can be use for the feeding of cattle and medium level of milk producer farms

MATERIALS AND METHODS

Soil conditions

The experimental area was situated on the farm of the Faculty of Animal Science. The type of the soil is brown forest soil with clay illuvitation. The properties of the level A (0-30 cm) are showed in the Table 1.

Climatic conditions

The climate of Hungary is arid continental. The precipitation and the average temperature data of the experimental periods are showed in the Table 2.

Materials and Methods of small plot trials.

The small plot trials were carried out in four repetitions, in complete random design. The plot sizes were: 1,40m x 9,20m = 12,88m^2

The sowing was made by Wintersteiger plot sowing machine on the 13 th September 2002, the harvesting by hand on the 6 th of June 2002. Afterwards the green yield of the plots was weighted, and the dry matter content was determined. The chemical components of the variations were analysed in two repetitions by Weendei analysis. The influence of the factor was evaluated by analysis of variance with the statistical software SPSS for Windows 10.0. The significance level was $p<0,05$.

Materials for species and subspecies comparison

We used for the small plot trial the following species and varieties (Table 3.). The sowing data are showed in the same schedule. In the present article we will introduce the yield results of the following varieties of spring barley, pea and vetch.

Table 1. Soil conditions

ph H_2O	K_A	Humus	clay	mud	sand	Pours correlations			
		%	%	%	%	Global porosity	VK	HV	DV
6,28	37	1,50	19,7	29,6	50,7	40,7	31,2	17,4	13,8

Table 2. Climatic conditions

Month	I.	II:	III:	IV.	V.	VI.	VII.	VIII.	IX.	X.
Rainfall (mm)	5,3	46,4	7,5	102,3	53,6	55,1	76,6	57,2	52,3	65,0
Temperature average	0,3	5,4	7,6	10,4	18,8	21,3	23,1	21,2	14,7	10,3

Table 3. Species and varieties

Spring (two rowed) barley in pure stand	Pea in pure stand	Vetch in pure stand	Mixtures: Spring barley-pea
Annabella	IP5	Beta	Annabell-IP5
Thuringia	Rubin	Gabi	Annabell-Rubin
Elisa			Annabell-Beta
			Annabell-Gabi

RESULTS

Green yield

From the spring barleys in pure stand two varieties (Thuringia and Elisa) shows nearly the same green yield (35,27 t/ha and 36,62 t/ha). The highest green yield (39,39 t/ha) was measured at variety Annabell, which was significantly higher than the others two varieties gives. According to the green yield it was no significant differences between the two vetches varieties, but they had the lowest yield (26,32 t/ha and 23,99 t/ha) compared to the other species. Between the pea varieties in pure stand Rubin had significantly higher yield than IP5 (33,03 t/ha – 26,32 t/ha). Between the mixtures the variety Annabell mixed with Rubin gives the highest green yield (33,93 t/ha), but the difference between the mixtures was not significant. The green yield of pure stand and mixtures are showed in the Figure 1.

Dry matter yield

After the determination of dry matter content the dry matter yield/ ha was calculated. The dry matter yield of the different components, and mixtures are showed in the Figure 2. Between the spring barleys Annabell (11,01 t/ha) and Elisa (10,95 t/ha) gives the highest DM yield. The yield of Thuringia was nearly 1 t/ha lower (10,06 t/ha) than the other barley varieties.

The tendency of dry matter yield between the pea and vetches varieties has not changed in comparison of green yield. The variety of Rubin and IP5 produced 6,12 and 5,57 t/ha of DM and variety Beta and Gabi produced 3,80 and 3,44 t/ha of DM.

Between the mixtures, the highest DM yield was measured at Annabell x Gabi mixtures (8,64 t/ha) but the difference compared to Annabell x Rubin was small and not significant.

Crude protein yield

With the knowledge of DM yield and crude protein content of DM the crude protein yield in kg/ha was calculated and shown in Figure 3. The differences of crude protein yield between the barley varieties were not significant. The difference between pea varieties was not significant as well. Between the mixtures, the highest crude protein yield was measured at the Annabell-Rubin mixture, which was significantly higher than the other ones.

CONCLUSIONS

- The highest green and dry matter yield was measured at the barley varieties in pure stand.
- Between the barley varieties Annabell gives the highest green, DM and crude protein yield.
- Spring barley Annabell mixed with pea Rubin gives the highest Crude protein yield comparing the mixtures.
- Among the component the mixture with peas is recommended for feeding ruminants due to it is higher crude protein yield related to mixture with vetches.

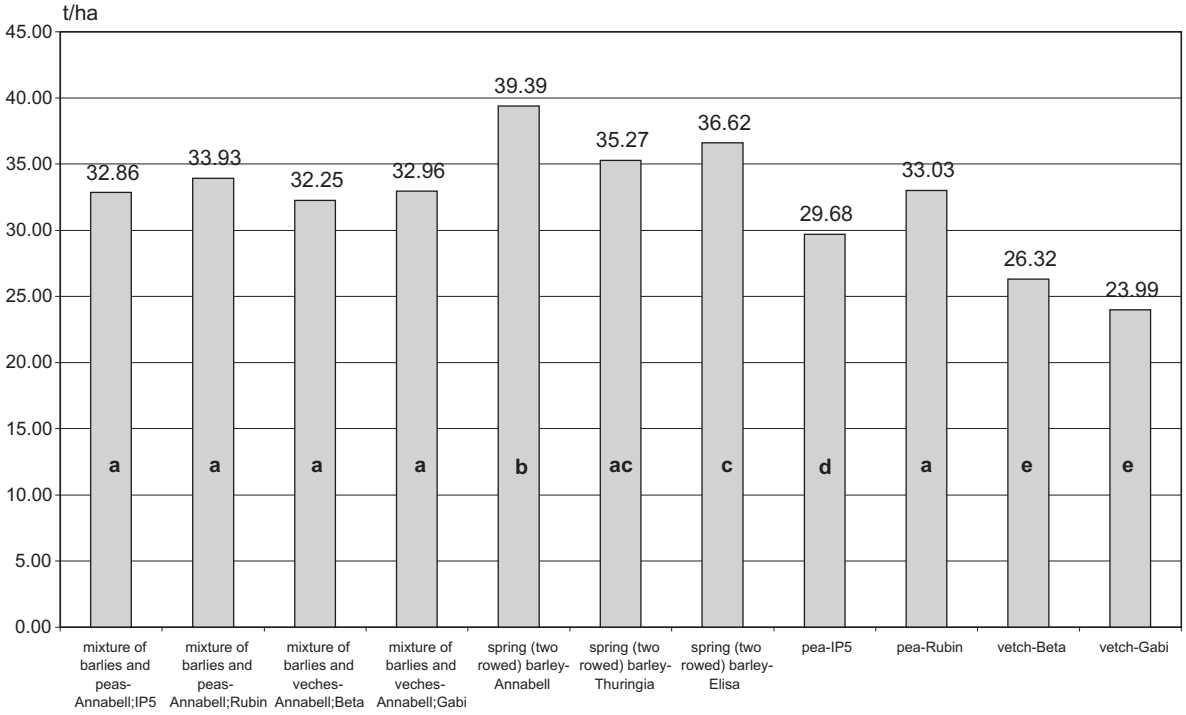

Figure 1. Green yield (t/ha) different green fodder crops in pure stand and in mixture (a, b, c, d, e, f=p<0,05)

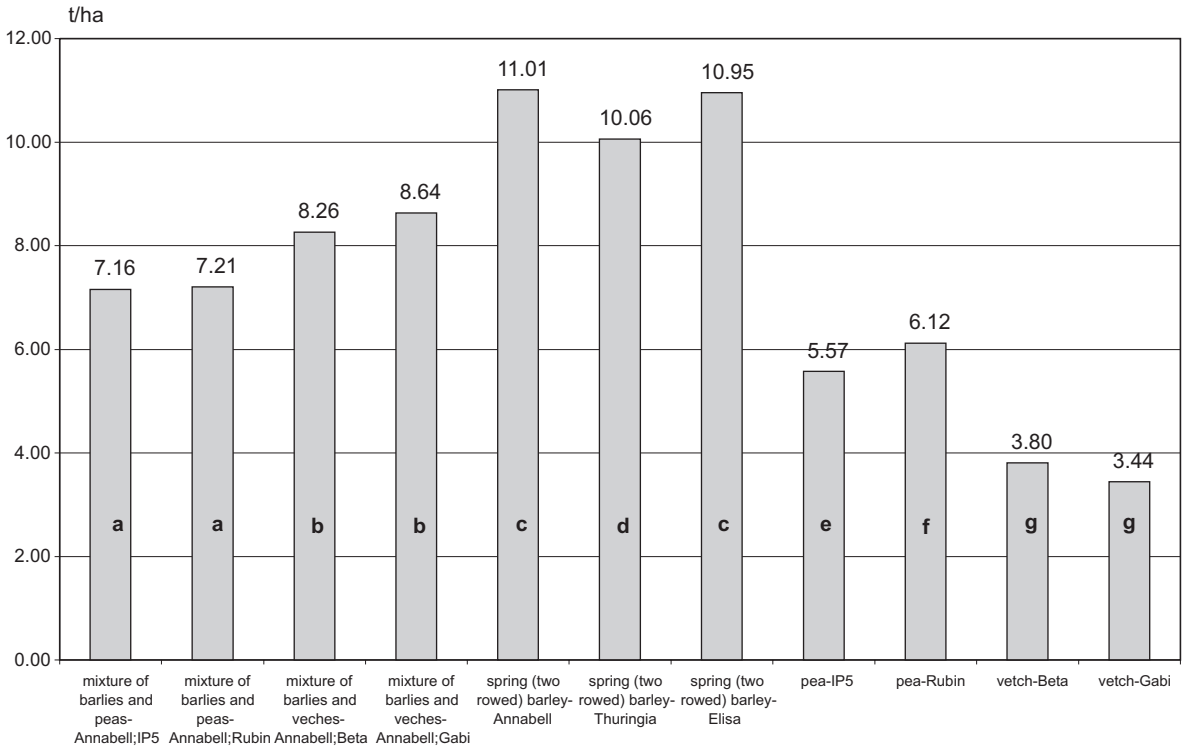

Figure 2. Dry matter yield (t/ha) of different green fodder crops in pure stand and in mixture (a, b, c, d, e, f, g=p<0,05)

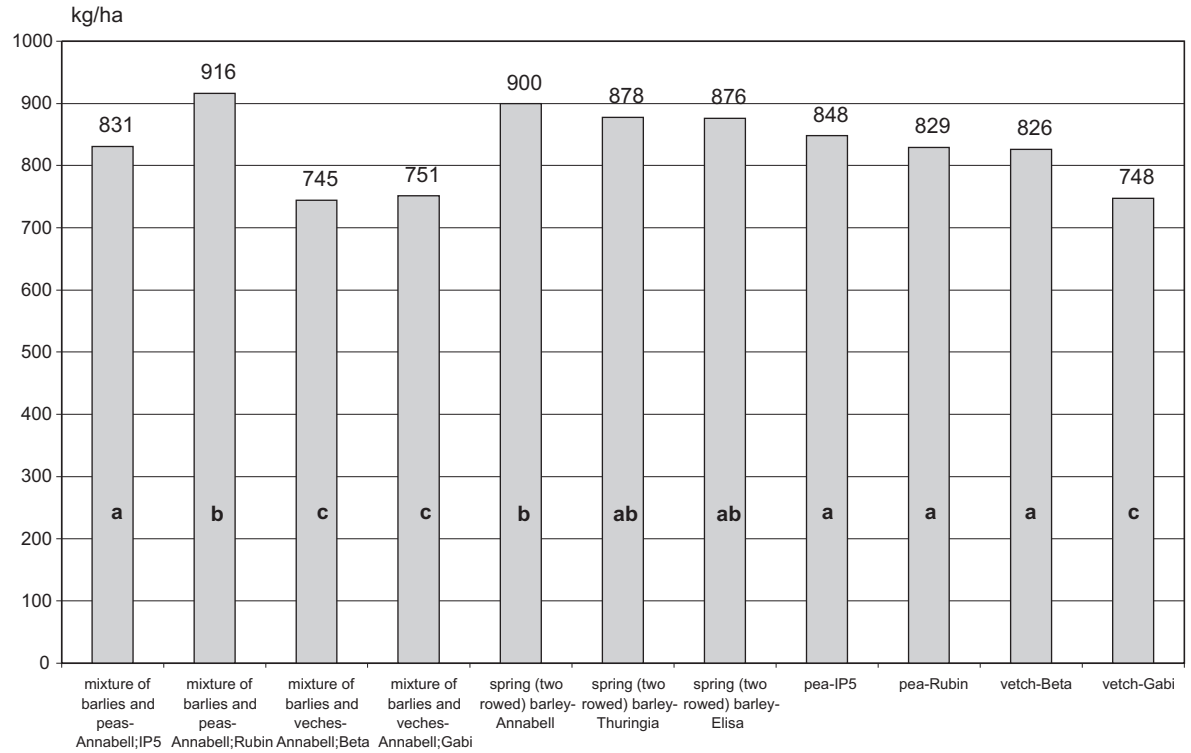

Figure 3. Crude protein yield (kg/ha) of different green fodder crops in pure stand and in mixtures (a, b, c=p<0,05)

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