THE DEPENDENCE BETWEEN THE MAIN PRODUCTION CHARACTERS IN VARIETY EMINENT OF *LOLIUM PERENNE*

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Abstract: ***The adaptability*** *of a cultivar is generally defined as the genetic feature which enables the plant to give yields that are both high and stable in different environmental conditions. The result of the interaction between the cultivar and the environment is expressed in the adaptability and yield stability of that specific cultivar. (SAVATTI, 2004). Introducing new varieties of fodder grasses, which are better from the point of view of their quality and quantity than the current ones, is a necessity, since the creation of intensive grasslands is the most important measure towards an increase in the production of forage. This paper aims at finding the dependence between the main production characters in variety Eminent of Lolium perenne. The variability study of the main characters (tiller height, number of vegetative tillers, plant weight, foliar surface) was made on the basis of biometric determinations. We determined linear correlations among the above-mentioned morphologic characters and then, based on these correlations, we ran a principal component analysis. In order to reach this goal, we studied variety Eminent in 2009 trying to find the influence of tiller number, tiller height and foliar surface on the weight of the plant. The investigated characters are more or less dependent on one another; each of these influences plant weight to some extent. There is significant positive linear correlation between the number of tillers and plant weight; between tiller height and plant weight; between the number of tillers and plant weight for Eminent variety of* ***Lolium perenne****. In conclusion, the correlation between plant weight, tiller number and plant weight is positive. An exception is the character of foliar surface, where the correlation between plant weight, number of tillers, tiller height and foliar surface is negative and statistically insignificant. Based on these correlations, we established the functional dependences among these well-correlated morphological characters, for Eminent variety. Thus, an increase in the number of tillers and plant size influences in a positive way the plant weight in Eminent variety of* ***Lolium perenne*** *The results of our research show that an increase in tiller number and height has a positive influence on plant weight for variety* ***Eminent*** *of* ***Lolium perenne****.*

Key words: *Lolium perenne, Arid III, production characteristics, depencences.*

INTRODUCTION

In order to improve the scheduling of forage production during the period of vegetation, the cultivation of some varieties with different degrees of earliness is the best solution. To this we should add gradual application of fertilizers and cultivation of species with different growth rates. The wide range of earliness of varieties allows the formation of a mixture with varieties from the same earliness class, which may be of different species, thus facilitating the achievement of green cover.

The adaptability of a cultivar is generally defined as the genetic feature which enables the plant to give yields that are both high and stable in different environmental conditions. The result of the interaction between the cultivar and the environment is expressed in the adaptability and yield stability of that specific cultivar.

As the cultivars are very different from the point of view of their adaptability to the environment, OKA (1967), distinguished between general adaptability, in a larger sense, and specific adaptability, in the narrow sense (SAVATTI, 2004).

Lolium perene has generative tillers that are formed in the first year, and that is why they are called spring tillers. Short tillers are predominant, with most leaves located at the base of the stem. In it, the new tillers grow at a distance from the main tiller, and thus the plant looks like a vase, with a narrower basis and a larger opposite end. It displays good land coverage, creating a dense green cover, and it can fallow the soil. (COJOCARIU, 2000).

In relation with its earliness, species *Lolium perenne* belongs to the intermediate group, forming spikes 50 days after the beginning of vegetation (MOISUC, 2002).

MATERIAL AND METHOD

The aim of this paper is to find the dependence between the main production characteristics of variety Eminent of *Lolium perenne.*

The research was carried out in the experimental fields belonging to the Discipline Culture of grasslands and fodder plants from the Didactical Station of USAMVB Timisoara, the experience being placed on a cambic chernosem weakly gleyed soil, with salinisation in depth.

This study was made in 2009.

The biological material studied is represented by foreign varieties of *Lolium perenne*, namely EMINENT (referred to aslo as Lp1)

The experience is placed in accordance with the randomized blocks method, in three repetitions, a parcel surface is 20 m^2 (5m x 4m). Sowing was made on August 15th 2007, with a 12.5 cm distance between rows. Seeding density is 1280 germinative seeds/m2 and sowing depth is 2.5 cm.

In order to help the statistical interpretation, we chose the following abbreviations:

- Lp1 NrFr - tiller number,
- Lp1H - tiller height,
- Lp1G - plant weight,
- Lp1SF - foliar surface.

This paper analyses the dependence of the main morphological characteristics (harvested in phenophase 59, in accordance with BBCH) **for variety Eminent of *Lolium perenne*.** We studied them in order to assess their potential under the conditions at Timişoara

RESULTS AND DISCUSSION

The matrix of the coefficients of linear correlation between the characteristics studied is presented in Table 1.

Table 1

The matrix of the coefficients of linear correlation between the characteristics under study

Correlation matrix between main production characters for Eminent

	Means	Std.Dev.	Lp1NrFr	Lp1H	Lp1G	Lp1SF
Lp1NrFr	33.00	3.49	-	**0.98**	**0.99**	-0.50
Lp1H	25.00	2.75	0.98	-	**0.98**	-0.62
Lp1G	334.40	28.26	0.99	0.98	-	-0.54
Lp1SF	24.27	3.97	-0.50	-0.62	-0.54	-

We can notice a significant positive linear correlation between tiller height and the number of tillers (coefficient of correlation 0.98); tiller height and plant weight (coefficient of correlation 0.98); number of tillers and plant weight, (coefficient of correlation 0.99).

The correlation between plant weight and other two characters: number of tillers and tiller height respectively, is positive. The only exception is the character foliar surface, where the correlation is negative and statistically insignificant (coefficient of correlation -0.54).

Thus, for variety Eminent of *Lolium perenne*, an increase in the number of tillers and in tiller height influences the increase in plant weight in a positive way.

The linear correlations between plant weight, tiller height, number of tillers per plant and foliar surface are presented intuitively in Figure 1.

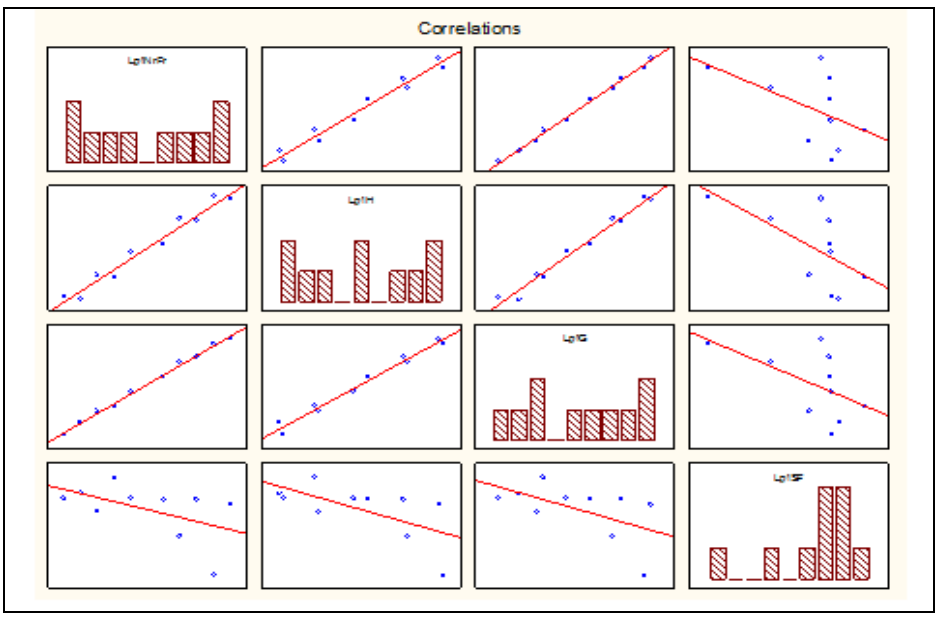

Figure 1. The graph of linear correlation between the main production characteristics of variety Eminent

Based on the linear correlations, we have established functional dependence between pairs of the variables that are well correlated: Lp1 NrFr - tiller number, Lp1H - tiller height, Lp1G- plant weight.

We also made a **linear regression analysis of plant weight in relation to the number of tillers per plant in variety Eminent** (see Table 2). We found that the variation proportion of the number of tillers per plant (466) was statistically significant (F = 101, df = 1) for a value of p below 0.05 (confidence interval 95%). Analysis of variance for the linear regression coefficients is presented in Table 2.

The regression equation y = ax+b was used to describe in the best way **plant weight in relation to the number of tillers for variety Eminent of *Lolium perenne*** (see Figure 2). Thus, **plant weight - Lp1G** was expressed in relation to **the number of tillers for variety Eminent - Lp1NrFr** by equation:

Lp1G = 68.300 + 8.0636*Lp1NrFr

Table 2.

ANOVA for the linear regression coefficients of plant weight in relation to the number of tillers for Eminent

ANOVA for the linear regression coefficients of plant weight in relation to the number of tillers for Eminent

	SS	Degr. of - Freedom	MS	F	p
Intercept	466.489	1	466.489	101.536	0.000008
"Lp1NrFr"	7152.445	1	7152.445	1556.802	0.000000
Error	36.755	8	4.594		

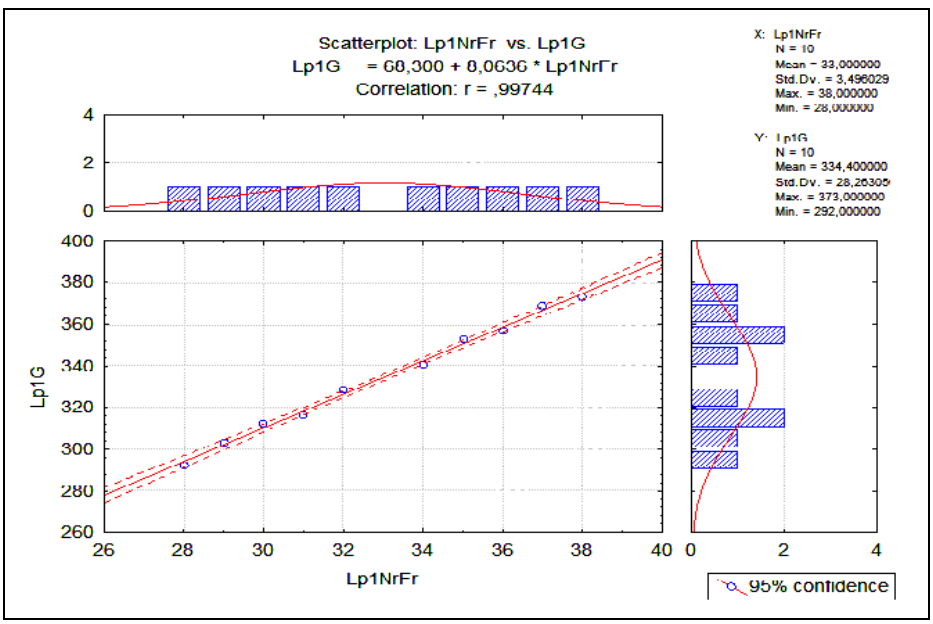

Figure 2. Linear dependence of plant weight on the number of tillers for variety Eminent

Figure 2 clearly shows that **for variety Eminent** there is positive linear correlation between plant weight and the number of tillers (correlation coefficient 0.99); the more the number of tiller increases, the bigger the plant weight will be. Confidence intervals (95%) for regression coefficients were (52.66958; 83.93042) and (7.59236; 8.53491).

We made a linear regression analysis of **plant weight in relation to tiller height for variety Eminent** (see Table 3). Thus we established that the variation proportion of the number of tillers (697.34) was statistically significant (F = 34.54, df = 1) for a value of p below 0.05 (confidence interval 95%). Analysis of variance for the linear regression coefficients is presented in Table 3.

The regression equation y = ax+b was used in order to express in the best way the dependence between **plant weight and tiller height for variety Eminent of *Lolium perenne*** (see Figure 3). Thus, **plant weight - Lp1G** was expressed in relation to **tiller height for variety Eminent - Lp1H** through the equation:

Lp1G = 80.435 + 10.159*Lp1H

Table 3.

ANOVA for the linear regression coefficients of plant weight in relation to tiller height for variety Eminent

ANOVA for the linear regression coefficients of plant weight in relation to tiller height for Eminent

	SS	Degr. of - Freedom	MS	F	p
Intercept	697.354	1	697.354	34.5466	0.000371
"Lp1H"	7027.713	1	7027.713	348.1495	0.000000
Error	161.487	8	20.186		

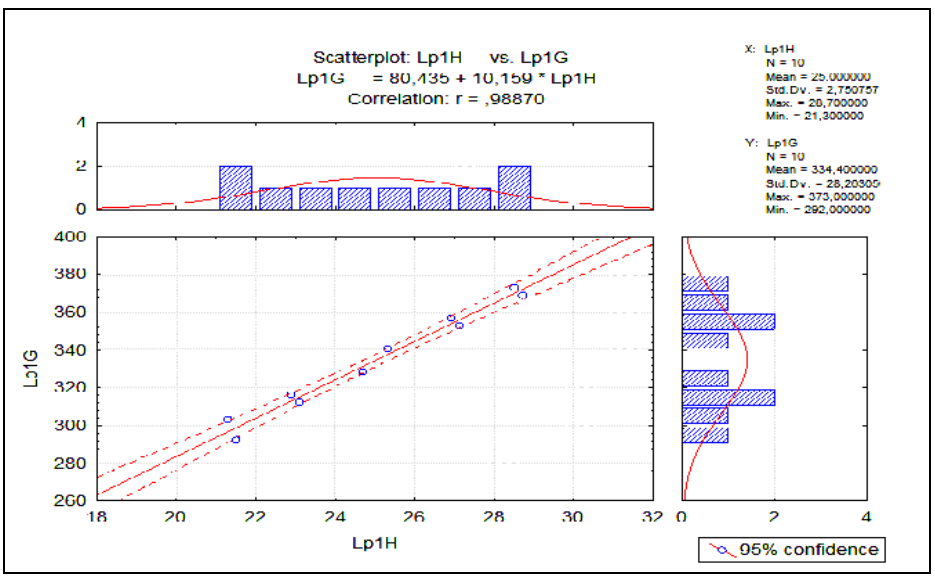

Figure 3. Linear dependence of plant weight on tiller height for variety Eminent

Figure 3 clearly shows that for **variety Eminent** there is a positive linear correlation between plant weight and tiller height (correlation coefficient 0.98); the more tiller height increases, the more plant weight will increase. The confidence intervals (95%) for the regression coefficients were (48.87765; 111.9928) and (8.90311; 11.4141).

CONCLUSIONS

After analysing variety **Eminent** of *Lolium perenne,* we can conclude that there is a positive linear correlation between plant weight and the number of tillers (correlation coefficient 0.99). There is also positive linear correlation between plant weight and tiller height (correlation coefficient 0.98), but there is statistical insignificant, negative correlation (correlation coefficient -0.54) between plant weight and another character, namely foliar surface.

Thus, an increase in the number of tillers and an increase in plant height have a positive influence on the increase of plant weight for variety **Eminent** of ***Lolium perenne***.

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