RESEARCH CONCERNING THE MAIN PRODUCTION CHARACTERS OF LOLIUM PERENNE IN THE CONDITIONS OF WESTERN ROMANIA

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Abstract: *Introduction of new varieties of forage grasses, more powerful in terms of quality and quantity, is a must, while the establishment of intensive grassland is the main measure capable of increasing the fodder production. Lolium perenne is one of the most important forage grass in temperate zones, used successfully in the Netherlands, in feeding dairy cows.(GILLILAND T. J., 2002, SMIT H. J, et al., 2005., SOKOLOVIĆ, D., 2010.). Perennial ryegrass (Lolium perenne L.) is one of the most important perennial cool-season forage grasses. It is highly productive, with the highest nutritive value among forage grasses, adapted for frequent defoliation and grazing. Market demands focus interest of perennial ryegrass breeders to production of cultivars with high, stable yield and good dry matter quality, tolerant to drought, frost and other stressful environmental conditions, with different maturity (SOKOLOVIĆ D et al., 2010). Knowing the characteristics that have varieties of forage plants is of great importance for the cultivator, because only by knowing them the forage plants can be capitalized (HARTMANN S., AND GERSTLE C., 2003., SMIT H. J, et al., 2005). This paper presents the behavior of a foreign genotype of Lolium perenne, namely Calibra, in the climatic conditions of Timisoara, in order to enrich with new varieties of fodder plants. Were studied the following biometric indices: vegetative shoot height, number of shoots, shrub weight and foliar surface. The data analysis showed that the variety Calibra performed well, recording values of 37.04 cm in the height of shoots, an average of 46 shoots / plant, and the average weight was 471.25 g and the foliar surface was 33.37 cm2. Interpretation of data obtained from the measurements mentioned above was processed by conventional methods of statistical analysis (correlation and regression analysis). There were performed correlational and linear regression analyses of the main characters in order to evaluate the potential production of Lolium perenne, variety Calibra. This variety has adapted to the climate of Timisoara, has a high genetic homeostasis, and is recommended for culture in the Banat.*

Key words: *Lolium perenne, Calibra, production characters, linear dependences*

INTRODUCTION

Lolium perenne is one of the most important forage grasses in temperate zones. (GILLILAND T. J et al., 2002).

Perennial ryegrass (*Lolium perenne* L.) is the most important species for feeding dairy cows. The majority of the farmers in the Netherlands graze their dairy cows during summer.

During grazing, the limited herbage intake is the main limitation of the dairy cows' production. (SMIT H. J, et al., 2005).

Perennial ryegrass (*Lolium perenne* L.) is one of the most important perennial cool-season forage grasses. It is highly productive, with the highest nutritive value among forage grasses, adapted for frequent defoliation and grazing. Market demands focus interest of perennial ryegrass breeders to production of cultivars with high, stable yield and good dry matter quality, tolerant to drought, frost and other stressful environmental conditions, with different maturity (SOKOLOVIĆ D et al., 2010).

Knowing the characteristics that have varieties of forage plants is of great importance

for the cultivator, because only by knowing them the forage plants can be capitalized (HARTMANN S., AND GERSTLE C., 2003, SMIT H. J, et al., 2005).

Fodder plant varieties must meet very different requirements of soil and climate, because it is required to produce feed in any climate, any type of soil in dry or wet areas, hot or cold areas, irrigated or not. This wide range of requirements covered by zoning forage species, and within each species, by zoning varieties (VARGA. P. et al., 1998).

Experiments with varieties or hybrids have a permanent character, because every year there are new varieties and hybrids both nationally and internationally, which require to be tested before being put into practice culture in a given area. These experiments are primarily aimed at identifying the most valuable crop in terms of production capacity, quality and other traits of agricultural interest (CIULCA S., 2006).

MATERIAL AND METHODS

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.

The biological material studied is represented by foreign varieties of Lolium perenne, namely Calibra (referred to aslo as Lp2). Sowing was made on 03.10.2007, with a distance of 12.5 cm between rows. Planting density was 1280 germinabile seeds/m^2. Seeding depth was 2.5 cm.

The experience is placed in accordance with the randomized blocks method, in three repetitions, a parcel surface is 20 m^2 (5m x 4m).

Assessment of quantitative characters of production components was achieved based on biometric measurements from 10 plants in each plot - repetition, in 2009. Thus, determinations were made on plant morphology, namely vegetative shoot height, number of shoots, the plant weight and foliar surface. Determination of morphological characteristics (length and width of leaves, plant height) was made using a scale rule.

Interpretation of data obtained from the measurements mentioned above was processed by conventional methods of statistical analysis (correlation and regression analysis).

RESULTS AND DISCUSSION

The analysis of linear correlations is a vital process, allowing us to combine a in a mathematical methodology the biological and dimensional aspects of *Lolium perenne*. This paper analyses the dependence between the main morphological characters (harvested in phenophase 59, in accordance with BBCH) for variety Calibra of *Lolium perenne*. We studied them in order to assess their potential under the conditions at Timişoara

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

- Lp2 NrFr – number of shoots,
- Lp2H - plant height,
- Lp2G - plant weight,
- Lp2SF - foliar surface.

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

We can notice a significant positive linear correlation between the plant height and the number of shoots (coefficient of correlation 0.98); the plant height and the plant weight (coefficient of correlation 0.97); the number of shoots and the plant weight, (coefficient of correlation 0.99).

The correlation between plant weight and other two characters (namely the number of shoots and the plant height respectively), is positive.

Table 1

Correlation matrix between principal production characters for Calibra

Correlation matrix between principal production characters for Calibra						
	Means	Std.Dev.	Lp2NrFr	Lp2H	Lp2G	Lp2SF
Lp2NrFr	46,3000	3,88873	1,000000	0,987884	0,990641	0,068464
Lp2H	37,0440	3,23180	0,987884	1,000000	0,979359	0,084524
Lp2G	471,2500	42,94394	0,990641	0,979359	1,000000	-0,000800
Lp2SF	33,3720	8,99946	0,068464	0,084524	-0,000800	1,000000

The only exception is the character foliar surface, where the correlation with the plant weight is negative and statistically insignificant (coefficient of correlation -0.54).

Thus, for variety Calibra 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 the plant weight, the plant height, the number of shoots per plant and the foliar surface are presented intuitively in Figure 1.

Based on the linear correlations, we established functional dependences between pairs of the variables that are well correlated: Lp2 NrFr – number of shoots, Lp2H – plant height, Lp2G- plant weight.

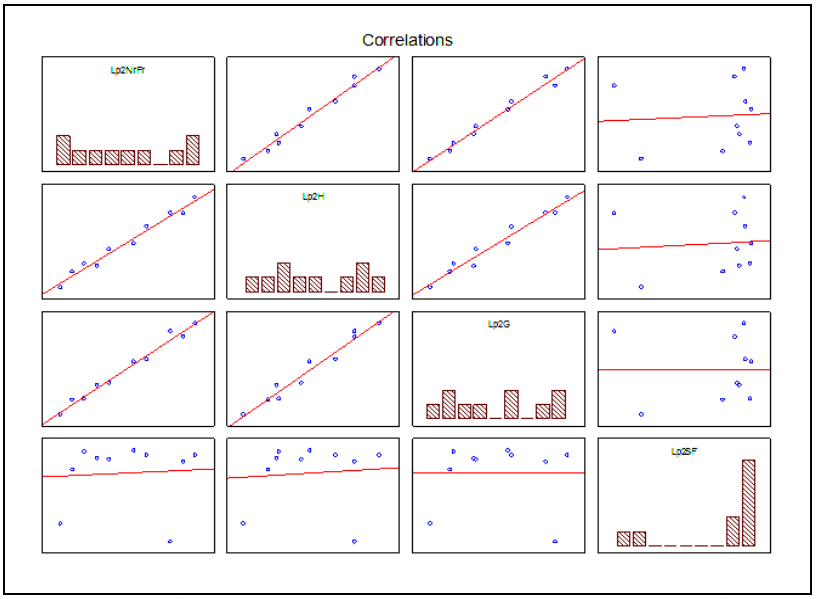

Figure 1. Graphs of linear correlations between principal production characters for Calibra

We performed a linear regression analysis of plant weight bades on the number of shoots per plant for variety Calibra (see Table 2). We found that the variation proportion of the number of shoots per plant (78,45) was statistically significant (F = 2,02, 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.

Table 2

ANOVA for the linear regression coefficients of the plant weight depending on the shoot numbers for Calibra

ANOVA for the linear regression coefficients of the plant weight depending on the shoot numbers for Calibra					
	SS	Degr. of - Freedom	MS	F	p
Intercept	78,45	1	78,45	2,0296	0,192077
"Lp2NrFr"	16288,41	1	16288,41	421,3953	0,000000
Error	309,23	8	38,65		

The regression equation y = ax+b was used to describe in the best way the dependence of plant weight based on the number of shoots for variety Calibra of *Lolium perenne* (see Figure 2). Thus, the plant weight – Lp2G - was expressed on the number of shoots for variety Eminent – Lp2NrFr by the equation

$$Lp2G = -35,26 + 10,94*Lp2NrFr.$$

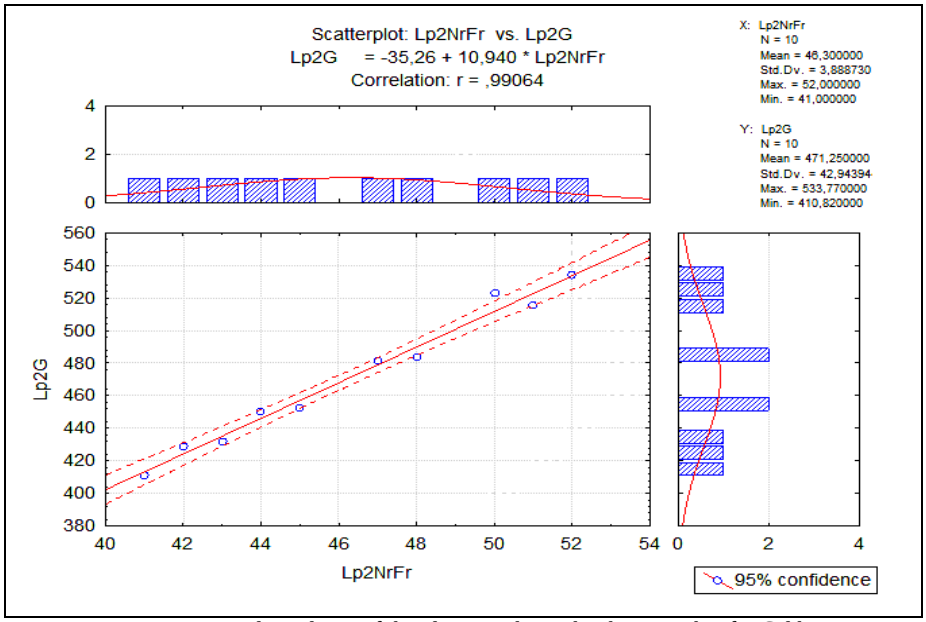

Figure 2. Linear dependency of the plant weight on the shoot number for Calibra

Figure 2 clearly shows that for variety Calibra there is positive linear correlation between the plant weight and the number of shoots (correlation coefficient 0.99); the more number of shoots, the bigger plant weight will be. Confidence intervals (95%) for regression coefficients were (-92,3434; 21,81575) and (9,7109; 12,16875).

We performed a linear regression analysis of the plant weight based on the plant height for variety Calibra (see Table 3). Thus we established that the variation proportion of the number of tillers (7,98) was statistically significant (F = 0,09, 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.

Table 3.

ANOVA for the linear regression coefficients of the plant weight depending on the height for Calibra

ANOVA for the linear regression coefficients of the plant weight depending on the height for Calibra					
	SS	Degr. of - Freedom	MS	F	p
Intercept	7,98	1	7,98	0,0941	0,766865
"Lp2H"	15919,51	1	15919,51	187,8058	0,000001
Error	678,13	8	84,77		

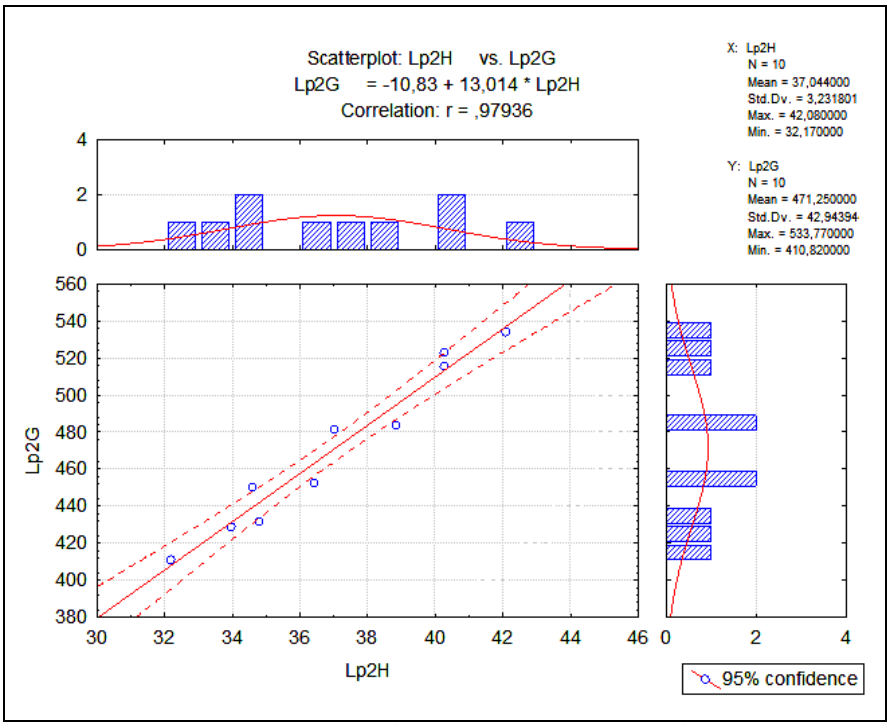

Figure 3. Linear dependency of the plant weight on the height for Calibra

The regression equation y = ax+b was used in order to express in the best way the dependence of the plant weight on the plant height for variety Calibra of *Lolium perenne* (see Figure 3). Thus, the plant weight – Lp2G - was expressed on the plant height for variety

Calibra – Lp2H - by the equation

$$Lp2G = -10.83 + 13.014*Lp2H$$

Figure 3 clearly shows that for variety Calibra there is a positive linear correlation between plant weight and plant height (correlation coefficient 0.97); the more plant height increases, the more plant weight will increase. The confidence intervals (95%) for the regression coefficients were (-92,2239;70,56879) and (10,8238; 15,20345).

CONCLUSIONS

After analysing variety Calibra of *Lolium perenne*, we can conclude that there is a positive linear correlation between plant weight and the number of shoots (correlation coefficient 0.99). There is also positive linear correlation between plant weight and plant height (correlation coefficient 0.97), but there is statistical insignificant, negative correlation between plant weight and 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 Calibra of *Lolium perenne*.

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