SELECTION OF SOME RESISTANCE FORMS IN SPECIES *PHLEUM PRATENSE* L. AND *LOLIUM PERENNE* L., USED IN MIXTURES FOR LAWNS BASED ON SENSITIVITY INDEX AT SOIL ACIDITY

SELECŢIA UNOR FORME REZISTENTE ÎN CADRUL SPECIILOR *PHLEUM PRATENSE* L. ŞI *LOLIUM PERENNE* L., UTILIZATE ÎN AMESTECURILE PENTRU GAZON, PE BAZA INDICELUI DE SENSIBILITATE LA ACIDITATEA SOLULUI

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Abstract. *Fertilization with nitrogen, in particular with fertilizers based on ammonium, imposed by a qualitative and neat lawn, helps to increase soil acidity as a result of nitrificării. In the intensive fertilization of soil, the acidity can become problematic because nitrogen fixation is increasing rizosfera acidity as a result of excessive retention of cation. In addition, acid rain causes an accentuation of soil acidity in many regions (SAMAC and TESFAYE, 2003). Given that the focus is increasingly on improving areas of green spaces, to obtain new biological forms - varieties of the main species for lawn grasses, with greater resistance to increased acidity of land, can represent an important research objective for companies' producing seed of this kind researches. Thus, in the present paper, are played on research testing the response to acidification of soil, two species of grasses, which represents the ideal partner for simple and complex mixtures of grass.*

Key words: lawn specia, acid resitance, amelioration, stress sensitivity index, variation analysis

Rezumat. *Fertilizarea cu azot, în special cu îngrăşăminte pe bază de amoniu, impusă de cerinţele unui gazon de calitate şi aspectos, contribuie la creşterea acidităţii solului, ca urmare a nitrificării. În condiţiile fertilizări intensive aciditatea solului poate deveni problematică deoarece fixarea azotului măreşte aciditatea rizosferei, ca urmare a reţinerii excesive a cationilor. În plus, ploile acide determină o accentuare a acidităţii solului în multe regiuni (SAMAC and TESFAYE, 2003). În condiţiile în care se pune accent tot mai mare pe mărirea suprafeţelor de spaţii verzi, obţinerea de noi forme biologice – soiuri la principalele specii de graminee pentru gazon, cu rezistenţă sporită la aciditatea crescută a terenurilor poate reprezinta unobiectiv important al cercetărilor companiilor producătoare de sămânţă de acest fel. Astfel, în lucrarea de faţă, sunt redate cercetări privind testarea reacţiei la gradul de acidificare a solului, la două specii de graminee importante, care reprezintă parteneri ideali pentru amestecurile simple şi complexe de gazoni.*

Cuvinte cheie: specii de gazon, rezistenţă aciditat, ameliorare, indice sensibilitate stress, analiza varianţei

INTRODUCTION

Lawn establishment is done in many cases through direct sowing. In most cases the nature of the land is not suitable, being degraded as a result of construction work, pressed and covered with debris, stones, brick and so one. Thus, there is a very careful cleaning, then the drainage is done properly. In this situation contribution of earth borrowing in layers of 10-20 cm being mandatory, (Florincescu Adriana, 1999). In most of the cases the borrowing earth has a high acidity due to the fact that it derives from other foundations building or from the forest outskirts.

Future owners of the lawns installed in this way either without knowing or due to lack of time, applies a mineral fertilization (usually early spring) and then proceed to the sowing itself, without submiting the germination substrate to a pH correction.

Thus, in short, we tried to imagine a short scenario of what happens many times and has as consequence the obtaining of an average lawn, with many yellow spots and low degree of twinning.

As a conclusion, what is stated above, the development of genotypes resistant to acidity and aluminum in particular the mobile, the main stress factor in acid soils, is a growing concern of the current improvement programs.

This objective is also an issue on which the presented study tries to find a solution. Thus, we propose a short presentation of the experiments that are part of broader research project, funded through PN II, which aims to identify new genetic resources resistant to drought and acid plants of perennial pastures, in order to recovery areas affected by these phenomena. In this sense, the species that we have awakened interest were *Phleum pratense* L. and *Lolium perenne* L. diploid, with five biotypes on the market or selected by us, the more so as they are used in different mixtures lawn.

MATERIAL AND METHOD

To identify variability and inter-intra specific on soil acidity tolerance was organized an polifactorial experiment in pots. There were taken into study two species of perennial grasses adapted to temperate continental climate.

Experimental factors were:

- The biotype, with 2 grades:

1. Phleum pratense L. (known from now on as PHL) with 5 biotypes: 34R00, 10010, 10385, 14R00 şi 1Bv00;

2. Lolium perenne L. diploid (known from now on as LPD) with 5 biotypes: Mara, 2002, 20020, 20062 şi 2003 şi

- Substratum pH-ul , with two grades: acid (A) pH=4 and neutral (N) pH=6,7

The experiment was conducted in the greenhouse covered with polycarbonate at a temperature of 22-250C during the day and 12-150C during the night. Atmospheric humidity was maintained at 70-80%. There were sown approximately 150 seeds of each provenance in a neutral substratum. After about a month and half were prick plantule with a twig, in multipot plastic pots (6 x 6 x 7 cm):

- 64 plants in each biotype in a strong acid substrate (pH = 4), consisting of 25 g (dry weight) / acid peat mash "Plantobalt sphagnum Moss"
- 48 plants in each biotype in a neutral substrate (pH = 6.7), consisting of 25 g (dry weight) / peat mash neutral "may Plantobalt filling substrate (both substrates produced in Plantafor Hummus Verkaufs GmbH, Germany).

Plants of each provenance were placed together in a design of split-plot with four randomized rehearsals. Main plot is represented by the biotype and the parcel by acid substrate. Placing each repetition was changed regularly to eliminate errors due to microclimate. Experimental conditions and the work of care were the same as during the sowing - pricking.

The first measurements were made after approximately 30 days after transplantation into pots, the scale of individual plants at 2 cm from the package. There were carried out quantitative measurements, on the average green weight, for samples collected from the neutral substrate and harvested for the acid substrate (denoted Fyn and FYA). Similarly, it was calculated and the average dry weight of each sample, which was determined by drying in the drying stove at 1050C for 48 hours and then weighed. This time the scoring was done for the DMN which originated from the neutral substrate and the DMA for the acid substrate.

To detect the most tolerant biotypes to acid soil, were taken into account both absolute and percentage values of the substrate acid productivity and the stress sensitivity index, calculated according to the formula of Fisher and Maurer (1978):

$$S = (YN – YS) / (YN * D)$$

where:

S- stress sensitivity index; YN- variation production in normal conditions; YS- variation production in stress conditions; D- stress intesityintensitatea stres -ului

$$D = 1 – YSM / YNM$$

where: Y_{SM}- medium production of all variation in stress conditions; Y_{NM}- production of all variation in normal conditions

In table 1 were calculated two indices of stress sensitivity, meaning the acidity in our case. An index was calculated based on mass production of green, marked with SMV and another based on the production of dry matter, noted SMU.

To have a clear picture of the values recorded in the index of the acid sensitivity, experimental results were used by interpretation using statistical analysis variant. Thus, by calculating the limit differences were seen real and significant differences between experimental variants and media experience. The determination of these elements was based on indications found in the methodological literature (Ardelean and Sestraş, 1996).

RESULS AND DISCUSSIONS

Data obtained from measurements for the production of green mass and dry, for evidence from the neutral substrate and the substrate on the acid, were grouped in the summary table 1. Also in this table are recorded data and calculated the index of sensitivity to acidity.

Table 1

Yields average values of green and dry weight obtained in the study biotypes taken on neutral and acid substrate, and the sensitivity index to acidity

No. crt	Biotype	FYN (g/plant)	FYA (g/plant)	SMV	DMN (g/plant)	DMA (g/plant)	SMU
1.	PHL 34R00	21.93	1.05	1.000	4.43	0.31	1.002
2.	PHL 10010	27.59	0.93	1.015	5.12	0.28	1.019
3.	PHL 10385	23.29	1.53	0.981	4.17	0.45 *	0.961
4.	PHL 14R00	20.12	0.97	0.999	3.97	0.27	1.004
5.	PHL 1Bv00	24.64	1.11	1.003	4.59	0.30	1.008
6.	**PHL average**	**23.514**	**1.118**		**4.456**	**0.321**	
7.	LPD Mara	10.35	1.35	1.009	2.39	0.40	1.019
8.	LPD 2002	11.00	1.74	0.977	2.35	0.47	0.978
9.	LPD 20020	10.66	1.55	0.992	2.42	0.47	0.988
10.	LPD 20062	9.06	1.29	0.995	2.15	0.39	1.002
11.	LPD 2003	12.11	1.43	1.024	2.71	0.47	1.012
12.	**LPD average**	**10.636**	**1.472**		**2.404**	**0.438**	

In tables 2 and 3 are grouped synthetic meanings differences calculated values for the index of sensitivity to acidity.

Table 2

Statistical interpretation of the sensitivity index to acidity calculated according to the mass of green production

No crt.	Biotypes	Sensitivity index	Relative values compared with experiment average	+/- d compared with experiment	Difference significance
1.	***Phleum pratense***				
2.	PHL 34R00	1,00	100,04	0,0004	-
3.	PHL 10010	1,015	101,5406	0,0154	*
4.	PHL 10385	0,981	98,13926	-0,0186	ooo
5.	PHL 14R00	0,999	99,93998	-0,0006	-
6.	PHL 1Bv00	1,003	100,3401	0,0034	-
7.	DL 5% DL 1% DL 0,1%		0,011732746 0,017766730 0,028541701		
8.	***Lolium perenne* diploid**				
9.	LPD Mara	1,009	100,5581	0,0056	**
10.	LPD 2002	0,997	99,36217	-0,0064	oo
11.	LPD 20020	0,992	98,86386	-0,0114	ooo
12.	LPD 20062	0,995	99,16285	-0,0084	oo
13.	LPD 2003	1,024	102,053	0,0206	***
14.	**LPD average**	1,00	100		
15.	DL 5% DL 1% DL 0,1%		0,003578 0,005419 0,008705		

Subunit values of these indices show a sensitivity tolerance factor to increased stress tolerance more than the index value is lower. Therefore, we can say that the biotypes to which real differences are negative and significant opportunities of research in the direction of improvement desired.

Table 3

Statistical interpretation of the sensitivity index to acidity calculated according to dry production

No crt.	Biotype	Sensitivity index	Relative values compared with experiment average	+/- d compared with experiment	Difference significance
16.	***Phleum pratense***				
17.	PHL 34R00	1,00	100,04	0,0004	-
18.	PHL 10010	1,015	101,5406	0,0154	*
19.	PHL 10385	0,981	98,13926	-0,0186	ooo
20.	PHL 14R00	0,999	99,93998	-0,0006	-
21.	PHL 1Bv00	1,003	100,3401	0,0034	-
22.	DL 5% DL 1% DL 0,1%		0,011732746 0,017766730 0,028541701		
23.	***Lolium perenne* diploid**				
24.	LPD Mara	1,009	100,5581	0,0056	**
25.	LPD 2002	0,997	99,36217	-0,0064	oo
26.	LPD 20020	0,992	98,86386	-0,0114	ooo
27.	LPD 20062	0,995	99,16285	-0,0084	oo
28.	LPD 2003	1,024	102,053	0,0206	***
29.	**LPD media**	1,00	100		
30.	DL 5% DL 1% DL 0,1%		0,003578 0,005419 0,008705		

- obtained real difference is significant ** difference is true separately obtained significant *** difference obtained is very real and significant - the difference is not significant and real difference is negative 0.

Calculation of sensitivity and index analysis indicates the variant of these two species a wide variability intra-and inter specific (Table 2 and 3). Relative values of production substrate acid production from neutral substrate varies from a minimum of 0.977 g / plant (LPD 2002) to a maximum of 1,024 (LPD 2003) for green table and a minimum of 0,961 (PHL 10385) to a maximum of 1,019 (PHL 10010 and Mara LPD) for dry mass.

The interpretation of results through statistical analysis of variant forms have sought to highlight the distinct differences significantly negative compared with the average experience, because those have an index that is low stress tolerance acceptable acidity.

CONCLUSIONS

Calculate the sensitivity index to acidity, based on calculations of the production of green mass and dry matter in the five species of perennial grasses of meadows studied, allow the following conclusions:

In species *Phleum pratense*, in both mass production of green and for the production of dry, just biotypes PHL 10385 falls within the parameters of the experiment they seek. It just shows the difference of index-sensitivity very significantly negative, representing a starting point for improving the program that is intended to be started.

In *Lolium perenne* diploid species, two of the five biotypes LPD 2002, LPD 20062, significant differences separate negative and biotipul LPD 20020 differences are very significant negative. Data they read from tables 1.2 and 3 are quite interesting in the sense that the two biotipuri LPD 2002, LPD 20,020 from the mass production of green are located on the second and third, which is different from what we have seen so far in the sense that biotypes with high tolerance to acidity have the lowest yields. Therefore the two biotypes open premises creating new forms, which show a high degree of tolerance to an acid and to achieve a satisfactory production.

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