CORRELATIONS BETWEEN PRODUCTIVITY ELEMENTS IN *Lolium perenne* L. SPECIES FOR NEW VARIETIES RESISTANT TO DROUGHT

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Abstract. Perennial ryegrass is considered the most important perennial gramineous plant due to the many possibilities of use (grass and fodder) [6, 9, 15].

With the increasing emphasis put on increasing the area of green space, obtaining new biological forms - varieties of the main species of gramineous plants for turf, with increased resistance to drought and land during the summer, may represent an important objective of the research companies producing such seed [6, 7].

In the present study, are given researches on correlations between productivity elements, obtained in an experiment that simulates conditions of severe drought soil, to different genotypes of the species *Lolium perenne L.,* which is an ideal partner for simple and complex mixtures of turf.

Establishment of correlations between key elements of productivity show to the breeder, in the selection work, choice of valuable genotypes consistent with the objectives of its program.

Keywords: grass seed, drought resistance, improvement, correlations, diploid and tetraploid genotypes.

INTRODUCTION

Species *Lolium perenne* L., synonym with lawn grass, is a perennial gramineois plant, with a common spreading in permanent grassland areas or river valleys [15]. In culture, are used in complex mixtures for lawn and the creation of temporary grassland exploited by grazing or mixed [5].

To design a improvement program to perennial ryegrass, we have to consider and study the correlations established between seed production and productivity elements in *Lolium perenne* L. (Perennial ryegrass) with different degrees of ploidy [1].

The results presented include studies on original material improvement (ecotypes, populations, species), used as valuable sources for creating new synthetic varieties. Biological material was studied in the selection fields both at the experimental plot and individual plant level. The results of this study concern the biological potential of building upon and correlations that are established between seed production and some phenotypic characters and qualities which we call elements of productivity.

MATERIALS AND METHODS

To calculate inter- and intra specific correlations on soil drought tolerance was organized poly factorial experiment in pots [3]. Of the *Lolium perenne* L. species were studied 5 biotypes of diploid form and 5 biotypes of tetraploid form.

On 5 March, they planted in plastic boxes, filled with a light horticultural substrate, about 250 seeds of each biotype. Rose plants were watered, fertilized, prick out in plastic pots with 13 cm diameter (0.95-liter capacity) filled with natural soil (chernozem luvic, clay-sandy texture, pH 7.3). After transplanting pots were removed from the glass house on a concrete platform, abundantly watered for 30 days. On 18 June the plants were clipped at 2 cm from the package and transplanted into pots with a diameter of 16 cm, depth 23 cm and 3-liter capacity [10]. After transplantation, for 60 days plants were maintained by regular watering, fertilization and weeding weeds. No pesticides were applied to control weeds, diseases or pests. On 15 September (approximately 200 days after sowing) the plants were moved to pots in a greenhouse system requiring fluid and heat stress and were arranged in five randomized repetitions of each of 40 plants per provenance. Each repetition was placed in another part of the greenhouse to reduce errors due to microclimate. For the same reason it was changed how the pots were placed within each group, every 10 days. After placing pots in a greenhouse, were abundantly watered (field capacity), followed by a period of 40 days of fluid and heat stress [11].

Selected individual plants were planted in isolated polycross's rye field, during the month of November, to cross and get hybrid seeds in the summer of next year. Seeds of the remaining plants were harvested separately on the plant.

Measurements were made on average seed production and productivity factors which contribute to its achievement. This contributed to establish the correlation coefficients, using as guidance the formulas of literature data [2]. Calculating the correlations coefficients among the main elements of productivity, show to the breeder, in the selection work, choice of valuable genotypes consistent with the objectives of his program [3].

RESULTS

Productivity elements taken into account are: no. of sets/ flowered/ m²; no. of spikes/ inflorescence; no. of seeds/spike; no. of seeds/ inflorescence and MMB (Mass of a thousand seeds).

In Table 1 and Table 2 are shown, in a synthetic way, the measurements for the phenotypic characters, undertaken in summer.

Table 1. Seeds production and productivity features Values to diploid genotypes of *Lolium perenne* L.

No.	Genotype	No. spikes/ inflorescence	No. of seeds / inflorescence	No. seeds/ spike	No. sets/flowered m²	Quantity of Seeds (grams/plant)	Seed production/ha	MMB (g)
1	LPD Mara	21.16	80.58	5.08	1669	17.5	391.66	1.52
2	LPD 2002	17.91	64.50	5.08	1567.5	13.8	384.16	1.86
3	LPD 2003	20	87.66	5.75	1843.5	16.8	602.5	1.77
4	LPD 20020	21.16	79.58	5.08	1465.08	18.8	399.16	1.63
5	LPD 20062	18.69	81.92	5.37	1722.79	15.70	563.05	1.65

The measurement results show that for the studied genotypes of *Lolium perenne* L, diploid type, seeds production varies a lot from a genotype to another, remarkable particularly for LPD 2003 and LPD 20062. These two, produce in the first year 602.5 kg/ha and 563.5 kg/ha.

Table 2. Seeds production and productivity features Values to tetraploid genotypes of *Lolium perenne* L.

No.	Genotype	No. spikes/ inflorescence	No. of seeds / inflorescence	No. seeds/ spike	No. sets/ m²	Quantity of Seeds (grams/plant)	Seed production/ha	MMB (g)
1	LPT 31A99	20.91	81.66	5.33	945.60	18.90	603.33	3.04
2	LPT 40026	17.16	50.25	4.25	990.49	20.10	515.00	3.20
3	LPT 40019	18.01	52.75	4.46	1039.77	21.10	540.62	3.36
4	LPT 30A99	16.99	49.75	4.21	980.63	19.90	509.88	3.17
5	LPT 40021	14.51	42.50	3.59	837.73	17.00	435.57	2.71

At tetraploid genotypes are highlighted seed yields of 603.33 kg / ha and 540.62 kg / ha. These are achieved by LPT 31A99 and LPT 40,026.

The correlation coefficients, calculated at species levels, are presented in Table 3. They show the influence of productivity factors on seed production.

Table 3. Correlations established between all productive characters measured from *Lolium perene* L genotypes.

No.	Character	No. spikes/ inflorescence	No. seeds/ spike	No. sets/flowered m²	Quantity of seeds (grams/plant)	Seed production kg/ha	MMB (g)
1.	No. spikes/ inflorescence	0.94**	0.998**	0.48	0.41	0.99**	0.46
2.	No. seed/ inflorescence	N/A	0.97**	0.64*	0.62	0.86**	-0.55
3.	No. seeds/ spike	N/A	N/A	0.66*	0.59	0.99**	-0.44
4.	Nr. sets/flowered/ m²	N/A	N/A	N/A	0.98**	0.41	-0.84^{00}
5.	Quantity of Seeds (grams/plant)	N/A	N/A	N/A	N/A	0.30	-0.94^{00}
6.	Seed production kg/ha	N/A	N/A	N/A	N/A	N/A	-0.10

Note: * - positive significant, ** - positive distinct significant, 0 - negative significant, 00 - negative distinct significant

The results obtained by calculating the correlation coefficient between all the characters which underwent productive measurements in genotypes of *Lolium perenne* L., have shown the positive distinct significantly correlation in the following cases:

- Between the no. of seeds/inflorescence and no. of spikes/inflorescence, with a coefficient of 0.94;
- Between no. of seeds/spike and no. of spikes/ inflorescence, with a coefficient of 0.998;
- Between no. of seeds/spike and no. of seeds/ inflorescence, with a coefficient of 0.97;
- Between seed production and no. of spikes/ inflorescence, with a coefficient of 0.99;
- Between seed production and no. of seeds/ inflorescence, with a coefficient of 0.86;
- Between seed production and no. of seeds/spike, with a coefficient if 0.99;
- Between seed quantity and no. sets/ m², with a coefficient of 0.98.

Positive significantly correlation appeared in two situations:

- Between no. of sets/ m² and no. of seeds/ inflorescence, with a coefficient of 0.64;
- Between no. sets/ m² and no. of seeds/spike, with a coefficient of 0.66.

Negative distinctive significantly correlation appeared at MMB with no. of sets/ m², with a coefficient of – 0.84 and a seed quantity (grams/plant), with coefficient of -0.94.

DISCUSSIONS

This experiment complements a broader study of the species used for lawns, the finding of genetic resources resistant to drought [10, 11, 12]. Identify correlation between these elements is very important work to improve, to facilitate the process of selecting the most valuable genotypes and reduce the time for obtaining new variety [13]. From the theoretical study of the correlations are remarkable opportunity to combine a mathematical methodology, modern biometric aspects of the plant, moving from subjective observations, a precise quantitative expression [14].

After tests on a series of morph-physiological characteristics and productivity of plants grown on environments with high drought conditions, both diploid and tetraploid genotypes were selected. These genotypes corresponded to improvement objectives.

Study variability in *Lolium perenne* was reported in 2007 [8]. Showed that such strains have appeared early short inflorescens, with a lower number of panicule and small seeds. Still not clear seed production ultimately obtained. The analysis of our results show that high seed production, at unit area, of the genotypes considered for the study, generally is done taking into account the number of sets a blossom, the number one seed from inflorescence and number of seed a spike.

Yield important multiplication by seed and showed in 2010 [4], defining it as a trait of major interest to the

species of turf grass and forage. Seed multiplication by relevant for new varieties of grass and received attention from economically. In this direction we showed that the appearance of a high quantity of seed per plant depends on the number of shoots floriferi meters and leads to a decrease in the thousand grain weight.

Among the characters studied, a high number of seeds in inflorescence, a high number of seeds in a spike and a high number of spikes in inflorescence are in a positive correlation with the realized yield, hence increasing the chances of improvement projects.

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