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DIPLOID AND TETRAPLOID VARIETIES OF THE *LOLIUM PERENNE* BEHAVIOR, UNDER THE INFLUENCE OF STORAGE YEARS AND STORAGE CONDITIONS

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Abstract

The value of the Lolium perenne seeds' quality parameters are influenced by a large number of internal and external factors. The analyzed factors are: the variety, storage conditions and storage period of the varieties analyzed. Most of these factors can be influenced and controlled by humans. A great importance regarding maintaining the seed quality of the varieties of Lolium perenne seeds, during the storage period, is represented by the storage condition and genetic information (diploid or tetraploid varieties). For the diploid varieties, the final count- germination decreases with seeds aging in uncontrolled environment, and for tetraploid varieties increases in the same conditions. The influence of the storage conditions upon the final -count germination, soil germination and field emergency for the diploid varieties is stronger than upon the tetraploid varieties. The soil germination and field emergency decreases with seeds aging for the diploid varieties and stays constant for tetraploid varieties

INTRODUCTION

The germination in the laboratory (soil and paper tests) and field emergency of the *Lolium perenne* seeds is represented by the totality of processes happening in the embryo while it passes from latent life to active life. It is known that only with a good quality seed, the result expected from this important forage plant can be obtained. In this project, I have deepened the study of this quality parameter for diploid and tetraploid varieties.

MATERIAL AND METHODS

For the study 8, varieties of *Lolium perenne* were used: Mara, Calibra, Kaiser, Lorenz, Marta, Măgura, Summit and Tove. The seed of all the varieties studied was obtained from the year's 2005 production and the samples used were extracted from certified biological category seed lots.

A material as homogeneous as possible regarding the quality indexes was used, so that the biological purity had values higher than 96%, the percentage of foreign seeds was situated between the legal limits (less than 1.5%), and the initial humidity of the lots was situated between 11.6%-12.8%. The 8 varieties were considered 8 variants. In the year 2005, laboratory tests were made to determine the initial germination (energy and germination capacity). Both the ensured conditions in the seeds growing period, and their evaluation were made according to the ISTA rules.

After making the tests in the vintage year, the samples were mixed and divided resulting two homogeneous sub-samples with the same weight, for each of the varieties studied. A set of sub-samples was kept in controlled environment (temperature under 10 ^{0}C, and relative air humidity under 50%), and the other set of sub-samples was kept in uncontrolled environment, in a space in which the temperature and relative air humidity were changing depending on the season. On both sets of sub-samples germination was determined (energy and germination capacity) for 3 years (2006, 2007, 2008).

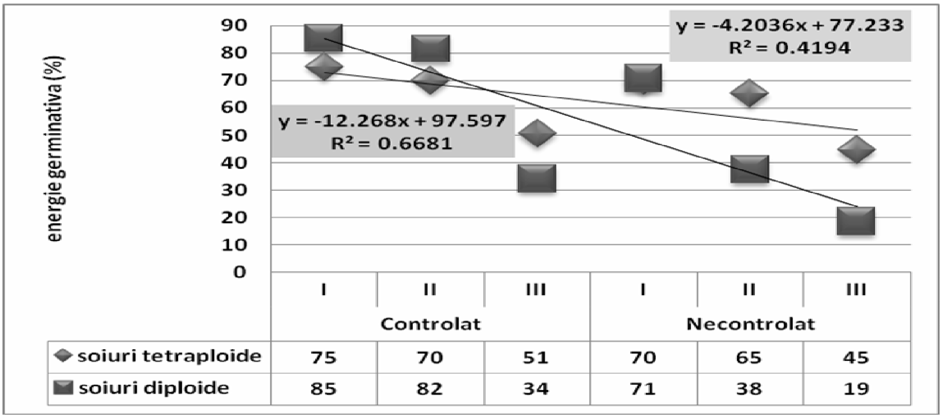
When determining the germination for each variant, the laboratory test was made on 4 repeats of 100 seeds. The germination layer used, was filter paper TP (paper layer), in temperature and light conditions of 20 ^{0}C. The evaluation of the seeds was made in 5 days (first-count germination) and 11 days (final-count germination). For soil germination was used the same condition for growing but the paper was changed with a mixture soil and sand (1:1). The field emergency was tested in small plots 25 x 25 cm in the field and the evaluation was performed at 11 days after planting.

RESULTS AND DISCUSSION

Concerning the first count germination, for the diploid varieties in comparison with the tetraploid varieties, through the same interaction: storage conditions x storage period various aspects are highlighted, such as (Figure 1):

- The first count germination of diploid varieties in controlled environment has higher values than the tetraploid varieties.
- Both regression lines, for the tetraploid and diploid varieties have the same gradient descent, which means that the first count germination decreases as the seed ages and the storage environment is no longer controlled.
- The influence of the storage years and storage conditions upon the first count germination is more powerful for diploid varieties, where the determination coefficient has a value of 66.8% towards 41.9% for tetraploid varieties.
- For diploid varieties, for each increase of the “x” with one unit (storage conditions x years of storage interaction) the first count germination decreases by 18.27% for diploid varieties and for tetraploid varieties by

4.20%. This leads to the conclusion that the diploid varieties lose their first count germination more than tetraploid varieties, in the studied varieties.



	Controlat I	Controlat II	Controlat III	Necontrolat I	Necontrolat II	Necontrolat III
soiuri tetraploide	75	70	51	70	65	45
soiuri diploide	85	82	34	71	38	19

Fig. 1. Influence of the storage conditions x storage years interaction upon the first-count germination of diploid and tetraploid varieties

From the chart of storage conditions x years of storage interaction, for the final count germination comparing the diploid and tetraploid varieties, there are some aspects to be noted (Figure 2):

- Final count germination, for diploid varieties in controlled environment, has higher values than for the tetraploid varieties. In uncontrolled environment it has lower values than for the same tetraploid varieties.
- The regression line for diploid varieties has a gradient descent, while the line of the tetraploid varieties is descending. This leads to the conclusion that the final count germination decreases as the seed ages and the environment is no longer controlled for the diploid varieties, but it decreases in the same conditions for the tetraploid varieties.
- The influence of storage years upon the final count germination is more powerful for diploid varieties where the determination coefficient has a value of 74% towards 62% for tetraploid varieties.
- For diploid varieties, for each increase of the "x" with one unit (storage conditions x years of storage) the final count germination decreases by 6.31% but it increases by 8.8% for the tetraploid varieties.

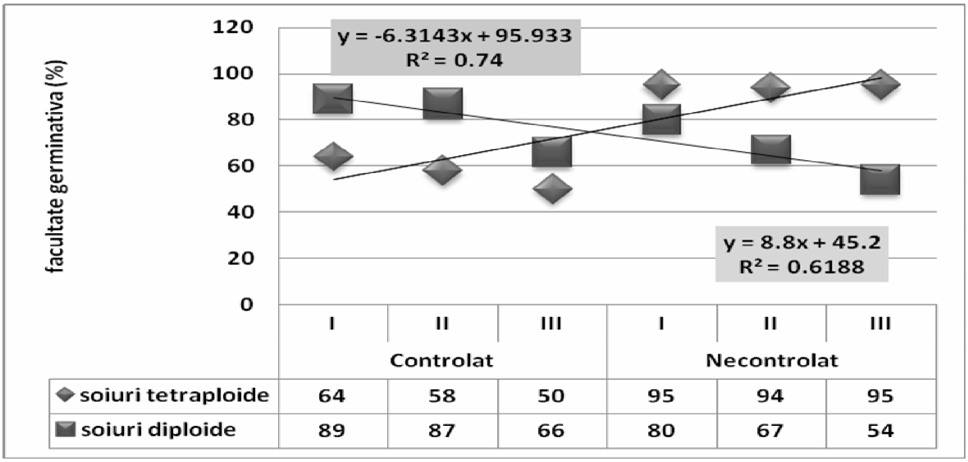


Fig. 2. Influence of the storage conditions x storage years interaction upon the final- count germination of diploid and tetraploid varieties

Soil germination, comparing the diploid and tetraploid varieties is characterized as following (Figure 3):

- Soil germination for diploid varieties, in controlled environment has higher values than for the tetraploid varieties.
- The regression line for the diploid varieties has a gradient descent, while for the tetraploid varieties the descent is linear, which leads to the conclusion that the soil germination for the first variety categories decreases as the seed ages and the storage environment is no longer controlled. For the tetraploid varieties it is almost constant, the amplitude being of 9% (the highest value - 75% in controlled environment in the first storage year, the lowest value - 66% in uncontrolled environment, in the third year of storage).
- The storage conditions and storage years' influence upon the soil germination is approximately equal for the two varieties, the determination coefficient being of 71.9% for the diploid varieties and of 70.7% for the tetraploid varieties;
- For the diploid varieties, for each increase of the "x" with one unit (storage conditions x years of storage interaction) the soil germination decreases by 6.68% for diploid varieties, while for the tetraploid varieties it decreases by 1.64%.

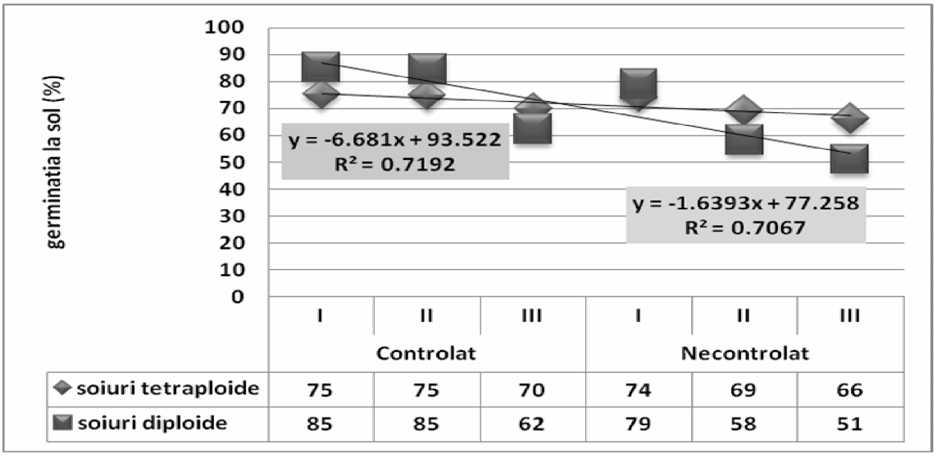


Fig. 3. Influence of the storage conditions x storage years interaction upon the soil germination of diploid and tetraploid varieties

From the chart of the storage conditions x years of storage interaction, for field emergency, comparing the diploid and tetraploid varieties there are some aspects to be noted (Figure 4):

- Field emergency for diploid varieties, in controlled environment, generally has values higher than for the tetraploid varieties and in uncontrolled environment has lower values towards the same tetraploid varieties.
- The regression line for the diploid varieties has a gradient descent, while for the tetraploid varieties the descent is almost linear, which indicates that the filed emergency decreases as the seed ages, and the storage environment is no longer controlled for the diploid varieties, but it is almost constant, regardless of the storage conditions and years of storage for the tetraploid varieties.
- The influence of the storage conditions and years of storage upon the field emergency, is more powerful for the diploid varieties, where the determination coefficient is of 72% towards 48% for the tetraploid varieties.
- For the diploid varieties, for each increase of the “x” with one unit (storage conditions x years of storage interaction) field emergency decreases by 6.40% and for the tetraploid varieties it decreases by 1.2%.

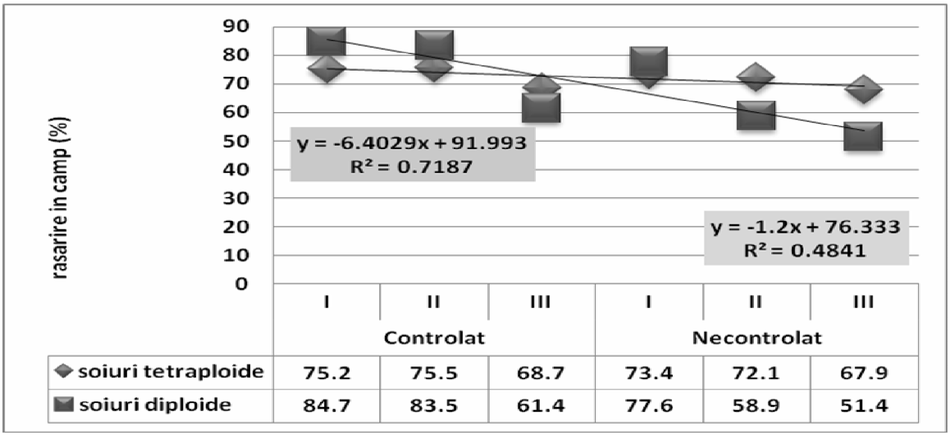


Fig. 4. Influence of the storage conditions x storage years interaction upon the field emergency of diploid and tetraploid varieties

CONCLUSIONS

1. The first count germination, the final count germination, soil germination and field emergency for diploid varieties register higher values in controlled environment, but in uncontrolled environment there are lower values registered towards tetraploid varieties.
2. For diploid varieties, the final count germination decreases as the seed ages and the environment is not controlled. For the tetraploid varieties it increases in the same conditions.
3. The soil germination for diploid varieties decreases as the seed ages and the environment is no longer controlled, while for the tetraploid varieties it is almost constant, the amplitude being of 9% (the higher value, 75% in controlled environment in the first year of storage; the lowest value, 66% in uncontrolled environment in the third year of storage).
4. The field emergency decreases as the seed ages for the diploid varieties and it stays almost constant for tetraploid varieties.
5. The influence of conditions and years of storage upon the soil germination is approximately equal for the two varieties, the determination coefficient being of 71.9% for the diploid varieties and of 70.7% for the tetraploid varieties.

REFERENCES

1. ISTA Rules, 2010. *International Association for Seed Testing*.