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DEPENDENCE QUALITY INDICATORS OF PEPPER SEEDS OF TESTING METHOD

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Abstract

The aim of this study was to determine the dependence on the two most important indicators of the quality of peppers seeds, germination energy and total germination of the test methods. Rating seed germination was performed on two different substrates (filter paper and sand). For the study two hybrids (SK-5 F1 and Atris F1) and one local variety (Elephant's ear) were used. Results of germination energy and total germination studied hybrids and cultivars show significantly ($p=0.01$) higher values on the surface filter paper, compared to the values obtained in the surface sand. The highest average germination energy 82% and total germination 95%, was found in the hybrid SK-5 F1, while the lowest average values of 68% and 77% recorded in the variety Elephant ear. Statistical analysis of the total germination showed significant ($p = 0.01$) difference under the influence of varieties and substrate tests. Between the two test methods for vigor, a significant correlation was established ($r = 0.889$, $p = 0.01$), while for the total germination determined highly significant correlation ($r = 0.987$, $p = 0.001$) was observed. It is very important that the seeds of peppers have a high germination energy and total germination, because uniform germination of seeds depends on them.

Keywords: *Germination energy, total germination, pepper*.

Introduction

Seeds are one of the basic preconditions of successful agricultural production, ie stable, high yields of good quality, and the identification and testing of seed quality is of great importance. Quality of pepper seeds is varietal characteristics and at the same time depends on the biological and agroecological conditions (Gvozdenović et al., 1995). The most important indicator of the quality of seed germination certainly, which is also an indicator of the viability of which depends on the use value of seed (Poštić et al., 2010b). If soil conditions are almost ideal (temperature and soil moisture) seed germination obtained in laboratory conditions is a good indicator of seed vigor on the basis of which can be predicted seeds sprouting in the field (Durrant and Gummerson, 1990). However, germination of seed is not a sufficient indicator of seed quality. In addition to meeting the standards that are prescribed in the rules on the quality of seeds, it is important that the seeds have a high germination energy, especially if you are sowing seeds performs in the open field (mainly in the production of industrial processing) Postic et al., 2010a. In practice, it is very important quick and uniform emergence of plants. Germination energy is an important indicator of quality seeds, which precisely speaks of the ability of seeds for rapid and uniform germination (Veselinov, 1984; Gvozdenović et al., 1995; Poštić et al., 2010a).

If the germination and sprouting of plants slowly, all the greater percentage of seeds and seedlings die because of the attacks of pests and diseases, formation crusts of soil, or the deviation from the optimum conditions for germination. The aim was to carry out assessment of

the two most important indicators of the quality of seeds depending on the different testing methods.

Material and methods

As a material used in the research is the local variety of pepper (Elephant ear) and two hybrids of red peppers in type, strokes, which are grown by us (SK - 5 F1 and Atris F1). Assessment of quality indicators (germination energy and total germination) pepper seeds carried in 2011 and 2012 in the laboratory for testing the quality of seeds of agricultural plants, the Institute for Plant Protection and Environment, Belgrade (Serbia). Used two test methods for determining seed germination: 1) standard laboratory filter paper moistened between 0.2% aqueous solution of KNO_3 and 2) in sterile sand. The seed was incubated for 14 days at a temperature of 20-30 ° C and a relative humidity of 95%. Seventh-day incubation period is estimated germination energy, and 14 total germination, and the number of typical seedlings (ISTA Rules, 2009).

According to the Regulations on the quality of the seed (Gazette SFRJ no. 47/87), the minimum permitted germination of seeds is 65% for release seed on the market, while the Regulations on the medical examination of crops and facilities for the production of seeds, seedlings and planting materials (Gazette RS no. 119/2007) was examined by the health of seed (table 1):

Table 1. Allowed (%) presence pests in the seeds of peppers

Pests	Allowed (%) in the plant material in trade
Fusarium solani	5
Alternaria solani	5
Colletotrichum dematium	5
Rhizoctonia solani	1
Sclerotinia sclerotiorum	1
Phytophtora capsici	0

Obtained results were analysed by the analysis of variance (ANOVA, F-test; $P \leq 0.05$ and $P \leq 0.01$) and effect of factors (year, genotype, method and their interaction). Correlation between observed parameters were determined by Pearson correlation coefficients (r). Data were processed by program STATISTICA, version 8 (StatSoft Inc, Tulsa, OK, USA).

Results and discussion

Analysis of germination energy and total germination of seeds (table 2) showed highly significant differences influenced by the variety factor (G). The impact test methods factor (M) on the germination energy was not statistically significant, while the total germination very significant impact. Very significant interactions studied factors in terms of total germination seed of peppers were obtained with the mutual influence of factors G × M. Significant interactions studied factors in terms of germination energy and total germination were obtained with the cumulative impact factor Y × G × M (table 2).

In hybrids was found higher germination energy and total germination on both substrates, as compared to the variety Elephant ear (table 3). These results are consistent with the results (Poštić et al., 2010a).

Table 2. F-values for observed factors

Factors	Germination energy	Total germination
Year (Y)	ns	ns
Genotype (G)	**	**
Method (M)	ns	**
Y × G	ns	ns
Y × M	ns	ns
G × M	*	**
Y × G × M	*	*

** - significant at 0.01; * - significant at 0.05; ns - not significant

By applying the method to the filter paper was influenced by that germination energy of the tested genotypes increased by an average of 3.5 to 6.0%, compared to the determined germination energy on the medium sands (table 3).
The genotypes showed an average increasing total germination for 7.5 to 12.5% on the medium filter paper, compared to the other tested surface sand.

Table 3. Germination energy and total germination pepper seeds

Method	SK 5 F1		Atris F1		Elephant's ear	
	GE	TG	GE	TG	GE	TG
Sadn	79,75	93,25	74,50	85,50	64,75	71,75
Filter paper	83,25	95,75	80,50	93,00	70,50	81,25
Average	81,50	94,50	77,50	89,25	67,63	76,50

Legend: GE - germination energy, TG - total germination.

The lowest average germination energy 67.6% and total germination 76.5 % was found in the variety Elephant's ear, while the highest germination energy 81.5% and 94.5% total germination founded in hybrids F1 SK 5 (table 3). Germination energy is an important biological properties of the seeds of which depends on the speed and uniformity of germination and emergence (Poštić et al., 2010a). Considering that the largest percentage of pepper seedlings produced in greenhouses without additional heating of the amount of energy depends directly on the seed germination and percentage of emerged plants.

Table 4. The correlation coefficients between the observed traits (n=6)

Germination energy	Total germination
0,889**	0,987***

Pearson correlation coefficient: *** P≤ 0.001, ** P≤ 0.01, * P ≤ 0.05, respectively

Germination is the percentage of seed capable of producing a typical seedlings, that emerge in a field under optimal environmental conditions (Postic et al., 2010a). For predicting field emergence seed total germination is a very reliable indicator. Durrant and Gummerson (1990) found a high correlation (r = 0.75 to 0.97) germination energy and total germination, but only under ideal field conditions.

Statistical analysis of the total germination showed significant ($p = 0.01$) difference under the influence of varieties and substrate tests. Between the two test methods for vigor, a significant correlation was established ($r = 0.889$, $p = 0.01$), while for the total germination determined highly significant correlation ($r = 0.987$, $p = 0.001$) was observed (table 4).

Conclusion

Based on the presented results of testing the quality of seeds studied cultivars and two hybrids of pepper, we can conclude the following:

By applying the filter paper method resulted in higher germination energy of the tested genotypes by an average of 3.5 to 6.0% and an increase in the total germination for 7.5 to 12.5%, compared to the established germination energy and total germination on surface sand.

The higher the value of in hybrids germination energy and total germination will affect faster and more even emergence of seed that will especially be important in the production of pepper seedlings in greenhouses without additional heating.

Estimated indicators of the quality of pepper seeds were above the legally prescribed standards and meet the requirements of putting seeds in the market. Very high quality hybrid seeds of peppers is a good basis to need additional production conditions (soil management, fertilization, irrigation and protection) can be achieved high yields of good quality. It is very important that the seeds of peppers have a high germination energy and total germination, because uniform germination of seeds depends on them.

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References

Durrant, M. J., Gummerson, R. J. (1990): Factors associated with germination of sugarbeet seed in the standard test establishment in the fild. Seed Sci.and Technology, 18, 1-10.

Gvozdenović, Đ., Takač, A., Jovićević, D., Bugarski Dušanka i Červenski, D., (1995): Production of pepper, Proceedings of the Institute, 23, pp. 397 - 403.

ISTA (2009): International Rules for Seed Testing. ISTA, Switzerland.

Rules on the quality of seeds of agricultural plants (1987), Official Gazette of the SFRJ number 47. pp. 1-71.

Rules on health examination of crops and objects for the production of seeds, seedlings and planting materials and health inspection seeds, seedlings and planting materials (2007), Official Gazette number 119.

Poštić, D., Momirović, N., Dolijanović, Ž., (2010a): Evaluation of the quality of pepper seeds. International Scientific Conference, Proceedings, 09-11. December, Jahorina. pp. 405-410.

Poštić, D., Protić, R., Aleksić, G., Gavrilović, V., Živković, Svetlana, Trkulja, N., Ivanović, Ž., (2010b): Seed quality of winter wheat during the period 2000-2005 years, Plant Protection, Institute for Plant Protection and Environment, Belgrade,Vol. 61, pp. 20-24.

Veselinov, E., (1984): Piper, Sofija.