SEED QUALITY OF NEW SOYBEAN VARIETIES PRODUCED IN SOUTH BAČKA IN 2011 YEAR

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ABSTRACT

Newly developed soybean varieties differ from each other in morphological characteristics, requirements for growing conditions and technological quality of seed. The mentioned differences affect quality of seed and its viability. The aim of this paper was to determine seed quality of new soybean varieties differing in protein and oil content, and in maturity groups. Testing of seed quality was carried out on new soybean varieties developed in the Institute of field and vegetable crops in Novi Sad (NS Zenit, NS Virtus, Galina, Valjevka, Diva, NS Maximus, Sava, Balkan, Idila, Rubin, Trijumf and Vojvodanka) in the Laboratory of agricultural expert service in Novi Sad. The following seed quality traits were determined: seed moisture content, bulk density and germination of seed. Seed moisture content determined immediately after harvest ranged from 8.5% to 12.5%, and hectoliter weight from 65.5 kg/hl to 71.3 kg/hl. Statistically significant differences were found among studied varieties. The lowest values of germination were obtained in Sava (78%) and Vojvodanka (79%), and the highest in Rubin (96%) variety, while the seed germination determined by applied cold test was slightly lower.

Key words: soybean, seed germination, seed vigour.

INTRODUCTION

Soybean (Glicine max. L. Merr.) is considered as an important plant species both for human and animal consumption. Wide range of products obtained from soybean seed originates from the presence of protein (aprox. 40%), and oil (aprox. 20%) in seed. Due to that fact, in breeding programs the great attention is paid to development of new varieties with altered seed chemical composition. In varieties developed at the Institute of field and vegetable crops in Novi Sad the protein content ranges from 32 to 49%, and oil content from 15 to 25% (Đorđević et al., 2012). Percentage of protein and oil in seed depends on genotypes and environmental conditions. Changes in seed chemical compositions may affect its quality. Determination of connections between seed longevity and total seed composition (proteins, lipids, starch) show that the seed rich in lipids has shortened life cycle (Lekić, 2003 to Pristley, 1986). Determination of seed viability, i.e. seed vigour determines the seed longevity with no adverse effects (ISTA, 2011). Surfaces under soybean in Serbia during the last several years vary between 140,000 ha and 150,000 ha (Viđić et al., 2010-a), and enough seed of good quality should be provided for these surfaces. The aim of this paper was to determine seed quality of new soybean varieties differing in protein and oil content, and in maturity groups.

MATERIAL AND METHOD

Seed used in this study was produced in the locality of Vajska in South Bačka district in 2011. year. Twelve genotypes of soybean belonging to different maturity groups: from maturity group 0 – Valjevka, Galina, NS – Zenit and NS - Virtus; maturity group I - Balkan, Sava, Diva, NS – Maximus, and group II - Vojvodanka, Rubin, Trijumf and Idila. Seed moisture content, bulk density and seed germination were determined in the laboratory of „Agriculture station”. Seed moisture content (%) was determined according to the Rule on quality of seed of agricultural plants (Official gazette 47/87). Grinded sample is dried for 17 ±1h at 103±2°C. Testing is done in four replications. Soybean seed bulk density (kg/m³) was determined by direct reading on Gramomat, tip 1.0, produced by Pfeuffer, Germany. Seed germination was determined by application of Standard laboratory method and Cold test. The Standard laboratory test was applied to 4 x 100 seeds. Seed germinated between filter papers. After eight days of incubation at 25°C the seed germination was determined (Rule on quality of seed of agricultural plants (Official gazette 47/87). Cold test was applied on 4 x 50 seeds. Mixture of soil and sand (2:1) was used as a medium. The seed was first submitted to temp. of 10°C for seven days, and then to 20°C for
six days (Hampton and TeKrony, 1995). After that period the seed germination was determined.

Obtained results were analyzed using one-dimensional analysis of variance according to the statistical package MSTAT, and were presented graphically.

RESULTS AND DISCUSSION

Seed moisture content of both varieties tested ranged from 8.5% (Trijumf) to 12.5% (Idila) (Fig. 1). Moisture content of the varieties from maturity group 0 ranged from 9.1 to 11.4%. Moisture content of the varieties from maturity group I ranged from 9.1 to 11.4%, and differences among varieties from maturity group II were the highest and ranged from 8.5 – 12.5%. Varieties Trijumf (8.5%), Diva (9.1%) and Vojvodanka (9.4%) had moisture content below 10%. Harvest of soybean with low moisture content is not desirable because the seed is very sensitive to mechanical damage, as the vital parts of the seed are found beneath a thin seed coat, which provides no sufficient protection. Mechanical damages occurring during harvest and handling are considered the major problem in soybean seed production (Carvalho and Nakagawa, 2000). From the other hand, high moisture content above 14% is also considered undesirable because the seed must be dried artificially, which makes production more expensive, and the seed with higher moisture content is susceptible to phyto-pathogenic fungi attack, which may have negative impact on seed quality.

Results and discussion showed that Rubin had a desirable chemical seed composition, with well balanced protein and oil content, while Đorđević et al. (2012) classified it as having the highest protein content within the II maturity group (up to 41% of protein). Varieties NS – Zenit, NS – Maximus and Trijumf fall into group of high oily genotypes with oil content above 22% (Đorđević et al., 2012). In the above mentioned soybean genotypes germination ranged from 81% to 86% as in most other genotypes, revealing that increased oil content had no effect on seed germination.

Seed germination obtained by application of Cold test ranged from 48 % (NS – Zenit) to 87% (Rubin) and was lower than the values obtained by application of Standard laboratory test (Fig. 3). Tested parameter in this test was not dependent on seed chemical composition. Statistically significantly the lowest values were obtained in varieties NS-Zenit (48% - oily genotype), Diva (52% - standard genotype) and Vojvodanka (54% - standard genotype), and statistically significantly the highest values were obtained in varieties Galina (82% - standard genotype), Balkan (86% - standard genotype), NS – Maximus (81% - standard genotype) and Rubin (87% - standard genotype). Cold test proved to be reliable in estimation of viability of fresh seed and it showed positive correlation with field emergence (Trawatha et al., 1995). It was developed in North America for estimation of physiological potential of maize seed, by simulating unfavorable soil condition such as low temperature and presence of pathogens in the soil. Cold test can also be used for estimation of the efficacy of herbicide use, selection of variety and seed lot suitable for early sowing; estimation of physiological damages caused by prolonged storage under unfavorable conditions.
condition; damages caused by frost and drought; measurements of effects of mechanical damages on germination in cold and wet soils (AOSA, 2002).

**Fig. 4. Seed germination of tested soybean varieties obtained by application of Cold test**

**CONCLUSION**

Based on the obtained results the following conclusions can be made:

- Moisture content of seed produced in 2011 in the locality of Vajska ranged from 8.5% to 12.5%.
- Bulk density of soybean seed was statistically significantly lower in genotypes from 0 maturity group in comparison to genotypes from II maturity group.
- Seed germination of tested varieties was above the prescribed minimum and ranged from 79% to 96%. Seed germination depended neither on maturity group.
- Seed germination obtained by applied Cold test was lower than the values obtained by application of Standard laboratory test and it ranged from 48% to 87%.

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