

EXAMINATION ON GENETIC POTENTIAL OF TRAIT YIELD OF GRAIN ON SOYBEAN VARIETIES CULTIVATED IN THE BITOLA PART OF PELAGONIA

¹Zivko Gacovski, ²Saso Stojanovski

University "St. Kliment Ohridski" Bitola, Veterinary Faculty – 7000 Bitola, R. Macedonia

e-mail: zivko.gacovski@uklo.edu.mk

ABSTRACT

It is examined genetic potential of trait yield of grain on four genotypes of soybean varieties, made in the Institute for Southern Crops in Strumica, R. Macedonia (Pela - 00 maturity group and Ilindenka – II maturity group) and in the Institute for field crops and horticulture Novi Sad, Serbia (Balkan - I maturity group and Condor - II maturity group), and possibilities for breeding in the Bitola part of Pelagonija, in production year 2010 and 2011.

From the three examined genotypes of soybean varieties, the genetic potential of the trait yield of grain, mostly come to expression at variety Condor, with an average yield of 2800 kg/ha, and at least come to expression at variety Pela, with average yield of 2350 kg/ha.

The genetic potential of the trait yield of grain on the genotype of soybean variety Ilindenka (St), with an average yield of grain of 2799 kg/ha, compared with Balkan variety with average yield of grain of 2500 kg/ha, gave higher average yield of grain of +10.69% or 299 kg/ha, then the variety Condor with an average yield of grain of 2808 kg/ha, a slightly lower average yield of grain of -0.32% or 9 kg/ha, while compared a variety Pella with an average yield of grain of 2350 kg/ha gave higher average yield of grain by + 16.04% or 449 kg/ha.

Out of the three examined genotypes of soybean varieties cultivated in conditions with irrigation, in Bitola part on Pelagonija, is achieved quite good yield of grain and it can successfully be grown in Bitola part on Pelagonija.

Key words: soybean, variety, trait, yield, grain.

1. Introduction

For achieving high and stable grain yield at soybean, despite the application of standard agrotechnic for the Pelagonian region, one of the most important preconditions is the selection of appropriate genotype – soybean variety, that most of all will respond to the agrotechnical conditions offered by the region in order to come to expression the genetic potential of trait yield grain of the variety.

Our examinations were focused to determine the genetic potential of trait yield of grain on four genotypes of soybean varieties, which belong to the group of: very early varieties (00), middle late and late (I) and late (II) soybean varieties intended for feeding of livestock.

2. Material and method for work

Examinations were conducted in the production 2010 and 2011 year, in the locality in village Novaci, on the surfaces of individual farmers. Planting material is obtained from the Institute for Southern Crops in Strumica, R. Macedonia (Pela - 00 maturity group and Ilindenka – II maturity group) and in the Institute for field crops and horticulture Novi Sad, Serbia (Balkan - I maturity group and Condor - II maturity group), Examinations are set by the method of random block system in 5 repetitions, with size of the studied parcels of 10 m². The results are compared with the standard, and the standard deviations are given in % and kg/ha. Based on measurements, carried out after the harvest of each repetition of the studied genotypes of soybean varieties, was conducted visual assessment of the trait yield of grain. After harvesting, is performed determination of moisture in the grain, and the yield in kg/ha with 14% moisture. During the vegetation are conducted standard agricultural practices such as: on locality in village Novaci - soil type alluvium, preculture wheat in both years of testing, reverberating of plant remaining on (15-20 cm) 28.07.2010 and 29.07.2011 year, fertilization (45 kg/ha N, 45 kg/ha P and 45 kg/ha K) 01.08.2010 and 02.08.2011 year, deep plowing (30-40 cm), 03.08.2010 and 04.08.2011 year, plating,

cultivation and sowing, 25.04.2010 and 27.04.2011 year, feed (40 kg/ha N) 21.05.2010 and 22.05.2011 year, protection from weeds after sowing (Linoreks 2 l/ha + Frontier 1,2 l/ha), 28.10.2009/10 and 29.10.2010/11 and foliar in the spring for correction of 3 branches with Pulsar 1,2 l/ha 10.04.2009/10 and 12.04.2010/1, irrigation in year 2010: I - 01.06 (25 mm/m²), II - 15.06 (25 mm/m²), III - 30.06 (50 mm/m²), IV - 15.07 (60 mm/m²), V - 30.07 (80 mm/m²), VI - 15.08 (80 mm/m²), VII - 30.08 (80 mm/m²) = 400 mm/m² and irrigation in year 2011: I - 02.06 (30 , mm/m²), II - 17.06 (50 mm/m²), III - 30.06 (50 mm/m²), IV - 15.07 (80 mm/m²), V- 29.07 (80 mm/m²), VI - 16.08 (80 mm/m²), VII - 29.08 (80 mm/m²) = 450 mm/m² and vintage on 29.09.2010 and 30.09.2011 year.

2.1. Soil and climatic conditions

a). Soil conditions

According to Mr. Filipovski (1971), soil conditions in Bitola part of Pelagonija are heterogeneous, i.e. represented are various soil types and subtypes

In the locality where tests are performed in the village Novaci, soil type is alluvial, without carbonate and with weak acidic reaction (pH in KCl 6, 26 and H₂O 6, 90), which is a suitable environment for the development of soybean.

Nutritious substances were analyzed according to the AL method (Bogdanovic, 1966), the soil is well supplied with humus (2, 70) and provided with secondary nutrients (P₂O) 14, 40 and (K₂O) 19, 50 by the method of Tjuran and Konanova.

b). Climatic conditions

In Table 1 are given data on the temperature conditions in Bitola part of Pelagonija, of which can be seen that they give opportunity to successfully grow soybean varieties with different length of vegetation period.

Tab.1 Climatic conditions

Months	Year 2010		Year 2011	
	Rainfalls in mm	Average monthly air temperature °C	Rainfalls in mm	Average monthly air temperature °C
IV	55,2	12,0	14,8	10,9
V	82,4	16,9	82,7	14,6
VI	43,2	20,2	31,9	19,9
VII	26,6	22,5	9,6	23,7
VIII	00,0	24,2	13,7	23,0
IX	46,3	17,7	44,0	20,3
X	142,0	10,7	30,1	9,8
Total	395,7		226,8	

Needs for water at soy are great. The lack of water is the main reason for the low yields, even in areas where other conditions are suitable. Depending on the length of the vegetation (100-190 days) necessary is about 450-825 mm rainfall or from 5000 to 6000 m³. The greatest need for water is at the stage of reproductive development, i.e. during the formation of legumes and grains. Rainfalls or irrigation in July and August, are of crucial importance for the production of soybeans. In the absence of rainfall decreases the activity of nitrogen retainers in the root, the number of grains in the husk and the absolute mass of the grains, and therefore the total yield.

The table above presented data for the total amount of rainfall during the vegetation of soybeans, from which can be seen that not meet the needs for normal development and achievement of high yields of this crop. And in the first year of examination in 2010 amounted to 395, 7 mm, while in the second 2011 year amount to 226, 8 mm, which means less for 168, 9 mm. If we analyze rainfall in both years of examination, 2010 and 2011, per months during the vegetation will notice that the biggest differences are in June (2010 – 43, 2 mm and 2011 – 31, 9 mm by 11, 3 mm less) July (2010 – 26, 6 mm and 2011 – 9, 6 mm less for 17, 0 mm) and August (2010 - 00, 0 mm and 2011 to 13, 7 mm, more for 13, 7 mm).

Because of that water deficit is supplemented by irrigation, and: year 2010, June 3 irrigations (I - 01.06 (25 mm), II - 15.06 (25 mm), III - 30.06 (50 mm) = 100 mm, July 2 irrigations IV - 15.07 (60 mm) and V - 30.07 (80 mm) = 140 mm, August 2 irrigations VI - 15.08 (80 mm) and VII - 30.08 (80 mm) = 160 mm or total = 400 mm/m², while in year 2011: June 3 irrigations I - 02.06 (30 mm), II - 17.06 (50 mm) and III - 30.06 (50 mm) = 130 mm, July 2 irrigations IV - 15.07 (80 mm) and V - 29.07 (80 mm) = 160 mm, August 2 irrigations VI - 16.08 (80 mm) and VII - 29.08 (80 mm) = 160 mm or total = 450 mm/m².

3.Results and discussion

According to Vasilevski. G. and associates (2001), for normal development and achievement of high yields, depending on the length of vegetation for soybean takes 450 to 825 mm rainfall to meet water needs.

From the data in Table 1 may be concluded that the total amount of rainfall and their distribution over the vegetation does not meet the water requirements of soybeans for better exploitation of the genetic potential of the examined trait yield of grain, at the tested genotypes soybeans.

In year 2010 the total amount of rainfall is 395, 7 mm and in 2011 is 226, 8 mm, rainfall or irrigation in June, July and August, are of crucial importance for the production of soybeans. The difference from the need of water during the vegetation of soybeans, or in the months that appear in deficit, in the reproductive stage of development i.e. during the period of formation of legumes and grains was complemented with irrigation in year 2010, July 3 irrigations with water quantity of 100 mm, in 2011, July 3 irrigations with amount of water of 130 mm, in year 2010, July 2 irrigations with water quantity of 140 mm, year 2011, July 2 irrigations with water quantity of 160 mm, and 2010 year, August 2 irrigations with water quantity of 160 mm, year 2011, August 2 irrigations with water quantity of 160 mm, in year 2010, total 400 mm/m², year 2011 450 mm/m², year 2010, all total 795, 7 mm/1m², year 2011, all total 676, 8 mm/m².

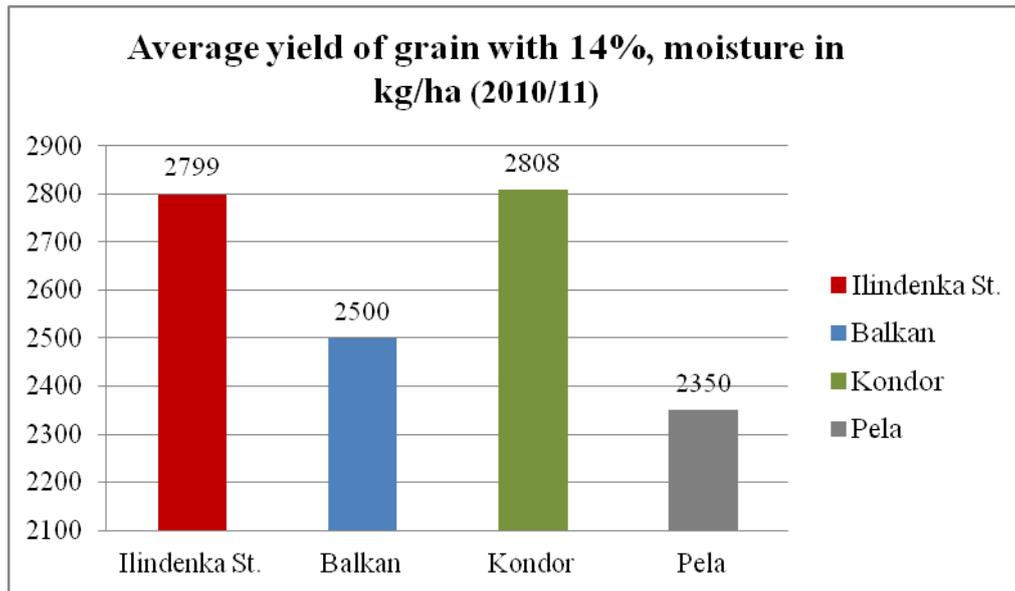
Tab.2 Examination of genetic potential of the trait yield of grain on four genotypes of soybean varieties, on the locality in village Novaci

Бр.	Genotype	Maturity group	Number of plants m ²		Average number of plants m ²	2010	2011	Average yield of grain with 14%, moisture in kg/ha	Average yield of grain with 14%, moisture in kg/ha	Average yield of grain with 14%, moisture in kg/ha	Индекс %
			2010	2011							
1	Ilindenka (St).	II	420	430	425	2750	2848	2799	2808	2799	100,00
2	Balkan	I	415	435	425	2500	2500	2500	2500	2500	89,32
3	Condor	II	421	425	423	2708	2908	2808	2808	2808	100,32
4	Pela	00	518	522	520	2300	2400	2350	2350	2350	83,96

In Table 2 are given data of the examination of genetic potential of the trait yield of grain on four genotypes of soybean varieties, made in the Institute for Southern Crops in Strumica, R. Macedonia (Ilindenka (St) and Pela) and in the Institute for field crops and horticulture Novi Sad, Serbia (Balkan and Condor), and possibilities for breeding in the Bitola part of Pelagonija, in production year 2010 and 2011.

The average yield of grain at variety Ilindenka (St), (2799 kg/ha), compared with variety Balkan with an average yield of (2500 kg/ha), achieved higher average yield for 10, 68 % or 299 kg/ha, in comparison with variety Condor, with an average yield of (2808 kg/ha) is insignificantly lower for 0.32% or 9 kg/ha, and in comparison with the variety Pela with average yield of (2350 kg/ha) gave higher yield for 16, 04 % or 449 kg/ha.

Chart 1



In Chart 1, are represented the data from Table 2, for the genetic potential of trait yield of grain of the examined genotypes of soybean varieties. From the chart it is obvious that out of the four examined genotypes of soybean varieties, the highest yield was achieved at variety Kondor 2808 kg/ha, than at variety Ilindenka (St), 2808 kg/ha, at variety Balkan 2500 kg/ha, and lowest at Pela variety with average yield of 2350 kg/ha.

Out of the four examined genotypes of soybean varieties, cultivated in conditions with irrigation, in Bitola part on Pelagonija, is achieved a very good yield of grain and it can successfully be grown in Bitola part on Pelagonija.

4. Conclusion

Based on two year examinations (2010 and 2011) in Bitola part of Pelagonija the genetic potential of the trait yield of grain of the genotypes of soybean varieties, which belong in (00 maturity group - Pela and II maturity group – Ilindenka), made in the Institute for Southern Crops in Strumica, R. Macedonia and (Balkan - I maturity group and Kondor - II maturity group), made in the Institute for field crops and horticulture Novi Sad, Serbia, can be drawn the following conclusions:

1. The average yield of grain at variety Ilindenka (St), (2799 kg/ha), compared with variety Balkan with an average yield of (2500 kg/ha), achieved higher average yield for 10, 68 % or 299 kg/ha, in comparison with variety Kondor, with an average yield of (2808 kg/ha) is insignificantly lower for 0.32% or 9 kg/ha, and in comparison with the variety Pela with average yield of (2350 kg/ha) gave higher yield for 16, 04 % or 449 kg/ha.

2. Out of the four examined genotypes of soybean varieties, cultivated in conditions with irrigation, in Bitola part on Pelagonija, is achieved a very good yield of grain and it can successfully be grown in Bitola part on Pelagonija.

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