ISSN 1330-7142
UDK = 633.34.002

EVALUATION OF AGRONOMIC PERFORMANCE OF DOMESTIC AND EXOTIC SOYBEAN GERMPLASM IN CROATIA

Aleksandra Sudarić [(1)]***, Marija Vratarić*** [(1)]***, I. Rajcan*** [(2)]

Original scientific paper
Izvorni znanstveni članak

SUMMARY

The collaboration and interchange of breeding materials between breeding programs worldwide is important and necessary to increase the amount of genetic diversity by incorporating unique exotic germplasm into existing domestic germplasm. The objective of this study was to measure and compare the agronomic performance of 15 soybean cultivars released by the Agricultural Institute Osijek (Croatia) (OS-cultivars) and 15 cultivars released by the University of Guelph (Canada) (CA-cultivars) in Croatia. Based on the comparison, parental combinations could be designed to introgress exotic germplasms from the CA-cultivars into Croatian. Agronomic performance was determined in field trials that were conducted at the experimental field of the Agricultural Institute Osijek during the period from 2002 to 2005. Quantitative traits were measured and analyzed for maturity, grain yield components, level and stability of grain yield, adaptability, lodging resistance and field tolerance to Peronospora manshurica. The results indicated higher agronomic performance of OS-cultivars compared to CA- cultivars. However, comparison of yield is only tentative because all but one OS cultivar were later maturing than the CA-cultivars. Among 15 tested CA-cultivars, five cultivars (OAC Millennium, OAC Champion, OAC Bayfield, OAC Auburn, OAC Wallace) were identified as the most favorable for parental combinations in hybridization with OS-cultivars. The results of this study will enable strategic incorporation of diversity from exotic Canadian germplasm into the domestic Croatian germplasm to develop segregating populations from which new, genetically more diverse improved soybean line, could be released.

Key-words: soybean, domestic germplasm, exotic germplasm, grain yield, stability, adaptability, genetic diversity, hybridization.

INTRODUCTION

Production of soybean (*Glycine max* (L.) Merr.) in The Republic of Croatia has had increased both in planted area and yields, particularly in recent years. The production area expansion of soybean as a crop and increased yield were a result of genetic improvements in modern cultivars as well as advances in cultural practices and crop management. Genetically improved cultivars are a result of long-term, continual and intensive breeding work on soybean. The Agricultural Institute Osijek (Croatia) has established a soybean breeding program, which has played a fundamental role in this expansion and made very significant contributions to the introduction, development and improvement of soybean production in Croatia. Through its activities, the program has continued to develop high-yielding and high-quality cultivars with high tolerance of the principal diseases, resistance to lodging and pod shattering as well as adaptability to different agroecological conditions of the local soybean production regions (Vratarić and Sudarić, 2000). The genetic improvements of cultivars in recent years have been accomplished mainly through the use of conventional breeding methods in a series of breeding cycles. Each cycle begins with the selection of parents to be used to create segregating populations. Orf et al. (2004) suggested that the parental selection depends on many factors, including the trait(s) of interest, the purpose of the cross, the relative importance of characters other than yield, the ancestry of the lines, and the resources and time available. Parents can be selected on the basis of comparative evaluation *per se*, by test cross evaluation, or experience of the breeders. In many cases,

1) Ph.D. Aleksandra Sudarić, Prof.Ph.D. Marija Vratarić-Agricultural Institute Osijek, Južno predgrađe 17, 31000 Osijek, Croatia, (2) Prof.Ph.D. Istvan Rajcan-University of Guelph, Dep. Of Plant Agriculture,Guelph, Ontario, Canada

per se evaluation data are readily available from yield performance tests. The genetic diversity of selected parents has great impact on the rate of further genetic improvement of cultivars. The lower rate may be associated with the limited amount of genetic diversity among the high-yielding cultivars used as parents for hybridization. Burton (1997) reported that elite parents of diverse origin are more likely to produce progeny superior to either parent than parents of similar ancestry. According to this aspect of breeding work, collaboration and interchange of breeding materials between breeding programs worldwide is necessary and important to increase the amount of genetic diversity by incorporating unique exotic germplasm into existing domestic germplasm. Thus, within the framework of a scientific collaboration between soybean breeding programs of the Agricultural Institute Osijek and the University of Guelph (Canada) a number of registered cultivars have been exchanged.

The objective of this study was to evaluate agronomic performance of exotic, Canadian cultivars in comparison with domestic cultivars through multi-environment trials. The results will enable us to identify the most favorable parental combinations of the domestic and Canadian cultivars. The utilization of foreign germplasm in hybridization will contribute to increasing the amount of genetic diversity leading to the development of segregating populations from which new, genetically more diverse and improved lines could be released.

MATERIAL AND METHODS

The research was conducted at the experimental field of the Agricultural Institute Osijek (Osijek, Croatia) during the period from 2002 to 2005. Experimental material consisted of 30 released soybean cultivars of which 15 cultivars in the group named OS-cultivars (Mura, Iva, Kruna, Una, Anica, Nada, Bara, Kuna, Nika, Ika, Podravka 95, Drina, Tisa, Ilova, Smiljana) originated from the soybean breeding program at the Agricultural Institute Osijek and 15 cultivars in the group named CA-cultivars (OAC Erin, OAC Brussels, OAC Millennium, OAC Lucknow, OAC Oxford, OAC Morris, OAC Champion, OAC Bayfield, OAC Clinton, OAC Arthur, OAC Exeter, OAC Stratford, OAC Auburn, OAC Wallace, RCAT Bobcat) were developed by the soybean breeding program at the University of Guelph, Canada. Field trials were designed as a randomized complete block with four replications. Plot size was $9m^2$ and plots consisted of 4 rows, 5 m long, with row spacing of 0.45m. The experimental plots were sown by precise planting machine in optimal time for soybean. Currently used management and cultural practices for soybean were applied in all field performance trials. During the growing period, the experimental material was evaluated for phenological phases, lodging resistance (on a scale from 0 to 5) as well as occurrence and intensity of diseases. The first evaluation of diseases was done at R2 stage for downy mildew (*Peronospora manshurica* (NAOUM.) Syd. ex Gaum) and second one at R6-R7 stages for late-occurring soybean diseases. Diseases severity was evaluated on a scale from 0 to 9. At maturity, 30 plants per plot were randomly selected, i.e. each cultivar per experimental year was represented by a sample consisting of 120 plants. Plots were harvested with small plot harvest combine, when cultivars reached full harvest maturity. Seed harvested from each plot was recorded in kilograms per plot and converted to kilograms per hectare at 13% seed moisture. In the Institute's laboratory, grain yield components and incidence of downy mildew on seed were measured and evaluated, respectively. Two 100 seed sampled were used from each seed lot to check for incidence of fungus crusts under stereo binocular. A number of infected seeds was expressed as a percentage. The experimental data were analyzed by two-factor ANOVA (genotype and year, as main effects) and Least Significant Difference (LSD) test with the general linear models procedure (GLM) of the SAS software package (SAS, 2001). ANOVA was used to test the significance of interaction between genotype and year (environment) effect (GEI), which was used to calculate and analyze stability and adaptability. Stability analyses of grain yield as well as adaptability of tested materials were performed by the combination of two parameters: S^2_{GxE} – portion of GEI variance of each genotype to total variance of GEI and b_i – regression coefficient (Finlay and Wilkinson, 1963). According to Plasteid and Peterson's method (1959), if GEI portion of single genotype in total GEI (S^2_{GxE}) is less, stability of genotype is higher and inverse. Regression coefficient represents specific reaction of a genotype to environmental conditions. Lin and Binns (1985) reported that genotypes with a b_i value <0.7 need to be considered as unresponsive to different environments, which indicated above-average of stability and adaptability to low-yielding environments. Genotypes characterized by b_i between 0.7 and 1.3 have average stability and wide-general adaptability, respectively. Genotypes with values $b_i > 1.3$ are considered responsive to good environments, having below-average stability and adaptability to high-yielding environments. According to Lin et al. (1986) the stability statistics applied in this study represents the Type 2 concept of stability: a genotype is considered stable if its response to environments is parallel to the mean response of all genotypes in the trial. If agronomic stability is demonstrated for a wide range of environments, a genotype is defined as having general or wide adaptation. Conversely, if agronomic stability is manifested over a limited range, a genotype has specific or narrow adaptation. Estimated parameters enabled grouping tested materials in consideration of their genetic potential and stability of grain yield as well as level of adaptability. The soil type at the experimental site was classified as a eutric cambisol (Škorić, 1973). The chemical soil properties were: pH 7.00 (H_2O); humus 1.83%; N_{org20} 2.34 mg/100g of soil; K_{20} 13.46 mg/100g of soil; P_{20} 3.39 mg/100g of soil (EUF method). Meteorological data (monthly mean air temperature and monthly total precipitation) for the investigated period (2002-2005) as well as 30-year average over soybean growing season at location Osijek are presented in Table 1.

Table 1. Monthly mean air temperatures (°C) and monthly total precipitation (mm) in Osijek, Croatia during soybean the growing season for the period from 2002 to 2005 and average values for the period 1971-2000

Tablica 1. Srednje mjesečne temperature zraka (°C) i ukupna mjesečna količina oborina (mm) po godinama tijekom vegetacije soje 2002. do 2005. te za prosjek razoblja 1971.-2000., Osijek (Hrvatska)

Month - *Mjesec*	Air temperature -*Temperatura zraka* (˚C)					Precipitation - *Količina oborina* (mm)				
	1971-2000	2002	2003	2004	2005	1971-2000	2002	2003	2004	2005
April - *Travanj*	11.2	11.5	11.5	11.4	11.5	51.0	57.6	9.1	122.0	56.0
May - *Svibanj*	16.7	19.1	20.5	15.4	17.4	59.2	155.6	43.2	63.3	60.3
June - *Lipanj*	19.6	22.1	24.7	19.8	20.1	82.0	48.1	25.3	88.4	92.6
July - *Srpanj*	21.3	23.0	22.9	22.1	21.8	66.3	84.6	70.3	58.4	117.4
August - *Kolovoz*	20.8	20.9	24.6	21.4	19.6	61.9	79.3	23.4	104.9	217.8
September - *Rujan*	16.5	16.0	16.7	15.8	17.4	51.0	74.8	49.3	44.7	71.6
October - *Listopad*	11.1	11.6	9.7	9.7	11.7	55.9	58.1	145.4	145.4	7.4
Total - *Ukupno*						427.3	558.1	366.0	627.1	623.1

RESULTS AND DISCUSSION

Mean values for investigated growing season, grain yield components, lodging and intensity of downy mildew on leaf and seed of tested cultivars expressed as 4-year averages with results of statistical analysis are presented in Table 2. The results showed significant differences among tested cultivars in the mean values of analyzed traits, except intensity of downy mildew on leaf, suggesting a level of genetic diversity among the tested materials. OS-cultivars had significantly longer vegetation period, were taller and had higher 1000-seed weight than CA-cultivars. There was no statistical difference between OS-cultivars and CA-cultivars for number of nodes per plant, lodging resistance and field tolerance of *Peronospora manshurica.*

As a whole, the summarized data for investigated traits indicated considerably higher agronomic values of OS-cultivars compared to agronomic values of CA-cultivars. CA-cultivars had shorter vegetation period than OS-cultivars, which is a positive trait in breeding for early maturity.

The average grain yield of 30 tested cultivars across four experimental years and the overall average of study with results of statistical analysis are summarized in Table 3. From this table, it is evident that there are significant differences in grain yield among tested genotypes across experimental years and in 4-year average, which has probably been caused by differences in the genetic background within the experimental material. Among the 30 cultivars, four significantly higher grain yield in relation to the trial average, while 10 cultivars (8CA;2OS) had statistical significant lower grain yield than the trial average. Yield of the other cultivar (10OS;11CA) had been on the level of the cultivars (3OS;1CA) that had trial average. By the overall trial average, the OS-cultivars had statistical significant higher grain yield (4322.5 $kgha^{-1}$) than CA-cultivars (3718 $kgha^{-1}$), which may be a reflection of much longer growing season for the OS-cultivars.

Table 2. Mean values of some quantitative traits of tested soybean cultivars in Osijek (Croatia), in 2002-2005

Tablica 2. Prosječne vrijednosti pojedinih kvantitativnih svojstava ispitivanih kultivara soje, 2002.-2005., Osijek (Hrvatska)

Cultivar *Kultivar*	Vegetation (days) *Vegetacija (dana)*	Plant height *Visina biljke* (cm)	Nodes num. plant^{-1} *Broj etaža po biljci*	1000-seed weight *Masa 1000 zrna (g)*	Lodging *Polijeganje* (0-5)	*Peronospora manshurica*	
						Leaf *List* (1-9)	Seed *Zrno* (%)
OS-cultivars/OS-*kultivari*							
1. Mura	120	85.5	11.3	143.5	0.3	1.1	1.0
2. Iva	126	100.5	11.6	141.1	1.0	1.2	2.0
3. Kruna	126	94.3	13.1	160.2	0.0	1.0	0.0
4. Una	127	97.3	13.7	179.2	0.3	1.1	0.5
5. Anica	127	99.5	14.1	183.8	0.0	1.0	0.0
6. Nada	129	93.7	13.4	180.5	0.4	1.1	0.6
7. Bara	130	95.1	13.2	159.8	0.6	1.2	2.0
8. Kuna	130	93.2	12.9	178.5	0.3	1.1	0.8
9. Nika	135	99.1	14.3	169.2	0.6	1.3	2.5
10. Ika	135	101.4	13.7	189.8	0.0	1.0	0.0
11. Podravka 95	135	98.4	12.7	182.4	0.0	1.0	0.0
12. Drina	137	105.2	14.2	178.3	0.4	1.1	2.0
13. Tisa	137	104.1	14.3	180.8	0.3	1.1	0.0
14. Ilova	137	110.9	15.7	165.8	0.6	1.1	1.2
15. Smiljana	137	100.2	13.5	183.6	0.3	1.0	0.0
CA-cultivars/CA-*kultivari*							
1. OAC Erin	110	68.0	10.6	140.4	0.3	1.1	1.5
2. OAC Brussels	112	70.8	12.3	145.2	0.0	1.0	0.7
3. OAC Millenium	112	68.7	10.9	173.1	0.3	1.0	0.5
4. OAC Lucknow	113	69.1	12.9	141.4	0.3	1.1	1.0
5. OAC Oxford	113	76.3	12.4	156.1	0.6	1.2	2.5
6. OAC Morris	113	69.0	11.7	140.9	0.3	1.1	1.5
7. OAC Champion	115	79.2	12.5	176.2	1.1	1.1	0.4
8. OAC Bayfield	117	74.4	12.8	163.9	0.6	1.0	0.0
9. OAC Clinton	117	71.7	10.9	155.6	0.3	1.3	3.0
10. OAC Arthur	117	67.5	12.4	154.2	0.3	1.1	0.7
11. OAC Exeter	121	68.8	12.0	168.2	0.2	1.2	2.0
12. OAC Stratford	121	80.2	12.3	195.0	1.2	1.3	2.5
13. OAC Auburn	121	73.1	12.3	173.2	0.2	1.1	0.6
14. OAC Wallace	124	78.1	12.8	179.8	0.2	1.0	0.0
15. Rcat Bobcat	124	76.0	11.6	173.4	0.2	1.1	1.5
Mean – *Prosjek:*							
OS cultivars OS *kultivari*	131.2	98.6	13.4	171.8	0.34	1.09	0.84
CA cultivars CA *kultivari*	116.7	72.7	12.0	162.4	0.41	1.11	1.23
Overall - *Sveukupni*	123.9	85.6	12.7	167.1	0.37	1.10	1.03
LSD (0.05)	10.8	11.4	2.4	7.4	0.8	n.s.	1.40

Table 3. Mean values, stability and adaptability of tested soybean cultivars in grain yield, 2002-2005, Osijek (Croatia)

Tablica 3. Prosječne vrijednosti, stabilnost i adaptabilnost ispitivanih kultivara soje za urod zrna, 2002.-2005., Osijek (Hrvatska)

Cultivar *Kultivar*	Grain yield - *Urod zrna* (kgha^{-1})					*Stability parameters *Parametri stabilnosti*	
	2002	2003	2004	2005	*X*	b_i	S^2_{GxY}
Stable cultivar, wide-general adaptability - *Stabilni kultivar, široke opće adaptabilnosti*							
1. Ika	5201	4050	4470	4850	4643	1.09	12408
2. Podravka 95	4740	3610	4430	4625	4351	1,03	12397
3. OAC Wallace	4936	3980	3952	4490	4340	0,98	12373
4. Kuna	4618	3570	4130	4425	4186	0,86	12456
5. Rcat Bobcat	4605	3680	3456	4100	3960	0,92	12407
6. Anica	4404	3580	4104	4280	4092	0,78	12383
7. Tisa	4384	3830	4041	4320	4144	0,83	12390
8. OAC Stratford	4315	3630	3867	3140	3738	0.87	12427
9. Kruna	3379	3333	3778	4150	3660	0.84	12463
10. OAC Champion	3748	3620	3094	3798	3565	0.92	12390
11. Iva	3959	3130	3733	3650	3618	0,78	12402
12. Mura	2996	3000	3400	3150	3137	0,77	12395
Unstable cultivar, adapted to low-yielding environments-*Nestabilni kultivar, adaptiran na niskoprinosne okoline*							
1. Una	4773	3400	4041	3528	4141	0.53	12546
2. Nika	4606	3320	3873	4350	4036	0,65	12533
3. OAC Exeter	4853	3400	3300	4020	3893	0,68	12551
4. Ilova	4549	3540	3748	3927	3941	0,54	12491
5. OAC Millenium	4490	3430	3130	3930	3745	0,64	12528
6. Bara	4544	3340	4144	3800	3957	0,60	12543
7. OAC Brussels	4279	3260	3037	3470	3511	0,66	12498
8. OAC Morris	4050	3060	3144	3660	3478	0,60	12526
9. OAC Erin	4159	3050	2644	3250	3276	0,67	12509
Unstable cultivar, adapted to high-yielding environments-*Nestabilni kultivar, adaptiran na visokoprinosne okoline*							
1. Smiljana	5117	3740	4396	4700	4488	1,47	12523
2. Nada	4834	3460	4326	4250	4218	1.37	12496
3. Drina	5081	3770	4059	4152	4265	1,42	12575
4. OAC Auburn	5161	3740	3096	3530	3882	1,51	12586
5. OAC Bayfield	4563	3480	3167	3410	3655	1,48	12537
6. OAC Clinton	4741	3630	3285	3750	3851	1,40	12524
7. OAC Oxford	4367	3380	3052	3870	3667	1,36	12573
8. OAC Lucknow	4463	3100	3204	3620	3597	1,43	12530
9. OAC Arthur	4308	3030	2911	3600	3462	1,48	12500
Mean – *Prosjek:*							
OS-cultivars - *kultivari*	4479.0	3511.5	4044.9	4143.8	4322.5		
CA-cultivars - *kultivari*	4469.2	3431.3	3222.6	3709.2	3708.0		
Overall - *Sveukupni*	4474.1	3471.4	3633.7	3926.5	4015.2	0.972	12482
LSD $_{cultivar\ -kultivar(A)}$ 5%	326.4	311.7	386.3	345.8	423.6		
LSD $_{year\ -\ godina\ (B)}$ 5%					191.2		
LSD $_{A\ x\ B}$ 5%					386.5		

*b_i – regression coefficient; S^2_{GxY} – interaction share of some cultivars in total cultivar x year interaction

b_i –koeficijent regresije; S^2_{GxY} – udio interakcije svakog pojedinog kultivara u ukupnoj interakciji kultivar x godina

Apart from genetic differences, grain yield was also affected by various climatic conditions during soybean growing season (Tab. 3), being evidently from considerable differences among the average values of grain yield per experimental years. Different environmental conditions throughout the study affected the grain yield of each cultivar, thereby GEI at each cultivar, was significant. Generally, the results for grain yield indicated that phenotypic variability for this trait is dependent on genetic factors, environmental variables, and the interaction between genotype and environment. These results

corresponded well with findings reported earlier (Vratarić et al. 2005, 2006; Sudarić et al., 2005, 2006; Yan and Rajcan, 2002, 2003).
According to the stability analysis for grain yield (Tab. 3), the cultivars could be grouped into three groups by their differences in stability and adaptability. The first group of cultivars (8OS;4CA) was characterized by lower individual values of S^2_{GxY} than the trial average value of S^2_{GxY} and value b_i of bout 1.0 which indicated considerable grain yield stability over diverse environmental conditions. The group of unstable cultivars consisted of 18 cultivars (Tab. 3), which had individual values of S^2_{GxY} higher than the average values S^2_{GxY} of trials, which indicated considerable variation in this trait as affected by environmental factors. Furthermore, the tested genotypes differed in their reaction on the environmental changes. Nine cultivars (4OS;5CA), had a $b_i<0.7$ which indicated above-average stability in grain yield and a tendency to produce higher grain yield than the average value in low-yielding environments. The other group of 9 unstable cultivars (3OS;6CA) were characterized by $b_i>1.3$ or below-average stability. Therefore, these lines will have higher grain yield than the average value in favorable environments, while in unfavorable environments their grain yield will be below the average. Such cultivars are classified as being narrowly adaptable to high-yielding environments.

CONCLUSION

This study has provided an evaluation of the agronomic and breeding values of 15 registered soybean cultivars developed at the Agricultural Institute Osijek-Croatia (OS cultivars) in comparison with 15 registered cultivars developed at the University of Guelph-Canada (CA cultivars). It was found out that the tested cultivars significantly differed in the length of the vegetation period, plant height, 1000-seed weight, stability of grain yield and adaptability. OS-cultivars had grain yield compared to CA-cultivars, suggesting that these cultivars are most adapted to environmental condition where they have developed. Thus, OS-cultivars are a result of the domestic breeding and have been developed into and for agroecological conditions of the soybean production area in Croatia, whereas Canadian cultivars were likely too early maturing for the region. However, despite significantly earlier maturity, some CA-cultivars performed relatively well and showed good stability and adaptation compared to OS-cultivars making them useful as parental components in breeding for the Croatian market, especially relative to early maturity. Among 15 tested CA-cultivars, five cultivars (OAC Millenium, OAC Champion, OAC Bayfield, OAC Auburn, OAC Wallace) were identified as the most favorable parents to be used in hybridization with OS-cultivars. The results of this study will be enable strategic incorporation of diversity from exotic Canadian germplasm into the domestic Croatian germplasm to develop segregating populations from which new, genetically more diverse improved soybean lines could be released.

REFERENCES

1. Burton, J.W. (1997): Soybean (Glycine max (L.) Merr.) Field Crops Res. 53:171-186.
2. Finlay, K. W., Wilkinson, G.N. (1963): The analysis of adaptation in plant breeding programme. Aust. J. Agric. Res. 14:742-754.
3. Lin, C.S., Binns, M.R. (1985): Procedural approach for assessing cultivar-location data:pairwise genotype-environment interactions of test cultivars with checks. Can. J. Plant Sci. 65:1065-1071.
4. Lin, C.S., Binns, M.R. Lefkovitch, L.P. (1986): Stability Analysis: Where Do We Stand?. Crop Science, 26:893-900.
5. Orf, J.H., Diers, B.W., Boerma, H.R. (2004): Genetic improvement: Conventional and Molecular-Based Strategies. In: Boerma, H.R. and Specht, J.E. (eds.): Soybeans: Improvement, Production and Uses. ASA, CSSA, SSSA, Madison, USA, 417-450.
6. Plaisted, R.L., Peterson, L.C. (1959): A technique for evaluation the ability of selections to yield consistently in different locations or seasons. Am. Potato J., 36:381-385.
7. SAS (2001): SAS System Software for Windows 8.2
8. Sudarić, A., Vratarić, M., Sudar, R. (2005): Quantitative Performances of Recently Developed OS-soybean elite lines in maturity group I. Agriculturae Conspectus Scientificus 70(1):1-9.
9. Sudarić, A., Šimić, D., Vratarić, M. (2006): Characterization of genotype by environment interactions in soybean breeding programmes of southeast Europe. Plant Breeding 125:191-194.

10. Škorić, A. (1973.): Pedološki praktikum. Sveučilište u Zagrebu, Poljoprivredni fakultet Zagreb.
11. Vratarić, M., Sudarić, A. (2000): Soja. Book. Poljoprivredni institut Osijek, Osijek, 25-58.
12. Vratarić, M., Sudarić, A., Sudar, R., Duvnjak, T., Jurković, D., Jurković, Z. (2005): Genetic advance in quantitative ttraits of soybean. Poljoprivreda 11(1): 5-10.
13. Vratarić, M., Sudarić, A., Kovačević, V. Duvnjak, T.Krizmanić, M., Mijić, A. (2006): Response of soybean to foliar fertilization with magnesium sulfate (Epsom salt). Cereal Research Communications 34(1):709-712.
14. Yan, W., Rajcan, I. (2002): Biplot analysis of test sites and trait relations of soybean in Ontario. Crop Sci. 42:11-20.
15. Yan, W., Rajcan, I. (2003): Prediction of Cultivar Performance Based on Single-versus Multiple-Year Tests in Soybean. Crop Sci. 43: 549-555.

PROCJENA AGRONOMSKE VRIJEDNOSTI DOMAĆE I STRANE GERMPLAZME SOJE U HRVATSKOJ

SAŽETAK

Suradnja i razmjena oplemenjivačkog materijala između oplemenjivačkih programa u svijetu značajna je i nužna za povećanje genetske raznolikosti unošenjem jedinstvene strane germplazme u postojeću domaću germplazmu. Cilj ovog istraživanja bio je odrediti i usporediti agronomsku vrijednosti 15 kultivara soje priznatih Poljoprivrednom institutu Osijek (Hrvatska) (OS-kultivari) i 15 kultivara priznatih University of Guelph (Kanada) (CA-kultivari) u Hrvatskoj. Temeljem usporedbe, moguće je složiti roditeljske kombinacije za unošenje strane germpalzme iz CA-kultivara u domaće kultivare. Agronomska vrijednost određivana je u poljskim pokusima postavljenim na pokusnom polju Poljoprivrednog instituta Osijek u razdoblju od 2002. do 2005. Kvantitativna svojstva koja su mjerena i analizirana su: dužina vegetacije, komponente urod zrna, visina i stabilnost uroda zrna, adaptabilnost, otpornost na polijeganje te poljska tolerantnost na Peronospora manshurica. Rezultati su ukazali na povećane agronomske vrijednosti OS-kulitvara u usporedbi sa CA-kultivarima. Međutim, pri usporedbi uroda važno je naglasiti da su svi OS- kultivari, osim jednog, imali dužu vegetaciju od CA-kultivara. Između 15 ispitivanih CA-kultivara, 5 kultivara (OAC Millenium, OAC Champion, OAC Bayfield, OAC Auburn, OAC Wallace) identificirano je kao najpovoljnije roditeljske kombinacije u križanjima s OS-kultivarima. Rezultati ovog istraživanja omogućit će plansko uvođenje raznolikosti iz strane kanadske u domaću hrvatsku germplazmu soje, što dalje vodi razvoju novih segregacijskih populacija iz kojih će nove, genetski različitije, poboljšane linije soje biti priznate.

Ključne riječi: soja, domaća germplazma, strana germplazma, urod zrna, stabilnost, adaptabilnost, genetska raznolikost, križanje

(Received on 24 October 2006; accepted on 27 November 2006 – *Primljeno 24. listopada 2006.; prihvaćeno 27. studenog 2006.*)