YIELD AND SEED QUALITY PERFORMANCE OF THE NEW SOYBEAN VARIETIES DEVELOPED AT RDSA TURDA

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INTRODUCTION

Soybean (*Glycine max* (L.) Merr.), is in the first 5 most widely grown crop throughout and has become more and more interesting to researchers being studied in many worldwide breeding programs (Adamič and Leskovšek, 2021) such as the one from Research and Development Station for Agriculture Turda (RDSA Turda), initiated in 1969.

The major breeding programs for *G. max* aimed at improving the yield, seed-oil, protein and seed-oil composition and quality and tolerance to the major biotic and abiotic stresses (Andersen et al., 2019). Identifying genotypes adapted to the environmental conditions in our country by obtaining high, stable, and high-quality production is a priority objective of agricultural research. In the context of current climate change, the paper aims to present the progress made in conventional soybean breeding in Turda, in the last decade.

Located in the center of Transylvania, in a representative area for this part of the country RDSA Turda has established over time, a high-level research center, creations and knowledge were disseminated to farmers. Rezi et. al., 2021 suggest that the correlations established between traits can help future breeding directives such as developing varieties for specific purposes (food industry, animal feed, biofuels).

Figure 1. Location of Research and Development Station for Agriculture Turda (RDSA Turda) and field view

MATERIALS AND METHODS

The present study was conducted at RDSA Turda, in the experimental field of Soybean Breeding Laboratory during 2018-2023, in order to assess the performance of the new conventional soybean varieties.

The biological material consists of 20 Turda soybean varieties from different maturity: very early (Perla, Carla TD, Bia TD, Isa TD), early (Onix, Eugen, Felix, Darina TD, Cristina TD, Mălina TD, Caro TD, Ilinca TD, Miruna TD, Nicola TD, Teo TD, Iris TD, Ziana TD) and semi-early (Larisa, Ada TD, Felicia TD, Raluca TD).

Quality parameters were determined using NIR infrared equipment (Tango Bruker Optik Gmbh, Ettingen, Germany). Experimental data was prepared and processed with Microsoft Excel and statistical program Past4.

RESULTS AND DISCUSSIONS

Table 1

The thermal and pluviometric regime, RDSA Turda 2018-2023

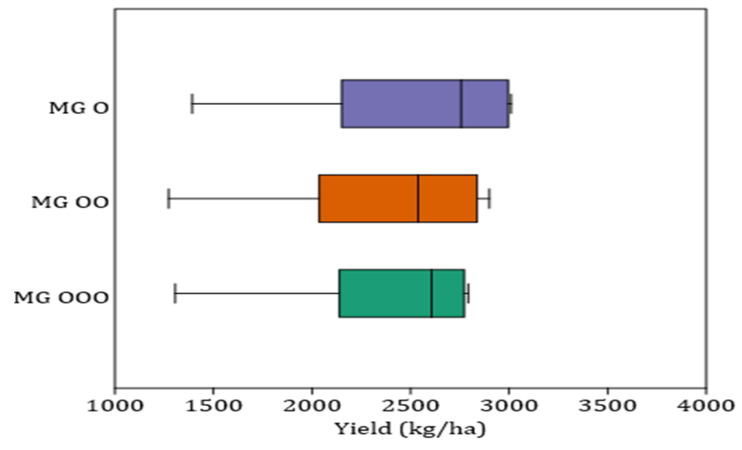
Variables	2018	2019	2020	2021	2022	2023
Months	**Temperature (°C) deviation compared to 65-year average**					
April	+5.4	+1.4	+0.4	-2.1	-1.2	-1.2
May	+3.7	-1.4	-1.3	-0.9	+1.3	+0.4
June	+1.5	+3.9	+1.2	+1.9	+3.1	+1
July	+0.7	+0.7	+0.5	3	+3.3	+2
August	+3	+2.8	+2.2	+0.4	+2.8	+2.6
September	+1.6	+2	+2.7	-0.1	-0.9	+3.8
	Rainfall (mm) deviation compared to 65-year amount					
April	-19.7	+16.7	-28.1	-7.5	-3.1	-15.1
May	-11.9	+83.7	-24.3	+12.1	+13.5	-36.2
June	+13.5	-16	+81.8	-39.8	-42.8	+59.9
July	+8.6	-42.1	+9.7	+46	-52.8	7.8
August	-18.4	+7.2	+1.5	-3.6	+38.5	+42.4
September	-12.7	-23.1	+14.9	-3.4	+77.5	+73.7

Source of primary data: Turda meteorological station (longitude: 23 ° 4′; latitude: 46 ° 35′; altitude: 427m)

Table 2

Yield and stability parameters for the soybean varieties created at RDSA Turda, during 2018-2023

Soybean variety	Maturity group	Yield (kg/ha)			Stability parameters		
		Min	Max	Average	CV %	b	R^2
Perla	OOO	1369	3467	**2534**	26.90	0.99	0.67
Carla TD		1402	2981	**2378**	26.18	0.92	0.68
Bia TD		1167	2745	**2331**	25.78	1.06	0.98
Isa TD		1286	2805	**2421**	23.81	1.02	0.99
Eugen	OO	1460	2784	**2392**	20.69	0.78	0.88
Onix		1183	2950	**2460**	26.92	1.10	0.99
Felix		1312	2876	**2392**	23.39	0.93	0.97
Cristina TD		1210	3022	**2458**	27.15	1.09	0.96
Malina TD		1204	3225	**2316**	31.69	1.14	0.86
Caro TD		1351	2837	**2421**	22.90	0.93	0.99
Ilinca TD		1199	2745	**2300**	25.79	0.99	0.98
Teo TD		1099	2859	**2350**	28.09	1.09	0.98
Miruna TD		1401	2840	**2272**	24.18	0.87	0.88
Nicola TD		1225	3011	**2396**	26.06	1.04	0.99
Iris TD		1349	2829	**2485**	23.09	0.93	0.94
Ziana TD		1286	3077	**2475**	26.46	1.08	0.97
Larisa	O	1232	2804	**2340**	25.20	0.93	0.93
Ada TD		1290	3014	**2534**	25.28	1.04	0.99
Felicia TD		1300	2899	**2436**	23.95	0.95	0.98
RalucaTD		1747	3527	**2898**	23.53	1.07	0.91



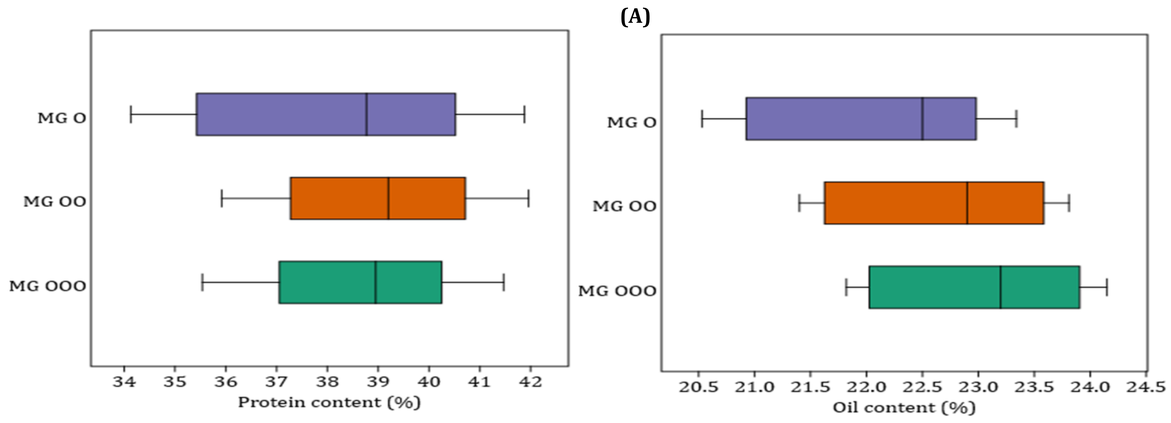


Figure 2. Boxplot for soybean varieties yield (A), protein content (B), oil content (C) depending on maturity group (MG), Turda 2018-2023

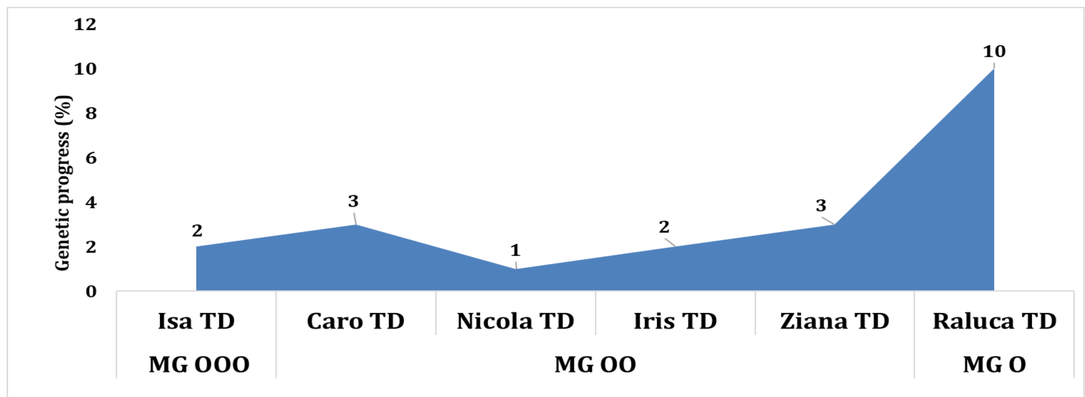


Figure 3. The genetic progress of the new soybean varieties compared to each corresponding maturity group control, based on method of Fasoula-Ioannides & Ioannides, 1992)

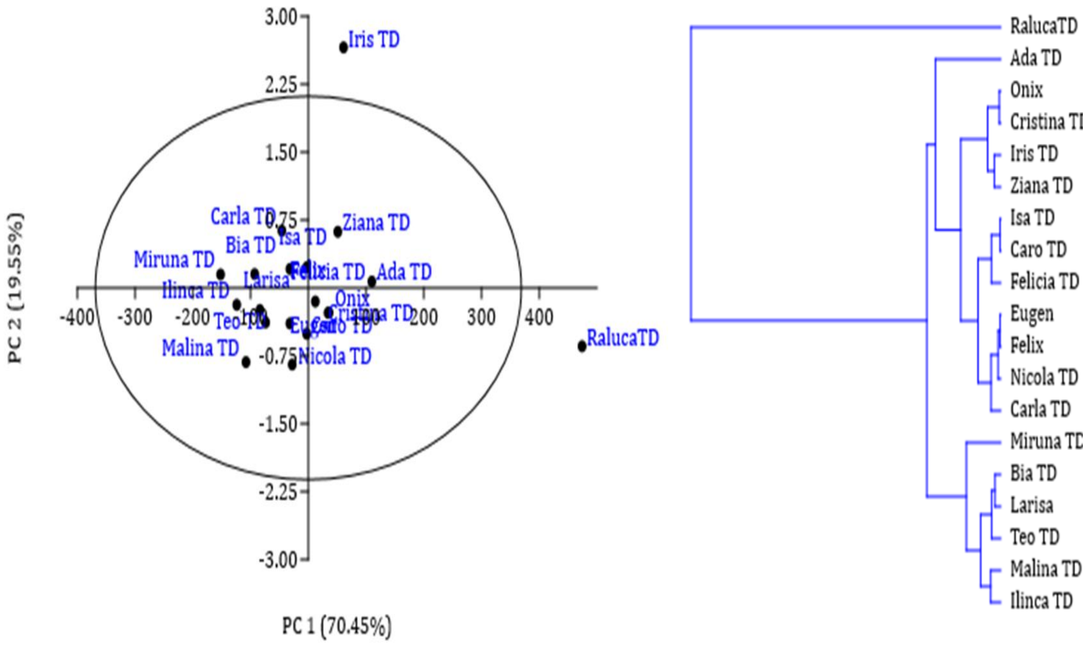


Figure 4. Principal component analysis PC1 x PC2 and dendrogram PCA

CONCLUSIONS

- ✓ Varieties Isa TD (very early group maturity), Iris TD (early group maturity) and Raluca TD (semi-early group maturity) represent a progress for soybean breeding program at RDSA Turda, standing out with high yield and stability.
- ✓ The newer high yielding varieties with pronounced stability of yield capacity and high fat and protein content, can be successfully recommended for food and feed.
- ✓ Turda soybean varieties can be used effectively during the early or later generations of a breeding program in order to secure the continuous adaptation of cultivars to this specific environment.

Selective bibliography

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