

DARINA TD, CRISTINA TD AND MĂLINA TD, THE NEW EARLY SOYBEAN VARIETIES CREATED AT A.R.D.S. TURDA

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Abstract: *The new soybean varieties Darina TD, Cristina TD and Malina TD are the most recent creations of Agricultural Research and Development Station Turda in the field of soybean breeding. The new cultivars were obtained through individually repeated selection of hybrid population accomplished by crossing the cultivars T93- 8966 x Amurskaja, Zefir x Lena and Amurskaja x Simson. The new varieties are characterized by a growing season adequate to the ecological conditions of the area. Their growing season rank is appropriate with the needs of the area, with a maturity group OO, Darina TD, Cristina TD and Malina TD growing season is 122 days, 124 days and 123 days, respectively. Darina TD has a reddish pubescence easily distinguished from the other soybean varieties whose pubescence is grey. At Cristina TD soybean variety the hilum colour is an important characteristic by which, at maturity, the Cristina TD variety may be distinguished from the rest of A.R.D.S. Turda soybean varieties whose hilum are brown, black and grey. Due to the white colour of flowers, during flowering Malina TD is easily distinguished from the other soybean*

varieties. A high yield potential as compared to the maturity group to which they belong, very high resistance to lodging, shattering, bacterial blight and mildew. This characteristics and features corroborated with high insertion of the basal pods, ensures suitable conditions for mechanized harvesting. Besides this features, the new soybean varieties have remarkable qualitative traits, high protein and oil content. The good behavior of the new soybean varieties, in terms of yield, emphasize with the results obtained within the network of The State Institute for Cultivar Testing and Registering. Darina TD, Cristina TD and Malina TD as compared with the Onix variety. In the period 2006 - 2011, the new soybean varieties were tested at A.R.D.S. Turda, and as a result Darina TD and Cristina TD are significantly distinct as compared to control (Onix). Remarkable are also the yield potential obtained by the new soybean varieties. The characteristics and features of the soybean cultivars Darina TD, Cristina TD and Malina TD created at A.R.D.S. Turda recommend them as the most adequate cultivars for the Transylvania Plain.

Key words: *soybean, early varieties, yield, qualitative traits*

INTRODUCTION

Transylvania Plain with the Muresului and Tarnavelor meadows offers very favorable conditions for soybean crop. In spite of this conditions, the cultivated areas have fluctuated greatly over the years, main limiting factor of enlargement of soybean crops was a very long growing season of the soybean (MURESANU, 2010).

The goal of A.R.D.S. Turda soybean breeding program is to develop new early soybean varieties with high yield, well adapted and stable, high resistance to the main stress factors (MURESANU, 2011).

A continuous concern for soybean breeding program at A.R.D.S. Turda is also the improvement of the other features of soybean varieties such as suitability to mechanized harvesting, resistance to diseases and pests, qualitative features (MURESANU, 2003).

To meet the diversity of ecological conditions found in Transylvania Plain, A.R.D.S. Turda has a wide range of early and very early soybean varieties (table 1). The new Darina TD, Cristina TD and Malina TD will complete the range of soybean varieties for this area.

Early and very early soybean varieties created at A.R.D.S. TURDA

Variety	Maturity group	Year of certification	Genealogy	Seed production
DIAMANT	000	1987	HI 464 x T- 1917	-
PERLA	000	1994	GS 54/145 x Norchief	A.R.D.S. Turda
GRANAT	00	1998	Evans x THI	-
SAFIR	00	2000	HL 20 x Altona	-
EUGEN	00	2002	Maple Arrow x Evans	A.R.D.S. Turda A.R.D.S. Secuieni
ONIX	00	2002	Maple Presto x Evans	A.R.D.S. Turda
FELIX	00	2005	Maple Presto x Merit	A.R.D.S. Turda
DARINA TD	00	2011	T93- 8966 x Amurskaja	A.R.D.S. Turda
CRISTINA TD	00	2012	Zefir x Lena	A.R.D.S. Turda
MALINA TD	00	2012	Amurskaja x Simson	A.R.D.S. Turda

The registered soybean cultivars in The Official Catalogue of varieties of Agricultural and Vegetables species in Romania are Perla, Eugen, Onix, Felix, Darina TD, Cristina TD and Malina TD.

MATERIAL AND METHODES

The new soybean variety Darina TD, having as genitors T93- 8966 source and the soybean variety Amurskaja, was obtained by crossing followed by individually repeated selection. Cristina TD and Malina TD, were obtained through individually repeated selection of hybrid population accomplished by crossing the varieties Zefir x Lena and Amurskaja x Simson.

During tests carried out through the soybean breeding program, the results were valued with appropriate statistical methods, according with the breeding stages and characters followed. The quality analysis, protein and oil content were valued with INFRAPID 61 analyzer, the method relies on diffuse reflection of electromagnetic radiation in the near infrared.

RESULTS AND DISCUSSIONS

The main morphological characteristics of the new soybean varieties as compared to the Felix and Onix varieties, are presented in table 2.

Darina TD is characterized by a compact brushy growing, an erect stem, a semidetermined growing, medium height of 95 cm, variation beetwen 72 cm and 115 cm, with an average height of the basal pods of 17 cm. It was a reddish pubescence easily distinguished from the eather soybean varieties whose pubescence is grey. The colour of flowers is violet and the fruit colour at maturity is light brown. The grain is ovoidal, yellow with a brown hilum. The thousand grain weight (TKW) is on average 146 g.,beetwen 130 g and 150 g.

Cristina TD is characterized by a compact brushy growing, an erect stem, a semidetermined growing, tall plant which was an average height of 100 cm, with an average height of the basal pods of 17 cm. It was a grey pubescence while the colour of flowers is violet. When matured, the pods are light brown. The grain is ovoidal, yellow with a yellow hilum,The hilum colour is an important characteristic by which, at maturity, the Cristina TD variety may be distinguished from the rest of A.R.D.S. Turda soybean varieties whose hilum are brown, black and grey. The thousand grain weight (TKW) is on average 170 g.,beetwen 148 g and 184 g.

Malina TD is characterized by a compact brushy growing, an erect stem, a

semidetermined growing, tall plant which was an average height of 101 cm, between 72 cm and 128 cm, with an average height of the basal pods of 17 cm. It has a grey pubescence and the colour of flowers is white. Due to the white colour of flowers, during flowering Malina TD is easily distinguished from the other soybean varieties. When matured, the pods colour is light brown and the grain is yellow, the shape is spherical flattened, with a brown colour of hilum. The thousand grain weight (TKW) is, on average, 134 g.

Table 2

Main morphological characteristics of soybean varieties Darina TD, Cristina TD and Malina TD created at A.R.D.S Turda, 2006-2011

Characteristics	Soybean varieties				
	Darina TD	Cristina TD	Malina TD	Felix	Onix
Strain :	Compact	Compact	Compact	Compact	Compact
- form of plant aerial part	Erect	Erect	Erect	Erect	Erect
- plant stem	Semideterm	Semideterm.	Semideterm.	Semideterm	Semideterm.
- growing type	95 (72-115)	100 (75 -127)	101 (72 -128)	104 (77-123)	114 (86-138)
- plant height (cm)	17 (15-19)	17 (15 -19)	17 (15 -18)	16 (14-20)	18 (16-19)
- insertion height(cm)	Reddish	Grey	Grey	Grey	Grey
- pubescence	Ovoid	Ovoid	Ovoid	Ovoid	Ovoid
Leaf:	Light green	Light green	Dark green	Light green	Light green
- form of leaflets					
- colour of leaflets	Violet	Violet	White	violet	Violet
Flower:					
- colour of flower	Light brown	Light brown	Light brown	Light brown	Brown
Fruit:					
- colour at maturity	Ovoid	Ovoid	Spherical flattened	Ovoid	Spherical-flattened
Grain:	Yellow	Yellow	Yellow	Yellow	Yellow
- form	Brown	Yellow	Brown	grey	Dark brown
- colour	146 (130-150)	170 (148-184)	134 (118-146)	157 (132-199)	144 (117-180)
- colour of hilum					
- TKW (gr)					

New soybean varieties can be remarked also for their physiological features, are characterized by a very high resistance to lodging, shattering, bacterial blight (*Pseudomonas glycinae*), mildew (*Peronospora manshurica*). Their growing season rank is appropriate with the needs of the area, with a maturity group OO, Darina TD, Cristina TD and Malina TD growing season is 122 days, 124 days and 123 days, respectively (table 3).

Table 3

Main physiological features of soybean varieties Darina TD, Cristina TD and Malina TD created at A.R.D.S Turda, 2006-2011

Varieties	Darina TD	Cristina TD	Malina TD	Felix	Onix	Eugen
Resistance to* :						
Lodging	V.R.	V.R.	V.R.	V.R.	V.R.	V.R.
Shattering	V.R.	V.R.	V.R.	V.R.	V.R.	V.R.
<i>Pseudomonas glycinae</i>	V.R.	V.R.	V.R.	R.	V.R.	R.
<i>Peronospora manshurica</i>	V.R.	V.R.	V.R.	V.R.	V.R.	V.R.
<i>Sclerotinia sclerotiorum</i>	R.	R.	R.	R	R	R
Growing season ** (days)	122	124	123	123	124	123

* V.R. - very resistant, R. - resistant, M.R. -middle resistant, S - sensitive

** number of days from arised to maturity

The good behavior of the new soybean varieties, in terms of yield, emphasize with the results obtained within the network of The State Institute for Cultivar Testing and Registering. Darina TD as compared with the Onix variety, used as control, achieved on an average, 106 per cent, between 97 per cent and 119 per cent. As well as Cristina TD, how achieved on an average 112 per cent, between 95 per cent and 135 per cent, compared with Onix variety. Malina TD is at the same level as Darina TD with an average percentage of 106, between 98 per cent and 114 per cent (table 4).

The new soybean varieties are characterized with a high yield capacity, the average yield of Darina TD, in the period 2006-2011, at A.R.D.S. Turda, was 3049 kg/ha, with variations between 2049 and 4016 kg/ha. For the same period the average yield of Cristina TD variety was 3008 kg/ha, with variations between 2153 and 3866 kg/ha , and for Malina TD average yield was 2752 kg/ha, with variations between 2010 and 3286 kg/ha. The new soybean varieties Darina TD and Cristina TD are significantly distinct as compared to control (Onix). Remarkable are also the yield potential obtained by the new soybean varieties. Darina TD achieved 4760 kg/ha at Seed Testing Centre (STC) Negresti in the year 2008, Cristina TD achieved 4890 kg/ha at STC Satu Mare in the year 2010 and Malina TD reached 4304 kg/ha at STC Satu Mare in the year 2010 (Table 5).

Table 4

Darina TD, Cristina TD and Malina TD yield as compared to Onix (Control) under S.I.V.T.R.'s network, 2008-2011

Localities	Control	Relatively yield %		
		Darina TD (test period 2008-2010)	Cristina TD (test period 2009-2011)	Malina TD (test period 2009-2011)
Tecuci	Onix	-	110	106
Satu Mare	Onix	119	118	106
Peciu Nou	Onix	-	113	98
Ovidiu	Onix	-	-	103
Negresti	Onix	97	114	108
Mircea Voda	Onix	-	135	114
Ludus	Onix	105	100	104
Inand	Onix	102	107	107
Cogeaalac	Onix	-	95	108
Average %		106	112	106

Table 5

Darina TD, Cristina TD and Malina TD yield as compared to Onix variety (Control) ARDS Turda , 2006-2011

Variety	Average yield (kg/ha)						Average yield 2006-2011			Yield potential (kg/ha)
	2006	2007	2008	2009	2010	2011	kg/ha	%	Signif.	
ONIX	3000	2093	2890	2114	3321	2958	2729	100	control	4602
EUGEN	2760	1974	2918	1945	3418	2969	2664	97.6	-	4000
FELIX	2880	1897	2819	2002	3769	2672	2673	97.9	-	4610
DARINA TD	3100	2049	3169	2406	4016	3552	3049	111.7	XX	4760
CRISTINA TD	3073	2153	3341	2268	3866	3348	3008	110.2	XX	4890
MALINA TD	2973	2010	2961	2172	3286	3107	2752	100.8	-	4304
							LSD 5%	17.7		
							LSD 1%	24.0		
							LSD 0.1%	32.0		

Besides the characteristics and features presented, the new soybean varieties have remarkable qualitative traits, high protein and oil content. Darina TD was, on average, protein content of 40,9 per cent and oil content of 21,0 per cent, the higher oil content as compared to the other soybean varieties. Cristina TD and Malina TD are also characterized by higher qualitative features reaching, on an average a protein content of 41,3 per cent and 41,2 per cent, respectively. As concerns the oil content, Cristina TD and Malina TD realized, on an average, 20,4 per cent each, a content close to the majority of the other varieties (table 6).

Table 6

Protein and oil content of Darina TD , Cristina TD and Malina TD as compared to other soybean varieties created at A.R.D.S. Turda, 2006-2011

Variety	Protein content		Oil content	
	Average %	Variation limits	Average %	Variation limits
Eugen	40.8	36.1 – 43.4	20.9	19.8 – 23.3
Onix	41.5	36.7 – 43.9	20.9	19.5 – 23.9
Felix	41.5	37.0 – 43.3	20.8	19.5 – 23.0
Darina TD	40.9	37.6 – 42.6	21.0	20.0 – 23.6
Cristina TD	41.3	37.7 – 43.0	20.4	19.2 – 23.1
Malina TD	41.2	38.3 – 44.1	20.4	19.0 – 22.6

CONCLUSIONS

The creations of Agricultural Research & Development Station Turda fully meet the requirements of this area, the new creations, Darina TD, Cristina TD and Malina TD reach maturity in the first decade of September and offers the possibility for training on time and in good conditions the land for sowing winter cereals.

The new creations have a high yield potential as compared to the maturity group in which they belong and a higher qualitative features.

The characteristics and features of the soybean cultivars created at A.R.D.S. Turda recommend them as the most adequate cultivars for the Transylvania Plain, Moldavia and West Plain.

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