SILVANA (LV. 200) - A NEW DIOIC HEMP CULTIVAR DEVELOPED AT THE SCDA LOVRIN (TIMIS COUNTY)

SOI NOU DE CÂNEPĂ DIOICĂ – SILVANA (LV.200) OBȚINUT LA SCDA LOVRIN

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Abstract: *The Silvana dioic hemp cultivar has been developed at the Agricultural Research and Development Station in Lovrin (Timis County), as a result of a series of hybridisations followed by repeated individual selection. It is characterised by avery good yielding capacity (11,360 kg/ha pf stems in the STAS network, 775 kg/ha seed, and over 31% fibber content in the stems. The hemp cultivar has a good adaptability to environmental conditions, and a vegetation period of 135 days in seed crops and 83-108 days in fibber crops.*

Rezumat: *Soiul de cânepă dioică Silvana este realizat la Staţiunea de Cercetare, Dezvoltare Agricolă Lovrin, fiind rezultatul unei hibridări urmată de selecţie individuală repetată. Se caracterizează printr-o capacitate foarte bună de producţie (tulpini – 11360 kg/ha în reţeaua STAS, sământă 775kg/ha şi în aceeaşi reţetă un conţinut de fibre în tulpini de peste 31%.*
Soiul are o adaptabilitate bună la condiţiile de mediu, şi şi o perioadă de vegetaţie de 135 zile în culturile pentru sământă şi 83-108 zile în culturile pentru fibre.

Key words: *hemp, fiber, lines*
Cuvinte cheie: *cânepă, fibră,linii*

INTRODUCTION

Obtaining high perdormances from the point of view of the quantity and quality of the agricultural production is strictly related to the biological factor represented by the hemp cultivar or the hybrid. Hemp is no exception in this case. Results in hemp crops in Romania have been related to dioic and monoic hemp cultivars particularly valuable from the point of view their production capacity (stem and seed) and quality (high fibber content and good hemp bundle yield).

To note the following hemp cultivars: Fibrămultă 151 (Ceapoiu, 1958), Lovrin 110 (Paraschivoiu and Tabără, 1977, 1981), Irene, Secuieni 1, Zenit and Denise (Găucă, 1987, 1997), hemp cultivars that are particularly valuable together with oither hemp cultivars that have been developed in other Euroeoan countries as well, such as Hungary (Bocsa,), Russia, Ukraina, Germany, France, etc.

Even though in the last 15 years hemp cultivation decreased in almost all the cultivation areas, improving and developing dioic, monoic, or unisexuate hemp cultivars has gone on and with good results. This is why, if we resume now the cultivation of hemp at economically perfoming levels, agricultural research can supply producers with particularly valuable dioic annd monoic hemp cultivars. Such a dioic hemp cultivar is Silvana (the Lv 200 hemp line) homologated to be cultivated in Romania and in Europe in 2007.

RESULTS AND DISCUSSION

Results analysed in this paper have been obtained in the ISTIS trial network, where we tested a few hemp developments at the SCDA Lovrin.

Stem productions are presented in Table 1. Analysing the results, we can see that both the Lovrin 110 hemp cultivar and the three newly developed hemp lines have a particulalry high production potential, i.e. over 11 t/ha of dried stems in the Lv 110 hemp cultivar and in the Silvana hemp cultivar (Lv 200), and over 10.6 t/ha in the Lv 201 hemp line (Arieşana). Tonote that the Silvana hemp cultivar overrates the control hemp cultivar Denise on the average for the four trial centers with 12%. Analysing stem production per trial centers and per years, we can see that the Silvana (Lv 200) hemp cultivar yielded more than the Denise control hemp cultivar in all trial centers (except for the trial center in Bacău, where it yielded 95% of the control production). In all the trial years and in all thr trial centers, the Silvana (Lv 200) hemp cultivar was superior to the control.

As for the production level, the Silvana hemp cultivar is within 6,633 kg/ha of dried stems in Luduş in in the year 2005 and 17,896 kg/ha in Satu Mare in 2007; except for a single trial center, Luduş, where the mean stem production for three years is 7,133 kg/ha in all the trial centers mean dried stem production was above 10 t/ha.

Table 1

Stem production in the hemp cultivars and lines tested in the ISTIS network (2005-2007)

Trial center	Hemp cultivar or line	2005		2006		2007		MEDIA	
		Kg/ha	%	Kg/ha	%	Kg/ha	%	Kg/ha	%
BACĂU	Denise	9300	100	15050	100	16017	100	13456	100
	Lovrin 110	11450	123	14467	96	19517	122	15145	113
	Lovrin 200	11100	119	14367	95	16517	103	13995	104
	Lovrin 201	9867	106	13650	91	16650	104	13389	100
	Lovrin 202	10820	116						
		10507		14384		17175			
INAND	Denise	8533	100	9683	100	10983	100	9733	100
	Lovrin 110	8667	102	9667	100	11083	101	9806	101
	Lovrin 200	9117	107	10050	104	11267	103	10145	104
	Lovrin 201	8767	103	10300	106	11733	107	10267	105
	Lovrin 202	8967	105						
		8810		9925		11267			
LUDUŞ	Denise	6200	100	6883	100	6683	100	6589	100
	Lovrin 110	6333	102	7417	108	6733	101	6828	104
	Lovrin 200	6633	107	8200	119	6567	98	7133	108
	Lovrin 201	6450	104	7717	82	7667	115	7278	110
	Lovrin 202	6450	104						
		6413		7554		6913			
SATU MARE	Denise	10829	100	10193	100	11565	100	10862	100
	Lovrin 110	14008	129	11128	109	14095	122	13077	120
	Lovrin 200	12767	118	11835	116	17896	155	14166	130
	Lovrin 201	11856	109	10863	107	12791	111	11837	109
	Lovrin 202	14238	131						
		12740		11005		14087			
MEDIAŞ	Denise	8716	100	10452	100	11312	100	10160	100
	Lovrin 110	10114	116	10670	102	12857	114	11214	110
	Lovrin 200	9904	114	11113	106	13062	115	11360	112
	Lovrin 201	9235	106	10634	102	12210	108	10693	105
	Lovrin 202	10114	116						
		9635		10717		12360			

The seed production such as presented in Table 2 is obtained in a single trial center, Luduş. Result analysis shows that from the point of view of the seed production too the Lovrin 110 hemp cultivar and the newly developed hemp lines tested are superior to the monoic hemp control cultivar Denise. On the average for the three yaers, the Lovrin 110 hemp cultivar yielded 751 kg/ha of seed, i.e. 8% more than the control hemp cultivar Denise, while the

Silvana (Lv 200) hemp cultivar had a mean seed production pf 775 kg/ha, i.e. 12% more than the control hemp cultivar. To note the fact that in a single year (2005), the seed yield of the Silvana (Lv 200) hemp cultivar was below the yield of the control hemp cultivar Denise.

Table 2

Sees production in the hemp cultivars and lines tested in the ISTIS network (2005-2007)

Trial center	Hemp cultivar or line	Seed production						Mean	
		2005		2006		2007			
		kg/ha	%	kg/ha	%	kg/ha	%	kg/ha	%
LUDUŞ	Denise	726	100	665	100	687	100	693	100
	Lovrin 110	774	106	730	110	751	109	751	108
	Lovrin 200	665	92	885	133	775	113	775	112
	Lovrin 201	696	96	776	117	737	107	736	106
Mean of the years		715		764		738		739	

Stem quality elements (total length and technical length) are shown in Tables 3 and 4. We can see that the Lv 110 hemp cultivar and the Lv 200 hemp lines (Silvana) and 201 (Arieşana) have a total mean length of the stems superior to that of the control hemp cultivar, i.e. 230 and 231 cm, respectively.

Table 3

Total stem length (cm) in the fibber hemp cultivars and lines tested in the ISTIS network (2005-2007)

Trial center	Hemp cultivar or line	2005		2006		2007		MEAN	
		cm	%	cm	%	cm	%	cm	%
BACĂU	Denise	195	100	225	100	160	100	193	100
	Lovrin 110	205	105	215	96	175	109	198	103
	Lovrin 200	187	96	230	102	220	138	212	110
	Lovrin 201	225	115	215	96	226	141	222	115
	Lovrin 202					210	131		
		203		221		198		206	91
INAND	Denise	231	100	218	100	214	100	221	100
	Lovrin 110	258	112	220	101	223	104	234	106
	Lovrin 200	245	106	217	100	218	98	226	102
	Lovrin 201	236	102	224	103	229	107	230	104
	Lovrin 202					233	109		
		243		220		222		228	101
LUDUŞ	Denise	185	100	210	100	230	100	208	100
	Lovrin 110	198	107	216	103	240	104	218	105
	Lovrin 200	205	111	229	109	230	100	221	106
	Lovrin 201	196	110	220	105	240	104	219	105
	Lovrin 202					220	96		
		196		219		234		217	96
SATU MARE	Denise	222	100	200	100	300	100	241	100
	Lovrin 110	276	124	225	113	305	102	269	112
	Lovrin 200	273	123	210	105	307	103	263	109
	Lovrin 201	221	100	200	100	304	101	242	100
	Lovrin 202					305	102		
		248		209		304		254	112
MEDIAŞ	Denise	208	100	213	100	226	100	215	100
	Lovrin 110	234	113	219	103	236	104	230	107
	Lovrin 200	228	110	222	104	242	107	231	107
	Lovrin 201	220	106	215	101	250	111	228	106
	Lovrin 202					242	107		
MEAN		223		217		239		226	

Analysing the results, we can see that the value of the stem total length is influenced by the soil and climate conditions specific to each trial center. This is the case of the Silvana hemp cultivar which, in in the year 2005, reached values of the total stem length of 187 cm in Bacău, 245 cm in Inand, 205 cm in Luduş and 273 cm in Satu Mare. The Satu Mare trial center thus offered the best conditions for the growth and development of the Silvana hemp cultivar.

Technical length of the stem is an extremely important element in the establishment of the quality of the hemp stemquality. The values of this feature are shown in Table 4.

Table 4

Techincal length (cm) in the fibber hemp cultivars and lines tested in the ISTIS network (2005-2007)

Trial center	Hemp cultivar or line	2005		2006		2007		MEAN	
		cm	%	cm	%	cm	%	cm	%
BACĂU	Denise	170	100	192	100	135	100	166	100
	Lovrin 110	178	105	187	97	137	101	167	101
	Lovrin 200	165	97	195	102	180	133	180	108
	Lovrin 201	188	111	182	95	190	141	187	113
	Lovrin 202					177	131		
		175		189		164		175	
INAND	Denise	170	100	167	100	165	100	167	100
	Lovrin 110	180	106	171	102	163		171	102
	Lovrin 200	175	103	168	101	156		166	99
	Lovrin 201	167	98	173	104	177		172	103
	Lovrin 202					181			
		173		170		168		169	
LUDUŞ	Denise	185	100	181	100	180	100	182	100
	Lovrin 110	182	98	190	105	186		186	102
	Lovrin 200	188	102	199	110	174		187	103
	Lovrin 201	178	96	192	106	200		190	104
	Lovrin 202					170			
		183		191		182		186	
SATU MARE	Denise	212	100	175	100	270	100	186	100
	Lovrin 110	256	121	190	109	273		240	129
	Lovrin 200	254	120	180	103	275		236	127
	Lovrin 201	210	99	170	97	272		217	117
	Lovrin 202					272			
		233		179		272		220	
MEDIAŞ	Denise	184	100	179	100	188	100	184	100
	Lovrin 110	199	108	185	103	190		191	104
	Lovrin 200	195	106	186	104	196		192	104
	Lovrin 201	186	101	179	100	210		192	104
	Lovrin 202			182		200			
		191		182		197		190	
MEAN								190	100

The results obtained in the ISTIS trial network show that the Lovrin 110 hemp cultivar and Silvana (Lv 200) hemp cultivar and the 201 (Arieşana) and Lv 202 hemp lines are particularly valuable from the point of view of the stem technical length, i.e., they are suited for long, high quality fibbers.

The analysis of the mean values of the technical length of the hemp cultivars Lv 110 and the hemp lines tested in the ISTSI network (Table 4) show that, on the average for the three trial years, technical length in the Lv 110 hemp cultivar was 191 cm (4% more than in the control hemp cultivar Denise) and in the Lv 200 hemp line (Silvana) mean technical length was 192 cm.

In the case of the technical length too, the values differ from a trial center to another depending on the climate conditions of the year. The ISTIS trial center in Baia Mare proved to be the most favourable for the tested hemp cultivars and lines.

Mean values of the stem lebgths in seed hemp crops are presented in Table 5. Analysis of the results show the fact that stem length in all the tested variants is above 200 cm. The highest value of stem length was in the Silvana hemp cultivar (Lv 200), i.e. 224 cm.

Table 5

Stem length (cm) in the seed hemp cultivars and lines tested in the ISTIS trial centers (2005-2006)

Trial center	Hemp cultivar or line	Stem length (cm)				Mean	
		2005		2006			
		cm	Difference compared to the control	cm	Difference compared to the control	cm	Difference compared to the control
LUDUŞ	Denise	216	-	195	-	206	100
	Lovrin 110	220	+4	206	+11	213	103
	Lovrin 200	236	+20	212	+17	224	109
	Lovrin 201	228	+12	208	+13	218	106
Mean of the years		240		205		220	

The vegetation period of the hemp cultivars and lines tested in the ISTIS trial network varies depending on the crop type – fibber or seed, on the trial center, and on the climate conditions of the year.

Thus, for fibber crops, in in the year 2005, the vegetation period varied in the Lv 110 hemp cultivar between 102 days in Bacău and 123 days in Inand. In the Silvana (Lv 200) hemp cultivar, the vegetation period was 99 days in Bacău and 122 days in Inand (Table 6).

In in the year 2006, the vegetation period in all the hemp cultivars was shorter.

In 2007, the vegetation period on the average for the fibber crops varied between 91 days in the Lv 201 hemp line and 97 days in the Denise hemp cultivar. The Lv 110 hemp cultivar had a vegetation period of 95 days and the Silvana hemp cultivar had a vegetation period of 94 days. In seed crops, the vegetation period varied between 133 and 137 days.

THC Content is a limiting factor in hemp cultivation. The European Union only admits hemp cultivars whose THC content is below 0.2%. It is only for these hemp cultivars that they supply subsidies. For the Lv 110 hemp cultivar and for the newly developed dioic hemp lines (SCDA Lovrin), testing was done from the point of view of the THC content at the Regional Laboratory for Wine Quality and Hygiene Control in Blaj, a laboratory that is acknowledged for this field too.

Results of analyses are presented in Table 6. Analysing the results, we can see that no sample contained more than 0.2% THC, the limit admnited by the European Union and for which they supply subsidies. Except for two samples, in all the samples THC values are below 0.1%. This makes the Lv 200 (Silvana) hemp line particularly valuable and recommends it for cultivation in other European countries as well.

Table 6

THC content in the dioic hemp cultivars and lines developed at the SCDA Lovrin **

No.	Hemp cultivar or line	Quality test	THC content (%)
1	Lovrin 110	Leaves + inflorescence tips	0.17
		Seed	0.07
2	Lovrin 200	Seed	0.06
3	Lovrin 201	Seed	0.07
4	Lovrin 202	Leaves + inflorescence tips	0.19

*Samples from the years 2005-2006

**Analyses carried out at the Regional Laboratory for Wine Quality and Hygiene Control in Blaj

CONCLUSIONS

1) The Lovrin 110 hemp cultivar retested in the ISTIS network between 2005 and 2006 proved to be one of the most valuable hemp cultivars to be cultivated successfully in the future.
2) The Lv 200 hemp line was, due to the results obtained in the ISTIS trial network, homologated unde rthe name Silvana.
3) Both the Lovrin 110 hemp cultivar and the Lv 200 (Sivana), Lv 201 (Arieşana) and Lv 202 hemp lines, have a low THC content, which allows safe cultivation.

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