

RESEARCHES REGARDING THE INFLUENCE OF „SECUIENI METHOD” ON SEED YIELDS AT MONOECIOUS HEMP (*CANNABIS SATIVA* L.) CULTIVATED IN THE PEDOCLIMATIC CONDITIONS OF CENTRAL MOLDAVIA

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Abstract

In this paper are presented the results obtained regarding the evolution of seed culture at monoecious hemp under the influence of „Secuieni method”, method which consists in applying shearings during the plant intense growth phase. When the plants have a number of 5 – 6 floors with opposite leaves is applied a first cut of the growth peak at 30 - 35 cm from ground level. After the first shearing, from the insertion of the leaves will grow 2 - 6 lateral shoots, that reached the size of 50-60 cm in the short term, between 15 - 20 days, when it is applied the second cutback at 15-20 cm above the first cutback. The big advantage of this method is that it reduces the plant size and allow harvesting by combines directly from the field, by raising the heder under the insertion of the ramifications with fruits. In A.R.D.S Secuieni pedoclimatic conditions, during 2013 – 2015, were performed researches on this method. The biological material used was represented by three varieties created at A.R.D.S Secuieni, respectively Denise, Diana and Dacia. These varieties were seeded with a seed norm of 6 kg/ha and the distances between the experimented rows were: 25 cm and 50 cm between rows. The obtained results have highlighted that the studied factors influenced in a very large extent the seed yield, that varied widely, ranging from 805 kg/ha at the Denise x 50 cm x uncut interaction and 1115 kg/ha at the Dacia x 50 cm x two cuttings interaction. The correlation between the applied cutting and the seed yield it was directly, the correlation coefficients (r) were statistically ensured and construed as being very significant at both experienced distances between rows (25 and 50 cm).

Key words: monoecious hemp, seed, production, cutting.

Hemp is one of the oldest and most popular crops (Forgo F., 1957). Hemp is considered a plant of increasingly higher importance for Europe (Ranalli P., 2004) being used to extract fiber, oil and as a medicinal plant (Șandru I. *et al*, 1996).

Hemp seeds are rich in oil and protein (Ceapoiu N., 1958). The seed oil content can be up to 36% and the protein content up to 28% (Șandru I. *et al*, 1996).

The oil is used in food, cosmetic products, industry. The hemp oil nutritional benefits are due to the fatty acids contained: omega-6, omega-3 (in the ideal ratio of 3:1), alpha linolenic acid, and lesser amounts of gamma-linolenic and stearidonic acid (Lesson G. and Pless P., 1999).

In this paper are presented results on the evolution of seed culture at monoecious hemp, under the influence of "Secuieni method", which consists in the application of shearings in plant intense growth phase.

MATERIAL AND METHOD

The researches were conducted during 2013-2015 in A.R.D.S. Secuieni on three monoecious hemp varieties (Denise Diana, Dacia), sown at a distance of 25 and 50 cm between rows, with a density of 30 g.s./sqm to which "Secuieni method" was applied.

Secuieni method consists of applying cuts during the vegetation period in order to reduce the plant height and to form new shoots. When the plants enter in the intense growth phase and have 5 – 6 floors with opposite leaves the first cutback of the growing peak is applied at 30 – 35 cm from ground level. Due to the cutting applied at the leaves insertion 2 – 6 lateral shoots will grow, that remain in culture as such. After the first shearing, when the shoots have sufficiently developed, it applies a second shearing over the first cut, at 15 – 20 cm (Gauca et al, 1990).

The experienced has been placed after the subdivided parcels method, on a typical cambic

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chernozem soil type, with water pH 7.05, 2.12% humus content, medium stocked with nitrogen (12.0 ppm), well supplied with mobile phosphorus (162.4 ppm) and mobile potassium (638.6 ppm). The experience was of 3 x 2 x 3 type, in three repetitions. The experimented factors were:

- A factor – varieties used with three graduations: a1 – Denise; a2 – Diana; a3 – Dacia;
- B factor – different distances between rows with two graduations: b1 – 25 cm; b2 – 50 cm;
- C factor – applying cuts in order to decrease the plants height with three graduations: c1 - uncut; c2 – cut only once; c3 – cut twice; (Leonte *et al* 2015);

The experimentation was conducted under non-irrigated conditions and fertilized with $N_{15}P_{15}K_{15}$ – 300 kg/ha and NH_4NO_3 – 200 kg/ha. The sowing was done in the optimal epoch, starting with the third decade of April, the previous plant was the winter wheat and the applied seed norm was of 6 kg/ha, compared with the seed norm from the classic system of 60 – 80 kg/ha. The obtained data were statistically processed and interpreted after the variance analysis method (Ceapoiu N., 1968).

In terms of thermal conditions, during the period, two of the experimental years were characterized as warmest (2013 - 2014 and 2014 - 2015) and a year was warmer (2012 – 2013) (Trotus *et al*, 2015) (figure 1).

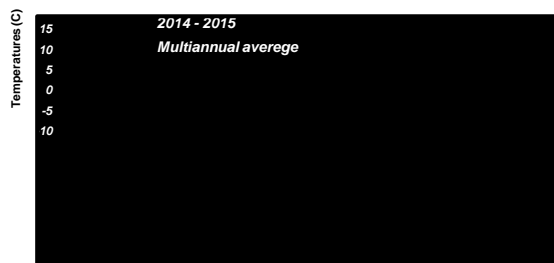


Figure 1 Monthly temperatures recorded at A.R.D.S. Secuieni, during 2013 – 2015

Under the aspect of rainfall regime, the 2012 - 2013 and 2013 - 2014 crop years were normals (548 mm and 498.7 mm) compared to the annual average, and the year 2014-2015 was noted as a dry year (343.5mm) (figure 2).

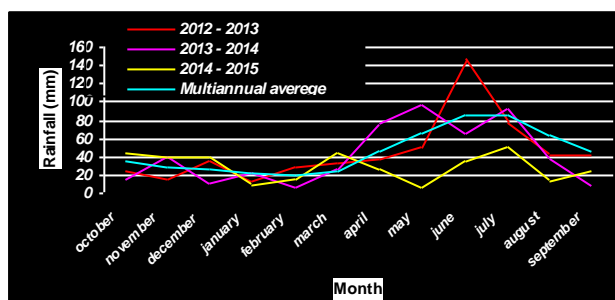


Figure 2 Monthly precipitation recorded at A.R.D.S. Secuieni, during 2013 – 2015

Throughout the entire growing season of monoecious hemp (from sowing to physiological maturity), rainfall ranged between 5.6 mm (May - 2015) to 146 mm (June – 2013).

RESULTS AND DISCUSSIONS

The experimental results obtained from the monoecious hemp, during the analyzed period, indicates a significant difference in seed production, depending on the cultivated variety and the climatic conditions.

In the first year of experimentation higher production stood out in the variants in which were applied two nippings at the Denise (1386 kg / ha) and Dacia (1385kg / ha) varieties, sown at a row spacing of 25 cm, making gains production very significant compared to the control variant (experience average). Denise and Diana varieties, sown at 25 and 50 cm between rows, where no cutbacks were applied have recorded negative yields compared to the control variant (experience average).

The 2013 – 2014 agricultural year was characterized as normal in terms of rainfall and warmly in terms of heat. However, the distribution of precipitation during the hemp growing period was very uneven, which negatively affected the crop production of hemp seed. The yields minimum level (876 kg/ha) was recorded in the variant characteristic to the interaction between Denise x 50 cm x uncut, and the maximum (1233 kg/ha), in the variant with two cuts and sown with Dacia variety at a distance of 25 cm between the rows. Significant yields increases, were achieved in the variants in which were applied two cuts and were sown with Denise variety, at the both distances between rows of 25 cm respectively 50 cm. Production increase statistically ensured and interpreted as significantly distinct was obtained in the variant where two cuts were applied, only at Dacia variety sown at a distance between rows of 25 cm (1233 kg/ha) (table 1).

The year 2014 - 2015 was characterized as dry in terms of rainfall and warm in terms of heat, which negatively affected the production of hemp seed. Thus, in this year, yields ranged from 668 kg/ha (Denise x 50 cm x uncut) to 895 kg/ha (Denise x 25 cm x one cut). Compared to the average experience (control variant), very significant production increases were achieved at the variants in which one cut was applied, sown with Denise and Dacia varieties at the distance of 50 cm between rows (table 1). Significant yield increases, were achieved at the variants in which was applied also a single cut, sown with Diana

and Dacia varieties, but sown at a distance of 25 cm between rows.

On average, over the three years of experimentation, the studied factors have influenced into a large extent the hemp seed yields which ranged between 805 kg/ha (Denise x 50 cm x uncut) and 1115 kg/ha (Dacia x 50 cm x two

cuts). The highest yields were obtained at Denise x 25 cm x two cuts (1106 kg / ha) and Dacia x 25, 50 cm x two cuts (1113 kg / ha, 1115 kg / ha), which have achieved distinctly significant production increases compared to the experience average (control variant) (*table 1*).

Table 1

The influence of the interaction between variety x sowing distance x cuts on the monoecious hemp seed production, during 2013 – 2015

Variety	Distance between row (cm)	Applied work	Seed production 2013(kg/ha)	Seed production 2014(kg/ha)	Seed production 2015(kg/ha)	Media 2013-2015
Denise	25	NR	930 ^{oo}	920	702 ^{oo}	851 ^o
		R1	1120	1068	895 ^{***}	1028
		R2	1386 ^{***}	1153 [*]	780	1106 ^{**}
	50	NR	870 ^{oo}	876 ^o	668 ^{ooo}	805 ^{oo}
		R1	977 ^o	1070	866 ^{***}	971
		R2	1216 [*]	1143 [*]	812 [*]	1057 [*]
Diana	25	NR	985 ^o	880 ^o	712 ^{oo}	859 ^o
		R1	1060	1053	822 [*]	978
		R2	1120	1067	775	987
	50	NR	990 ^o	907 ^o	712 ^{oo}	870 ^o
		R1	1010	910 ^o	792	904
		R2	1105	1030	727 ^o	1068 [*]
Dacia	25	NR	950 ^o	877 ^o	692 ^{ooo}	840 ^{oo}
		R1	1103	1120	820 [*]	1014
		R2	1385 ^{***}	1233 ^{**}	720 ^o	1113 ^{**}
	50	NR	1023	900 ^o	728 ^o	884
		R1	1175	1030	872 ^{***}	1026
		R2	1380 ^{***}	1173 [*]	792	1115 ^{**}
Media			1099	1023	772	965
DL A x B x C kg/ha			103	105	38	82
			152	158	53	121
			236	252	76	188

The variety influence on the hemp seed production, in the three years studied, have materialized by obtaining yields ranging from 925 kg/ha (Diana) and 998 kg/ha (Dacia) (*table 2*).

Table 2

The variety influence on *Cannabis sativa L.* seed production, during 2013 – 2015

Variety	Yield (kg/ha)	% compared to the control	Difference (kg/ha)	Sign.
Denise	970	101	6	
Diana	925	96	-39	oo
Dacia	998	104	34	
Media	964	100	Mt.	
DL kg/ha		5% =	43	
		1% =	71	
		0,1% =	133	

The distance between rows did not significantly affect the seed production obtained at hemp, and the obtained production were of 954 kg / ha (50 cm) and 975 kg / ha (25 cm) (*table 3*).

Table 3

The influence of the distance between rows on *Cannabis sativa L.* seed production, during 2013 – 2015

Distance between rows (cm)	Yield (kg/ha)	% compared to the control	Difference (kg/ha)	Sign.
25	975	101	10	
50	954	99	-11	
Media	965	100	Mt.	
DL kg/ha		5% =	36	
		1% =	54	
		0,1% =	87	

Compared to the control variant (experience average) the variant in which the „Secuieni method” was applied made a very significantly production increase (92 kg/ha), at the application of two cuts, and the uncut variant made an yield difference (-113 kg/ha) statistically ensured and interpreted as negatively very significant (*table 4*).

Table 4
The nippings influence on *Cannabis sativa* L. seed production, during 2013 – 2015

The applied work	Yield (kg/ha)	% compared to the control	Difference (kg/ha)	Sign.
uncut	851	88	-113	ooo
One cut	987	102	23	
Two cuts	1056	110	92	***
Media	964	100	Mt.	
DL kg/ha		5% =	27	
		1% =	37	
		0,1% =	49	

Regarding the correlation between the nipping applied and seed production obtained in the three agricultural years, it notes that this was direct and has been interpreted as very significant at both distances of 25 cm and 50 cm between rows (figure 3).

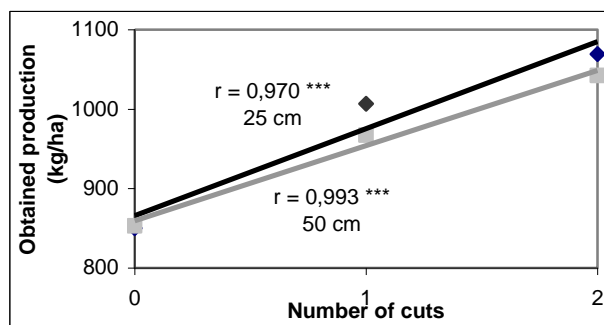


Figure 3 The nippings influence on seed production at monoecious hemp

CONCLUSIONS

The results obtained during the studied period have revealed:

- researches on the obtained hemp seed yield showed differences depending on the climate conditions and the number of cuts applied;

- during the experimented period (2013-2015) the highest yields were obtained at Dacia x 25, 50 cm x two cuts (1113 kg/ha, 1115 kg/ha) and Denise x 25 cm x two cuts (1106 kg/ha) interactions, which achieved distinct significantly production increase compared with the experience average (control variant);

- the highest yields, statistically ensured, and interpreted as highly significant were obtained in the Dacia x 25 cm x two cuts (2013) and Denise x 25 cm x two cuts (2013) interactions.

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