The Influence of Different Seeding Space and Organic Fertilization Level upon Production and Mass of 1000 Seeds, Recorded in Some Hemp Varieties

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ABSTRACT

Hemp (*Cannabis sativa* L.) was used for textile and cordage more than 4000 years. The cultivation of industrial hemp declined in the 19th century but it remains one of the oldest crops in history. Despite of the decline, nowadays interest for this crop has recently been renewed within various European countries (Roman et al., 2012). The aim of the research is to observe the evolution of production values and physical parameters (MMB- grain) under the influence of different seeding space and organic fertilization level recorded in some hemp varieties approved in Romania, with a low level of THC.

Keywords: *fertilization, hemp, MMB-grain, production, seeding space.*

INTRODUCTION

Originate from China, hemp is cultivated over 2000 years, for paper, canvases, ropes, and also food production.

In our country, hemp is one of the oldest cultivated plants, the main use was for clothing production.

Until '89, Romania, owned first place in Europe and fourth place world wide for cultivated areas with hemp, over 45.000 hectares.

Today, unfortunately, hemp acreage declined dramatically, the major factors who contributed were disappearance of smelters, negative association/confusion with marijuana („*Cannabis indica*”), current legislation, which does not allow to grown hemp, without an authorization.

Nowadays, it is aimed a relaunch for hemp culture, the main purpose is for obtaining the hempseed. These have a rich content in protein,

unsaturated fatty acids (Omega 6 and Omega 3), in ratio 3:1, the ideal ratio for human consumption recommended and confirmed by numerous medical research.

The first therapeutic use of the hemp plant, documented in Arabic literature, dates back to the 8th or 9th century. The most commonly used part of the plant at that time, were the seeds, and, to a smaller extent, the leaves.

Today we know that the essential fatty acids act through various action mechanisms such as the metabolites and the messengers. They play crucial roles in the metabolic traffic due to their effect on the nuclear receptors. These fatty acids can directly affect the nuclear receptors, by activating or repressing a series of metabolic pathways that are necessary for the correct defensive response of a cell. They also allow an organism to form the

eicosanoid molecules involved in the reproductive functions, inflammation processes, fever and pain production. The essential fatty acids have an impact on the traumas and diseases, in the formation of blood clots, regulation of blood pressure, secretion of gastric acid and on many other processes that are important for human health.

MATERIALS AND METHODS

Our study was based on a trifactorial experience:

A Factor – hemp varieties

a_1 - Dacia Secuieni (monoecious hemp), from SCDA Secuieni, Romania

a_2 - Denise (monoecious hemp), from SCDA Secuieni, Romania

a_3 - Zenit (monoecious hemp), from SCDA Secuieni, Romania

B Factor – fertilization

b_1 - unfertilized

b_2 - foliar fertilization with Fertitel (60ml/200sqm)

b_3 - foliar fertilization with Biostar (40ml/200sqm)

C Factor – plants density

c_1 - 333.000 pl/ha (30cm x 10 cm)

c_2 - 200.000 pl/ha (50cm x 10 cm)

c_3 - 143.000 pl/ha (70cm x 10 cm)

The hemp varieties studied are authorized, according to the Official Catalogue of varieties of crop plants in Romania, edition 2012 and comes from Secuieni (Roman, Romania), Agricultural Research and Development Station and includes the following morphological characteristics:

Dacia Secuieni, it was registreted in 2012, have high stem, which can reach over 4 meters in seed culture. The vegetation period is between 120-130 days.

Can achieved a stem production between 8,5 -11.8 t/ha, with a fiber content of good quality and the seed production can exceed 1000 kilograms.

The hemp varitety, Denise, is a monoecious plant and was recorded in 1999. Stem is high, between 2,5 – 3 meters and the growing season is 120-130 days. The stems production are between 11-12 t/ha and seed production is estimated to 900 kilograms.

Zenit was homologated in 2000, the vegetation period is between 120-130 days in seed culture and 90-110 days for fibre culture. The seed

production capacity is estimated to 1200 kilos/ha and strains production, 8 – 9 /ha.

The autumn-plowing was caried at 20-25 cm, and smoothed finely with a big disk harrow and with small disk. The seeding of monoecious hemp took place on 27.04.2012.

It is known from the literature that the row spacing for hempseed cultivar is 60-70 cm and 10-12 cm between plants providing seed density 20-25 seeds/m² (Şandru et al,1996). Tabără (2005) obtained the best results on the distance of 37,5 cm.

The spacing between rows was 70 cm, 50 cm and 30 cm and the distance between plants on row was 10 cm.

During the growing season was applied an extract from *Tagettes* sp. to control the invasion of fleas, which had a repellent effect against fleas.

Also, in July, the culture was foliar fertilized with two biological fertilizers, Biostar and Fertitel.

The harvest took place in 07.09.2012 with car combine for experimental fields Wintersteiger.

The experimental technique for bi-factorial experiences was used. The two factor variance analysis was used for calculations. Interpretation of the significance of the differences was made using the “t” test and Duncan test.

RESULTS AND DISCUSIONS

The application of fertilizers on Denise variety has increase the mass of 1000 grains value.

The control unfertilized recorded 15.16 g, results obtained are higher with 1.42 g (Fertitel) and 1.89 g (Biostar). The fertilization with Biostar has decreased the mass of 1000 grains for Dacia Secuieni and Zenit varieties (table 1).

Compared to the control (density 143.000 pl/sqm) the mass of 1000 grains is directly influence for Denise variety, the difference by the control are significantly distinct for 333.000 pl/sqm denisty, the differences recorded being 1.17% and are presented in table 2.

The highest hemp seed production was recorded to Zenit variety, at 333.000 pl/sqm density and the value obtained was 603.27 kg/ha.

The hemp variety Denise has recorded the lowest seed production (253.49 kg/ha), the differences obtained compared to control (Zenit variety) were significantly negative, the differences are related in table 3.

Regarding the relation between mass of 1000 grains and hemp seed production, it can be observed that at Denise and Zenit varieties the relation mentioned is directly proportional, a high value of mass of 1000 grains is correlated to high hemp seed production. As an exception, the relation between these two production elements in case of Dacia Secuieni variety, a high value of mass of 1000 grains does not lead to a high seed

production. The explanation can be the number of seeds on plant for Dacia Secuieni variety compared with other 2 varieties studied (figure 1).

CONCLUSIONS

The crop quality and quantity depends on plants density, the seed productions increase with the increase of the plants density. The absence

Tab. 1. Mass of 1000 grains obtained for the varieties tested in different fertilization conditions

Variety	Fertilization	MMB (mass of 1000 grains)	% by control	Difference	Significance	Duncan Test
Dacia Secuieni	unfertilized	16,47	100,0	0,00	Mt.	B
	Fertitel	16,64	101,0	0,17	-	B
	Biostar	16,27	98,8	-0,20	-	B
Denise	unfertilized	15,16	100,0	0,00	Mt.	A
	Fertitel	16,59	109,4	1,42	**	B
	Biostar	17,06	112,5	1,89	***	B
Zenit	unfertilized	16,72	100,0	0,00	Mt.	B
	Fertitel	16,19	96,9	-0,52	-	B
	Biostar	16,34	97,7	-0,38	-	B
DL (LSD) (p 5%)				0,81		
DL (p 1%)				1,14		SD= 0,86
DL (p 0.1%)				1,67		

Tab. 2. Mass of 1000 grains obtained for the varieties tested in different fertilization seeding space

Variety	Plant's density (pl/ sqm)	MMB (mass of 1000 grains)	% by control	Difference	Significance	Duncan Test
Dacia Secuieni	143.000 pl/sqm (10 cm x 70 cm)	16,77	100,0	0,00	Mt.	BC
	333.000 pl/sqm (10 cm x 30 cm)	16,58	98,8	-0,19	-	ABC
	200.000 pl/sqm (10 cm x 50 cm)	16,03	95,6	-0,74	-	AB
Denise	143.000 pl/sqm (10 cm x 70 cm)	16,83	100,0	0,00	Mt.	BC
	333.000 pl/sqm (10 cm x 30 cm)	15,66	93,0	-1,17	oo	A
	200.000 pl/sqm (10 cm x 50 cm)	16,32	97,0	-0,51	-	AB
Zenit	143.000 pl/sqm (10 cm x 70 cm)	17,22	100,0	0,00	Mt.	C
	333.000 pl/sqm (10 cm x 30 cm)	15,94	92,5	-1,29	oo	AB
	200.000 pl/sqm (10 cm x 50 cm)	16,09	93,4	-1,14	oo	AB
DL (LSD) (p 5%)				0,77		
DL (p 1%)				1,04		SD= 0,86
DL (p 0.1%)				1,39		

Tab. 3. Production obtained for the varieties tested in different fertilization seeding space

Variety	Fertilization	Production kg/ha	% by control	Difference	Significance	Duncan Test
Dacia Secuieni	143.000 pl/ha (10 cm x 70 cm)	382,00	100,0	0,00	Mt.	ABC
	333.000 pl/ha (10 cm x 30 cm)	454,00	118,8	72,00	-	BC
	200.000 pl/sqm (10 cm x 50 cm)	352,90	92,4	-29,10	-	AB
Denise	143.000 pl/sqm (10 cm x 70 cm)	243,49	100,0	0,00	Mt.	A
	333.000 pl/sqm (10 cm x 30 cm)	372,00	152,8	128,51	-	ABC
	200.000 pl/sqm (10 cm x 50 cm)	346,00	142,1	102,51	-	AB
Zenit	143.000 pl/sqm (10 cm x 70 cm)	448,80	100,0	0,00	Mt.	BC
	333.000 pl/sqm (10 cm x 30 cm)	603,27	134,4	154,47	*	D
	200.000 pl/sqm (10 cm x 50 cm)	504,00	112,3	55,20	-	CD
DL (LSD) (p 5%)				135,85		
DL (p 1%)				190,69		SD= 135,72
DL (p 0.1%)				269,21

Fig.1. The relation between mass of 1000 grains and hemp seed production recorded in 2012

of precipitation recorded in July, August caused decreases in seed production.

The foliar fertilization with Biostar has decreased the mass of 1000 grains for Dacia Secuieni and Zenit hemp varieties.

Denise variety has responded favorably to fertilization, the mass of 1000 grains has increased higher with 1.42 g (Fertitel) and 1.89 g (Biostar) compared to the control.

The highest hemp seed production was recorded to Zenit variety, at 333.000 pl/sqm density and the value obtained was 603.27 kg/ha.

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