

RESEARCH REGARDING THE INFLUENCE OF PLANTS DENSITY ON THE HEMP SEED PRODUCTIONS (*CANNABIS SATIVA L.*)

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Abstract. Hemp is one of the most productive and useful plants known for centuries hemp has been the oldest and most important textile plant. Over centuries the fibers were used for the making of ropes, sails, cloth and paper, while the seeds were used for protein-rich food and feed. Hemp has many industrial applications such as the production of paper, textiles, building materials, food, medicine, paint, detergent, varnish, oil, ink, and fuel. The paper has proposed a study regarding the evolution of production values and physical parameters (MMB- grain) under the influence of different seeding space recorded in some hemp varieties approved in Romania, with a low level of THC (tetrahydrocannabinol).

Keywords: hemp, plant density, MMB-grain, hemp seed production

INTRODUCTION

Hemp has been an agricultural crop for thousands of years. Hemp is one of the most productive and useful plants known. It grows quickly without pesticides in most locations and climates, with only moderate water and fertilizer requirements, becoming a valuable and environmentally friendly crop.

More than 10,000 years ago the Chinese were processing hemp fiber for use in ropes.

The earliest hemp fabric found dates back to around 8000 BC from ancient Mesopotamia. This makes the textile fiber of hemp as old as pottery and older than records of metal work (Ceapoiu, 1958).

Over centuries the fibers were used for the making of ropes, sails, cloth and paper, while the seeds were used for protein-rich food and feed. Hemp have many industrial applications such as the production of paper, textiles, building materials, food, medicine, paint, detergent, varnish, oil, ink, and fuel. Botanically, hemp is classified as *Cannabis sativa L. ssp. culta* (Muntean et al, 2011).

Hemp is an annual plant, it rises in spring and dies naturally at the first frost. Its adaptability geared by its photoperiodic reaction enables it to grow all around the world. Hemp is a short day plant (Wareing and Philips, 1978) and the flowering initiation takes place at a precise moment related to day length.

MATERIAL AND METHOD

Our study was based on a bifactorial experience.

- A Factor – hemp varieties

a₁- Dacia Secuieni (monoecious hemp), from SCDA Secuieni, Romania

a₂ – Denise (monoecious hemp), from SCDA Secuieni, Romania

a₃ – Zenit (monoecious hemp), from SCDA Secuieni, Romania

- B Factor – plants density

b₁ – 333.000 pl/ha (30cm x 10 cm)

b₂ – 200.000 pl/ha (50cm x 10 cm)

b₃ – 143.000 pl/ha (70cm x 10 cm)

The hemp varieties utilized are authorized, according to the Official Catalogue of varieties of crop plants in Romania, edition 2012.

The autumn-plowing was carried 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 60-70cm and 10-12cm between plants providing seed density 20-25 seeds/m² (Șandru 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.

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 DISCUSSION

The results regarding the interaction between plants density and hemp varieties are presented in Table 1. It is found that plants density influence MMB- grain for all the hemp varieties taken in study (Dacia Secuieni, Denise, Zenit).

By comparison with plants density of 143.000 plants per hectare taken as the control, at the density of 200.000 plants per hectare are found very significant positive differences regarding MMB-grain analysis for all the hemp varieties tested.

At the density of 333.000 plants per hectare can be observe very significant negative differences for Dacia Secuieni and Denise varieties and negative significant for Zenit variety.

To all the hemp varieties tested, the biggest value has been achieved at the of 200.000 plants per hectare (Dacia Secuieni – 17,70 g, Denise – 27,40 g, Zenit – 29,30 g).

In average for the varieties tested, can be observe that the mass of 1000 grains varies depending on the plants density.

Between plant density and varieties tested the seed productions obtained were established highly significant direct correlations. Increasing the plants density were recorded higher seed productions per hectare. By comparison with the control (143.000 plants per hectare) it can be observe, for the density of 200.000 and 333.000 plants per hectare, were established highly significant direct correlations for the experimented cultivars.

Average on the hemp varieties studied, sowing at a 200.000 and 333.000 plants per hectare plant density were recorded higher productions, with highly significant correlations. Analyzing the data from table 2 by using Duncan test, there were established significant differences regarding the seed productions between the experimented cultivars (table 2).

Table 1

Influence of plants density between hemp variety on MMB hemp seed

Variety	Plants density (pl/ha)	MMB (g)	Percentage (%)	Difference/significance	Duncan Test
Dacia	143.000 (70cm x 10 cm)	16,80	100	Control	B
	200.000 (50cm x 10 cm)	17,70	105,4	0,90***	C
	333.000 (30 cm x 10 cm)	15,40	91,7	-1,40 ⁰⁰⁰	A
Denise	143.000 (70cm x 10 cm)	26,60	100	Control	E
	200.000 (50cm x 10 cm)	27,40	103,0	0,80***	FG
	333.000 (30 cm x 10 cm)	25,10	94,4	-1,50 ⁰⁰⁰	D
Zenit	143.000 (70cm x 10 cm)	27,50	100	Control	G
	200.000 (50cm x 10 cm)	29,30	106,6	1,80***	H
	333.000 (30 cm x 10 cm)	27,10	98,5	-0,40 ⁰	F
Average/variety	143.000 (70cm x 10 cm)	23,63	100	Control	B
	200.000 (50cm x 10 cm)	24,80	105	1,17***	C
	333.000 (30 cm x 10 cm)	22,53	95	-1,10 ⁰⁰⁰	A
LSD (p 5%) plant density				0,22	0,22-0,23
LSD (p 1%) plant density				0,31	
LSD (p 0,1%) plant density				0,43	
LSD (p 5%) plant density x variety				0,38	0,38-0,43
LSD (p 1%) plant density x variety				0,53	
LSD (p 0,1%) plant density x variety				0,75	

Tabel 2

Influence of plants density between hemp variety on hemp seed productions

Variety	Plants density (pl/ha)	Seed production (g)	Percentage (%)	Difference/significance	Duncan Test
Dacia	143.000 (70cm x 10 cm)	382,90	100	Control	C
	200.000 (50cm x 10 cm)	454,00	119	71,10***	D
	333.000 (30 cm x 10 cm)	448,80	117	65,90***	D
Denise	143.000 (70cm x 10 cm)	243,63	100	Control	A
	200.000 (50cm x 10 cm)	346,00	142	102,37***	B
	333.000 (30 cm x 10 cm)	372,90	153	129,27***	C
Zenit	143.000 (70cm x 10 cm)	352,90	100	Control	B
	200.000 (50cm x 10 cm)	504,00	143	151,10***	E
	333.000 (30 cm x 10 cm)	603,27	171	250,37***	F
Average/variety	143.000 (70cm x 10 cm)	326,48	100	Control	A
	200.000 (50cm x 10 cm)	434,67	133	108,19***	B
	333.000 (30 cm x 10 cm)	474,99	146	148,51***	C
LSD (p 5%) plant density				9,50	9,49-9,96
LSD (p 1%) plant density				13,34	
LSD (p 0,1%) plant density				18,83	
LSD (p 5%) plant density x variety				16,46	16,44-18,53
LSD (p 1%) plant density x variety				23,11	
LSD (p 0,1%) plant density x variety				32,62	

CONCLUSIONS

- The biggest values of the mass of 1000 grains were recorded at the density of 200.000 plants per hectare, for the all hemp varieties tested.
- The maximum seed yield of 603, 27 kg/ha was reached for the monoic hemp, the Zenit variety.
- The crop quality and quantity depends on plants density, the seed productions increase with the increase of the plants density.

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