

INFLUENCE OF CULTIVAR, CULTIVATION METHOD AND PLANT DENSITY ON THE PRODUCTION OF ONIONS

Dan Daniela, D. Maniutiu

University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

Abstract. *Experiments conducted in 2010 in the city Reghin, Mures County, was followed the influence of two cultivars (De Buzau and Nickerson F1), the method of cultivation and plant density on the production of onions, as well as on commercial quality of the bulbs. The method of cultivation and plant density have major influence on production. Thus, experimental version founded by the seedling culture, both density of 700 thousands plants/ha, and the 1400 thousands plants / ha, as that established by direct seeding at density of the 1400 thousands plants / ha, records production increases very significantly, compared with the variant culture established by direct seeding density of 700 thousands plants/ha. Nickerson hybrid in culture through seedling , at both densities, records production increases of 13.1% and 26.4%, compared to the control version (De Buzau, direct sowing, 700 thousand plants/ha). Variety De Buzau, at the density of 1400 thousands plants/ha, at the culture established by direct sowing, as well as the one through seedling, makes differences of production very significant positive towards the control version.*

Keywords: onions, cultivar, method of cultivation, density.

INTRODUCTION

The approach of this study was started from the fact that although in the specialty literature there are many researches related to the onion crop, the plant density, they were still issues that require clarification, related to the behavior of different cultivars to a particular method of cultivation, as those regarding on their suitability to climatic conditions in the areas of culture. Among the three methods for culture of onion for bulbs, by chives, and directly sowing, there are some differences on adapting to eco climatic conditions, productivity, product quality and destination, and economic efficiency of crops.

Highest productivity under traditional technology is recorded at seedling onions, in irrigated crops. By using hybrids with high production potential and at high density, the higher productions can be obtained by direct sowing culture.

The recommendations in the specialty literature on plant density of onion are very different. Some authors consider that the minimum density of plants, to ensure normal production of onions is 35-40 plants / m² (Bălașa, 1973). Krug and collaborators (1986) recommend a density of up to 150 plants/m² at common varieties and 80-100 plants/ m² for hybrids, indicated densities by Chauv and Foury also (1995). At an optimal regime of water supply the increasing plant density from 50-80 plants/m² led to production increases of 13.3% at Wolski variety and of 24.0% at the variety Red of Turda (Apahaidean, 1996).

Recent research conducted at the direct sown onions, with more varieties and hybrids have shown that by increasing the density of plants harvested at 80-90

plants/m² productions can be achieved between 54 t and 80-82 t / ha (Popandron and *et al.*, 2009).

In these circumstances it was considered necessary, that in the vegetable basin Reghin, Mures County, specializing in the onion crop, to determine the behavior of two onion cultivars, at the culture by direct sowing and planting, with different densities, to obtain a product of high quality, suitable for fresh consumption (salads), agreed a lot by us.

MATERIAL AND METHOD

In the experience were used varieties De Buzau and F1 Nickerson hybrid. In case of variety De Buzau - the bulb is large, spherical, golden-yellow color. It is resistant to drought and conservation.

Bulb of Nickerson F1- is ovoid, red-violet color, both outside and inside. To establish technological sequences at onion crop, it was held in the city Reghin, Mures County, a experience with three factors.

Factor A-cultivation with two graduations:

-a1-De Buzau;

-a2 -Nickerson F1;

Factor B-culture method with two graduations:

-b1-through direct seeding;

-b2-by seedling;

Factor C-density factor with two graduations:

-c1-70 plants/m²;

-c2-140 plants/m².

From the combination of factors resulted eight experimental variants.

Experience has been placed in blocks subdivided with three repetitions. Experimental plot harvested area was 7.5 m².

Culture by direct sowing was established in April 20, 2010, and that trough the seedling was planted in May 15, 2010, and the seedlings occurred during March 26 - May 15, having aged of 50 days. Were applied maintenance works specific of each culture method. Harvesting was done on 1 September 2010 at direct sown onions and 3 September 2010 at the seedling onions.

RESULTS AND DISCUSSION

Depending on the method of culture, the culture period in the field was 135 days at culture by direct sowing and 112 days at culture by seedling, plus 50 days during seedling production. Average production of bulbs was 23, 53 t/ha, with variations depending on the experimental version from 13,8 to 29,6 tons/ha.

Production of onion depending on the cultivar, cultivation method and densit. Analyzing the unilateral influence of cultivar on production of bulbs (Table 1), it is noted that Nickerson F1 hybrid registers a production difference of - 3.27 t/ha, significantly distinct negative from the variety De Buzau, considered control variety.

Table 1

Unilateral influence of cultivar on production of bulbs, Reghin, 2010

Cultivar	Production		Difference ±	Significance of difference
	t / ha	%		
De Buzau	25.16	100	-	-
Nickerson F1	21.89	87.0	-3.27	00
		DL 5%	0.90	
		1%	2.07	
		0.1%	6.58	

Relatively weaker result registered at Nickerson hybrid is caused by very low production in the version with direct sowing and low density and can be determined by an weaker sprouting. With regard to the unilateral influence of culture method (by direct sowing and seedlings) (Table 2), over the production of onion crop is observed that at the crops trough seedling is registered a production increase of 19.5%, very significantly, towards crops established by direct sowing.

Table 2

Unilateral influence of culture method on the production of bulbs, Reghin, 2010

Method of culture	Production		Difference ±	Significance of difference
	t / ha	%		
By seeding	21.43	100	-	-
By seedling	25.62	119.5	+4,19	XXX
		DL 5%	0.71	
		1%	1.17	
		0.1%	2.20	

And in this case weaker spring of the Nickerson hybrid and low production in the variant with reduced density reduces the average of versions of culture by direct sowing. Analyzing the unilateral influence of density plants at unit of surface over the production of onions (Table 3) is noted that the experimental variants with high density (140 plants/m²) recorded higher production, with significant differences compared with the experimental variants with reduced density of 70 plants/m².

Table 3

Unilateral influence of plant density over production of bulbs, Reghin, 2010

Density (plants / m ²)	Production		Difference ±	Significance of difference
	t / ha	%		
70	20.26	100	-	-
140	26.79	132.3	+6,53	XXX
		DL 5%	0.83	
		1%	1.20	
		0.1%	1.80	

The result is consistent with that obtained also by other authors (Radu Negru, 1974; Apahideanu, 1996; Popandron *et al.*, 2009).

As regards to the bilateral influence of cultivar and the method of production over the onion crop (Table 4) shows that F1 Nickerson hybrid by direct sowing records harvest decreases with very significant differences from the control variety (De Buzau, direct sowing), the average value being diminished by very low production recorded at the lowest density.

Table 4
Bilateral influence of cultivar and of method of culture on the production of bulbs,
Reghin, 2010

Cultivar	Method of culture	Production		Difference ±	Significance of Difference
		t / ha	%		
De Buzau	By seeding	24.93	100	-	-
Nickerson F1	By seeding	17.93	71.9	-7.0	000
De Buzau	By seedling	25.38	101.8	+0.45	-
Nickerson F1	By seedling	25.85	103.7	+0.92	-
				DL 5%	1.12
				1%	2.22
				0.1%	5.87

Both varieties De Buzau and Nickerson F1 hybrid, grown by seedling, make production increases of 1.8% and 3.7% towards control version, but statistically differences uninsured.

In terms of the bilateral influence of the method of cultivation and plant density on the production of bulbs (Table 5) it can be seen that the experimental variations seedling established by both the density of 70 plants/m² and also at 140 at the plant/m², achieves production differences of 5.12 t/ha and respectively of 3.25 t/ha, very significant positive from the variants with direct sowing.

Table 5
Influence of bilateral method of cultivation and plant density
on the production of bulbs

Method of culture	Density (plants / m ²)	Production		Difference ±	Compared to direct sowing	
		t / ha	%		%	Difference±
By sowing	70	17,70	100	-	100	-
By seedling	70	22,82	128,9	+5,12 ^{xxx}	128,9	+5,12 ^{xxx}
By seeding	140	25,17	142,2	+7,47 ^{xxx}	100	-
By seedling	140	28,42	160,6	+10,72 ^{xxx}	112,9	+3,25 ^{xxx}
				DL 5%	1,08	
				1%	1,66	
				0.1%	2,74	

Variants of culture by direct seeding at density of 140 plants/m² records a production increase of 42.2% very significant, compared to direct sowing culture but with a lower density per unit area.

Under the combined influence of factors (Table 6) it is noted that the best results are obtained at the density of 140 plants/m² at the variety De Buzau, at culture established by direct sowing, as well as to the one through seedling. Nickerson F1 hybrid grown by seedling also makes positive differences in

production very significantly from version control (De Buzau, directly sown, 70 plants/m²).

Table 6
Combined influence of factors on the production of bulbs
Reghin, 2010

Cultivar	Method of culture	Density (plants/m ²)	Production		Difference ±	Compared with De Buzau variety	
			t/ha	%		%	Difference ±
De Buzau	By seeding	70	21.57	100	-	100	-
Nickerson F1	By seeding	70	13.83	64.1	-7.73 ⁰⁰⁰	64.1	-7.73 ⁰⁰⁰
De Buzau	By seeding	140	28.30	131.2	+6.73 ^{xxx}	100	-
Nickerson F1	By seeding	140	22.03	102.1	+0.46	77.8	-6.27 ⁰⁰⁰
De Buzau	By seedling	70	21.20	98.3	-0.37	100	-
Nickerson F1	By seedling	70	24.43	113.1	+2.86 ^{xx}	115.2	+3.23 ^{xx}
De Buzau	By seedling	140	29.57	137.1	+8.00 ^{xxx}	100	-
Nickerson F1	By seedling	140	27.27	126.4	+5.70 ^{xxx}	92.2	-2.30 ⁰

DL 5% 1.59

1% 2.63

0.1% 5.34

At the density of 70 plants/m², Nickerson F1 hybrid grown by seedling achieves an increased production of 13.1%, significantly distinct compared with version control.

The worst results are recorded at Nickerson F1 hybrid, direct seeding at density of 70 plants / m² with a very significant negative difference in production compared to version control.

CONCLUSIONS

After analyzing the experimental results obtained in 2010 with two cultivars at different densities and culture methods, the following conclusions can be drawn:

1. Nickerson hybrid gave poor results in the production of the bulbs compared with the variety De Buzau.

2. Experimental variants of culture established by seedling recorded productions higher than those established by direct sowing.

3. Regarding the influence of density on the production of bulbs, it was found that the experimental variations with a density higher than 140 plants/m² gave much higher bulbs productions compared with the experimental variants with density of 70 plants/m² as both hybrid Nickerson and the variety De Buzau.

4. At the experimental variations created by the seedling De Buzau variety with a density of 140 plants/m² both cultivars, records the best production results compared with control version (variety De Buzau, direct seeding at density of 70 plants/m²).

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