

## RESEARCHES REGARDING THE INFLUENCE OF TECHNOLOGICAL SEQUENCES ON THE YIELDS OF TUBERS AND BIOMASS AT JERUSALEM ARTICHOKE UNDER THE CONDITIONS OF A.R.D.S. SECUIENI

### CERCETĂRI PRIVIND INFLUENȚA UNOR SECVENȚE TEHNOLOGICE ASUPRA PRODUCȚIEI DE TUBERCULI ȘI BIOMASĂ LA TOPINAMBUR ÎN CONDIȚIILE DE LA S.C.D.A. SECUIENI

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**Abstract.** *The paper aims to highlight the influence of the distance between tubers in a row and the nutrition system of the Jerusalem artichoke plant on the yields of tubers and biomass. The research was conducted between 2018 and 2019, in the experimental field of A.R.D.S. Secuieni. The obtained results showed that the studied factors influenced to a great extent the tuber yield obtained. Thus, the yield of tubers varied within wide limits, being between 23.16 t / ha (40 cm x NOPOKO) and 32.77 t / ha (50 cm x N120P120K80). The interaction of the studied factors influenced the yield of biomass at Jerusalem artichoke, ranging from 25.15 t / ha (40 cm x NOPOKO) to 35.45 t / ha (50 cm x N120P120K80).*

**Key words:** tubers, biomass, Jerusalem artichokes

**Rezumat.** *Lucrarea își propune să evidențieze influența distanței între tuberculi pe rând și a sistemului de nutriție al plantei de topinambur asupra producției de tuberculi și biomasă. Cercetările au fost efectuate în perioada 2018 - 2019, în câmpul experimental al S.C.D.A. Secuieni. Rezultatele obținute au arătat că factorii studiați au influențat într-o măsură foarte mare producția de tuberculi obținută. Astfel, producția de tuberculi a variat în limite largi, fiind cuprinse între 23,16 t/ha (40 cm x NOPOKO) și 32,77 t/ha (50 cm x N120P120K80). Interacțiunea factorilor studiați au influențat producția de biomasă la topinambur, variind de la 25,15 t/ha (40 cm x NOPOKO) până la 35,45 t/ha (50 cm x N120P120K80).*

**Cuvinte cheie:** tuberculi, biomasă, topinambur

## INTRODUCTION

In Central and Western European countries, Jerusalem artichoke tubers are widely used as a raw material for the extraction of inulin and fructose (Fuchs, 1987; Grube *et. al.*, 2002; Ninness, 1999). Large tubers are preferred because they have a higher inulin content (Baert, 1996). Tubers can be used successfully to obtain biomass for biofuel or in the alcohol industry. They can also be used as animal feed or in the food and medicine industry. A substance contained in tubers,

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inulin, has the lowest percentage of glucose and sucrose, compared to those obtained from other plants. This substance contributes to the normalization of blood sugar levels and is of real benefit to diabetics (Tanjor *et. al.*, 2012).

Jerusalem artichoke can grow in soils poor in fertility. However, the application of optimal technological links considerably increases crop productivity. Optimal technological links that increase the productivity of tubers and biomass include cultivar selection, planting date, fertilization, nutrition space, effective weed control, irrigation and harvest time.

## MATERIAL AND METHOD

The trial was conducted on a typical cambic chernozem soil type, middle texture, acid: pH H<sub>2</sub>O–6.29, characterized as: well-supplied in phosphorus (39 ppm PAL), Ca (13.6 mEq/100 g soil Ca) and Mg (1.8 mEq/100 g soil Mg), middle supplied in active humus (1.88 %) and nitrogen (16.2 ppm N-NO<sub>3</sub>) and poorly supplied in potassium (124.6 ppm K<sub>2</sub>O). The experiment was organized in 2018-2019 in the experimental field of Agricultural Research - Development Station Secuieni, Neamt County, placed according to the method of subdivided plots in three replications.

Factor A was represented by the distance between plants in a row with two graduations: a1 - 40 cm and a2 - 50cm. Factor B was the fertilization system with five graduations: a1 - Unfertilized, a2 - N40P40K40, a3 - N80P80K80, a4 - N120P120K80 and a5 - N160P160K80.

## RESULTS AND DISCUSSIONS

During the analyzed period, the studied factors influenced to a great extent the tuber production obtained. Thus, the average production varied in wide limits, being between 23.16 t/ha (40 cm x unfertilized variant) and 32.77 t/ha (50 cm x N120P120K80). Compared to the control variant (average experience), the non-fertilized variants achieved production differences between 5.38 t/ha and 2.14 t/ha, interpreted as distinct and very significant.

Statistically assured production increases were within wide limits, from 1.83 t/ha (50 cm x N80P80K80), an increase interpreted as significant up to 4.24 t/ha (50 cm x N120P120K80), an increase interpreted as being distinct and very significant (tab. 1).

The biomass production of Jerusalem artichoke ranged from 25.15 t/ha (40 cm x unfertilized variant) to 34.45 t/ha (50 cm x N120P120K80). Compared to the control variant (average of experience), distinctly significant and very significant production increases were achieved at the interactions of 40 cm and 50 cm between tubers in a row at fertilization with N80P80K80 and N120P120K80 (2.03 t/ha - 4.53 t/ha), which means that Jerusalem artichoke responds favorably to planting 50 cm between tubers and higher doses of fertilizers (tab. 2).

Table 1

The influence of the interaction between the distance between tubers/row x fertilization on the tubers production at *Helianthus tuberosus* L. (Jerusalem artichoke), 2018-2019

Distance between tubers / row (cm) (A)	Fertilization (B)	Tubers production (t/ha)	%	Diff.	Sign.
40	Unfertilized	23.16	81.16	-5.38	ooo
	N40P40K40	25.99	91.08	-2.55	oo
	N80P80K80	28.43	99.63	-0.11	
	N120P120K80	30.81	107.97	2.28	**
	N160P160K80	28.28	99.11	-0.26	
50	Unfertilized	26.40	92.52	-2.14	oo
	N40P40K40	28.58	100.16	0.04	
	N80P80K80	30.36	106.40	1.83	**
	N120P120K80	32.77	114.86	4.24	***
	N160P160K80	30.51	106.94	1.98	**
Average		28.53	100	Ct.	
LSD A X B		5% = 1.13 t/ha 1% = 1.66 t/ha 0,1% = 3.01 t/ha			

Table 2

The influence of the interaction between the distance between tubers / row x fertilization on the biomass production at *Helianthus tuberosus* L. (Jerusalem artichoke), 2018-2019

Distance between tubers / row (cm) (A)	Fertilization (B)	Biomass production (t/ha)	%	Diff.	Sign.
40	Unfertilized	25.15	81.34	-5.77	ooo
	N40P40K40	28.13	90.96	-2.80	oo
	N80P80K80	30.57	98.85	-0.36	
	N120P120K80	32.95	106.55	2.03	**
	N160P160K80	30.42	98.38	-0.50	
50	Unfertilized	29.08	94.03	-1.85	oo
	N40P40K40	31.26	101.08	0.33	
	N80P80K80	33.04	106.84	2.11	**
	N120P120K80	35.45	114.63	4.53	**
	N160P160K80	33.18	107.31	2.26	**
Average		30.92	100	Ct.	
LSD A X B		5% = 1.16 t/ha 1% = 1.81 t/ha 0,1% = 3.47 t/ha			

## CONCLUSIONS

1. Jerusalem artichoke can grow in poor soils in terms of fertility, but the application of optimal technological links considerably increases the production of tubers and biomass.

2. The application of the optimal technological links led to the obtaining of tuber productions of up to 32 t/ha and 35 t/ha of biomass production.

*Acknowledgments: This work was supported by a grant of the Romanian Ministry of Research and Innovation CCDI – UEFISCDI, project number 9/PCCDI/2018 within PNCDI III.*

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