THE EFFECT OF DIFFERENTIAL FERTILIZATION UPON DESIRÉE AND OSTARA POTATOS PRODUCTION ON DISTRICAMBOSOL SOIL

Eva-Maria FIŢ, Maria-Claudia HANGAN

University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture
3-5, Mănăştur Street, 400372, Cluj-Napoca, Romania Phone: +40-264-596384; fax: +40-264-593792;
Corresponding author: fiteva@yahoo.com

Abstract: *Potato is a current permanent issue, it is an essential factor to ensure food of the humanity, feeding the animals and industrial processing Because it forms an abundant vegetative mass and a high quantity of tubers per unit area, potato plant is a great consumer of nitrogen, phosphorus, potassium, calcium and magnesium. The export of mineral elements from soil by crops is very high which causes rapid poorness of soil. is necessary a appropriate fertilization to prevent this phenomenon. The potatoes yielding occurs with a high consumption of nutrients, although consumption does not increase proportionally the crop production are obtained. a rational fertilization are obtained increases production from 30 to 70% and significant effect on the development quality of tubers production. The differential fertilization in the experimental field, from Avram Iancu place, Alba district, on the Districambosol soil the following fertilization treatments were applied: first possibility is considered as the control where no fertilization was made, the other treatments: $N_{40}P_{40}K_{40}$, $N_{80}P_{80}K_{80}$, $N_{120}P_{120}K_{120}$, manure 20t/ha, manure 20t/ha + $N_{40}P_{40}K_{40}$, manure 20t/ha + $N_{80}P_{80}K_{80}$, manure 20t/ha + $N_{120}P_{120}K_{120}$, leaf fertilizer + $N_{40}P_{40}K_{40}$, leaf fertilizer + $N_{80}P_{80}K_{80}$, leaf fertilizer + $N_{120}P_{120}K_{120}$, leaf fertilizer + manure 20t/ha. Districambosol soil is an acid brown soil on shale hort crystalline clayey, affecting sustainable production capacity. The mandatory premise to increase yields per hectare is the cultivation of species and varieties of plants with high production capacity and optimization of agrochemical soil characteristics progressively by works and fertilization. By optimizing soil agrochemical is following maxim satisfaction in higher plants growing requirements as compared to plants growing in soil reaction and the presence of nutrients in certain concentrations and proportions between them. Some authors specifies that yield development growth with increasing dose of nitrogen and organic fertilizer, in our case the potato production increases in case of variety Desiree: $N_{80}P_{80}K_{80}$ + leaf fertilizer, leaf fertilizer + $N_{120}P_{120}K_{120}$ and to potato production increases variety Ostara the treatments are: $N_{120}P_{120}K_{120}$, leaf fertilizer + $N_{120}P_{120}K_{120}$.*

Key words**:** *potato, differential fertilization, production*

INTRODUCTION

The technology of potato cultivation in order to obtain high crops, economic and quality, the problem of fertilizers used is very important. Without the use of optimal doses of well balanced fertilizers in terms of nutrients, the investment made for used with high varieties capacity has very low efficiency (M. RUSU et al., 2005).

The potato is a plant with high demands to nutrients as abundant form of vegetative mass and a high quantity of tubers at the unit area. It is a great consumer of nitrogen, phosphorus, potassium, magnesium and calcium, but the macro elements too.

The potato fertilization both dozes and ratio of nutrients is causing significant differences between varieties of different precocity (D. NĂSTASE şi colab., 1996).

The organo-mineral fertilization efficiency in the Apuseni Mountains is primarily beneficial on soil maintaining and enhancing fertility and by achieving organic production of tubers in potato crops.

MATERIAL AND METHODS

Research and experiments linked to the objectives were conducted on an acid brown soil (Districambosol soil) located in the Avram Iancu village, Alba district. Pedomorfologic point of view of soil is characterized by:

- Terrain: low terraced slope corrugated
- Gradient: 15-20%
- Altitude: 1200m
- Use: arable, potato crop
- Rock: green sericite shale; shale micacee, conglomerates, clays
- Horizons sequence: A_0-A/B-B_{V1}-B_{B2}(G)-R.

On the agrochemical the soil is characterized by moderately acid pH with low humus content to medium low phosphorus content and medium potassium supply (table 1).

Table 1

The agrochemical and pedological analysis at Districambosol soil type in Avram Iancu areas

HORIZONTAL		A 0	A / B	B V1	B V2
Depth (cm)		0-20	20-40	60-80	100-120
pH H2O		5.17	5.23	5.37	5.27
Humus%		3.10	2.12	1.56	1.26
P - Al (ppm)		22.4	10.0	4.0	2.0
K - Al (ppm)		110	60	56	48
Yes (g / cm 3)		1.53	1.49	1.48	1.46
V%		30.2	34.7	59.8	55.1
Particle size analysis %	Sand Coarse	24.3	22.6	21.0	20.1
	Fine sand	42.48	41.95	42.19	44.55
	Dust I + II	16.27	18.36	17.27	15.22
	Clay	16.95	17.09	19.54	20.13
	Texture	LN	LN	LN	

The analysis methodology performed to characterize the level of agrochemical soil and crops nutrition is adopted and recommended by the ICPA for OSPA district laboratories.

The experiences with systems fertilization investigated at potato crops, at Desiree and Ostara varieties, were the following variants:

1. Unfertilized control;
2. $N_{40}P_{40}K_{40}$ (the complex 15-15-15);
3. $N_{80}P_{80}K_{80}$ (the complex 15-15-15);
4. $N_{120}P_{120}K_{120}$ (in complex 15-15-15);
5. 20t/ha manure;
6. 20t/ha manure + $N_{40}P_{40}K_{40}$ (the complex 15-15-15);
7. 20t/ha manure + $N_{80}P_{80}K_{80}$ (the complex 15-15-15);
8. 20t/ha manure + $N_{120}P_{120}K_{120}$ (in complex 15-15-15);
9. Foliar fertilization (F-311 HUM) + $N_{40}P_{40}K_{40}$ ((in the complex 15-15-15);
10. Foliar fertilization (F-311 HUM) + $N_{80}P_{80}K_{80}$ (the complex 15-15-15);
11. Foliar fertilization (F-311 HUM) + $N_{120}P_{120}K_{120}$ (in complex 15-15-15);
12. Foliar fertilization (F-311 HUM) + manure 20t/ha.

RESULTS AND DISCUSSIONS

The differentiated fertilization ensures the smallest differential production of tubers in organo-mineral fertilization variants (20t/ha manure + $N_{120}P_{120}K_{120}$) and organic (manure 20t/ha). Tuber crops were highest at the variants leaf fertilized amid maximum dose of mineral fertilizers (F-311 HUM + $N_{120}P_{120}K_{120}$ and F-311 HUM +$N_{80}P_{80}K_{80}$) (Table 2, Figure 1).

Foliar fertilizers are widely regarded as products with a stimulating effect and correct mineral nutrition, the role secondary nutrients, resulting in a significant increase productive used of elements from soil and applied it without substitute methods of fertilization through the root (the ground) to of the foliar fertilizers have additional (complementary) role to balance and optimize the system of applied fertilization at agricultural and horticultural plants.

Table 2

Production results regarding the effect of differentiate fertilization for potato, Ostara genre (year 2009)

No.	Fertilization variance	The average tubers production				
		t / ha	%	Difference t / ha	Significance of difference	Duncan test
1	Control	21.67	100.0	0.00	Mt.	A
2	$N_{40}P_{40}K_{40}$	25.95	119.8	4.29	-	AB
3	$N_{80}P_{80}K_{80}$	28.09	129.7	6.43	-	AB
4	$N_{120}P_{120}K_{120}$	27.86	128.6	6.19	-	AB
5	Manure 20t/ha	25.71	118.7	4.05	-	ABC
6	20t/ha manure + $N_{40}P_{40}K_{40}$	20.24	93.4	-1.43	-	ABC
7	20t/ha manure + $N_{80}P_{80}K_{80}$	24.76	114.3	3.10	-	ABC
8	20t/ha manure + $N_{120}P_{120}K_{120}$	17.14	79.1	-4.52	-	ABC
9	F-311 HUM + $N_{40}P_{40}K_{40}$	24.76	114.3	3.10	-	BC
10	F-311 HUM + $N_{80}P_{80}K_{80}$	31.90	147.3	10.24	*	BC
11	F-311 HUM + $N_{120}P_{120}K_{120}$	32.14	148.3	10.48	*	C
12	F-311 HUM + manure 20t/ha	20.24	93.4	-1.43	-	C
DL (5%)				8.73		
DL (1%)				11.89		
DL (0.1%)				15.98		

Analyzing the tubers production produced in 2009 by Districambosol soil in Avram Iancu areas, may be the first indication that the production levels achieved, regardless the fertilization, the biological potential of Ostara variety is obtained the maximum crops with only 31-32 t/ha tubers to the medium potential production of the variety (41 t/ha). The significant effect of fertilization was found to control the doses of mineral fertilizers in combination with foliar fertilization (F-311 HUM + $N_{80}P_{80}K_{80,}$ F-311 HUM + $N_{120}P_{120}K_{120}$), the rest of fertilization was not find different from the controls.

As the Ostara variety, the Desiree variety was performed similar to differentiated fertilization, the highest crops achieving in foliar fertilized variants in combination with the highest doses of mineral fertilizers (F-311 HUM + $N_{80}P_{80}K_{80,}$ F-311 HUM + $N_{120}P_{120}K_{120}$) (Table 3, Fig. 2).

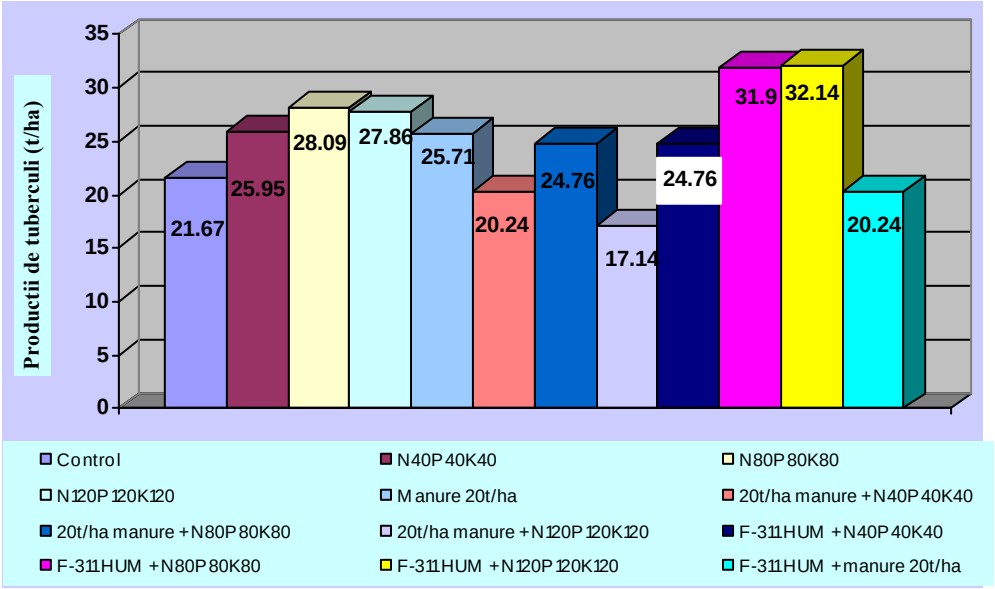

Fig. 1. The effect of differentiated fertilization on the production of tubers Ostara variety on Districambosol soil in Avram Iancu areas (2009)

Table 3

Production results regarding the effect of differentiate fertilization for potato, Desirée genre (year 2009)

No.	Fertilization variance	The Average tubers production				
		t/ha	%	Difference t/ha	Significance of difference	Duncan Test
1	Control	19.05	100,0	0,00	Mt.	A
2	$N_{40}P_{40}K_{40}$	20.24	106.2	1.19	-	AB
3	$N_{80}P_{80}K_{80}$	22.62	118.7	3.57	-	AB
4	$N_{120}P_{120}K_{120}$	22.86	120.0	3.81	-	AB
5	Manure 20t/ha	15.71	82.5	-3.33	-	ABC
6	20t/ha manure + $N_{40}P_{40}K_{40}$	19.05	100.0	0.00	Mt.	ABC
7	20t/ha manure + $N_{80}P_{80}K_{80}$	19.76	103.7	0.71	-	ABC
8	20t/ha manure + $N_{120}P_{120}K_{120}$	25.24	132.5	6.19	-	ABC
9	F-311 HUM + $N_{40}P_{40}K_{40}$	23.09	121.2	4.05	-	BC
10	F-311 HUM + $N_{80}P_{80}K_{80}$	28.57	150.0	9.52	**	BC
11	F-311 HUM + $N_{120}P_{120}K_{120}$	25.71	135.0	6.67	*	C
12	F-311 HUM + manure 20t/ha	20.95	110.0	1.90	-	C
	DL(5%)			6.32		
	DL(1%)			8.62		
	DL(0,1%)			11.58		

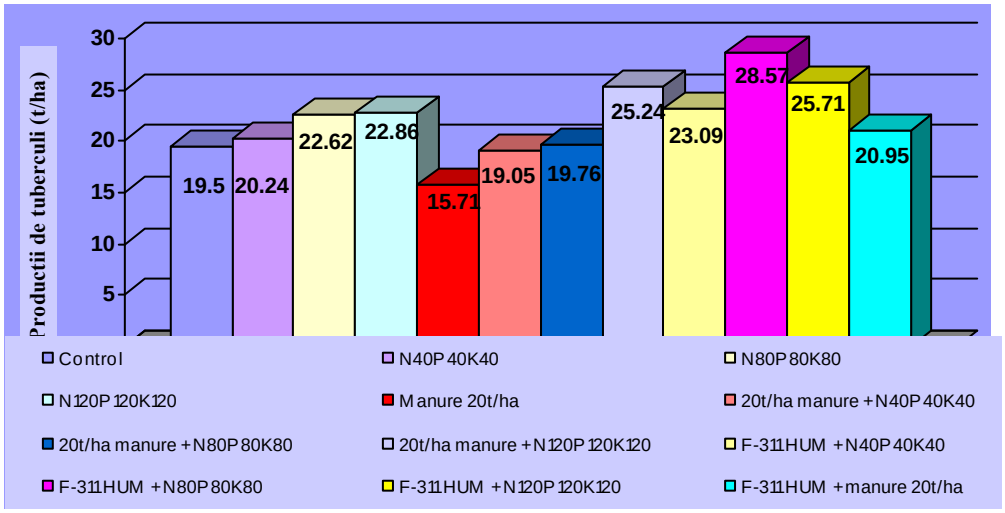

Fig. 2. The effect of differentiated fertilization on the production of tubers variety of Ostara on Districambosol soil in Avram Iancu areas (2009)

The significant and significantly distinct effect at variant compared with controls, may support the observations made above about the effect of foliar fertilization on mineral fertilization applied to soil.

In the same context we can state that the effect of foliar fertilizer application is determined by provided significant and complex fertilization to soil of applied type NPK. The results confirmed other research showing that the effect of foliar fertilization is even safer as the soil is well provided with nutrients and agrochemical situation is determined by previous or concomitant fertilization technology concerned. (RUSU M. şi colab., 2008), (BORLAN Z. şi colab., 1995).

CONCLUSIONS

The potato can significantly capitalize the foliar fertilizer optimally placed in the structure of applied fertilization to soil but the remedial nature and secondary to the main built-in soil. The favorable effect of foliar fertilization is conditional on the optimal representation of the elements in soil nutrient status.

The variants with foliar fertilization and high doses of NPK were achieved the highest cropss significantly and substantially separate after analysis of variance.

Compared with controls, the variants with mineral fertilization NPK complex 15-15-15, organo-mineral fertilization (manure 20 t/ha and NPK complex 15-15-15) reported no significant differences in the production, both the Ostara variety and the Desirée variety.

The exclusive organic fertilization (manure 20 t/ha) crops under version control tubers were fertilized, and this is blamed on non-redundancy manure nutrient due semi-fermented unfavorable conditions organic matter mineralization of soil.

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