

DYNAMICS OF TUBERS' ACCUMULATION AND THE NUTRITIONAL QUALITY OF THE POTATOES CULTIVATED ON THE SANDY SOILS FROM THE SOUTH PLAIN AREA FROM ROMANIA

Aurelia DIACONU, Milica DIMA^{*}, Marieta PLOAE, Mihaela CROITORU,
Reta DRĂGHICI, I. DRĂGHICI

*Research-Development Station for the Culture of the Plants on the Sandys Soils
Dăbuleni, Dolj County, Romania*

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ABSTRACT - Potato production is very high performing culture, but also very demanding environmental conditions (climatic) and technological (fertilization, protection). Potato yields are influenced by a complex of biological factors, environmental and technological. The strongest factor limiting production is drought period from May to September, when training and intense accumulation of tubers that occurs with great frequency in all areas of the country's culture. Potato varieties tested in 2008-2010 to the Research-Development Station for the Culture of the Plants on the Sandys Soils Dăbuleni, Dolj County, Romania, regarding the dynamics of accumulation in tubers showed that the variety is an important factor in culture technology. Choosing the right variety of potato crop leads to success. To highlight the ability of potato cultivars to accumulate as early substances in tuber harvesting were done at 45 days of vegetation at 55 days after physiological maturity vegetation and potato plants. Production of tubers in the trade conditions

of the area by plain ranged greatly depending on the variety grown and harvest time. Determinations on quantitative accumulation and nutritional quality of potato tubers were performed according to the variety and amount of fertilizer applied to sandy soils in climatic conditions in southern of Oltenia.

Key words : Quality; Production; Variety; Sandy soil; Tubers.

REZUMAT – **Dinamica de acumulare a tuberculilor și calitatea nutrițională la cartoful cultivat pe solurile nisipoase din zona de câmpie din sudul României.** Cartoful este cultura care realizează producții foarte ridicate, dar este și foarte pretențioasă la condițiile ecologice (pedoclimatice) și tehnologice (fertilizare, protecție). Producțiile de cartof sunt influențate de un complex de factori biologici, ecologici și tehnologici. Factorul care limitează cel mai puternic producția este seceta din perioada mai-septembrie, în momentul formării și acumulării intense a

^{*} E-mail: milicadima@yahoo.com

tuberculilor, ce apare cu mare frecvență, în toate zonele de cultură din țară. Soiurile de cartof testate la Stațiunea de Cercetare-Dezvoltare pentru Cultura Plantelor pe Nisipuri Dăbuleni – Dolj, în perioada 2008-2010, în ceea ce privește dinamica de acumulare a tuberculilor, au arătat că soiul este un factor important în tehnologia de cultură. Alegerea corectă a soiurilor duce la reușita culturii de cartof. Pentru a pune în valoare capacitatea soiurilor de cartof de a acumula cât mai timpuriu substanțe în tuberculi s-au făcut recoltări la 45 zile de vegetație, la 55 zile de vegetație și la maturitatea fiziologică a plantelor de cartof. Producția de tuberculi comerciali, realizată în condițiile climatice ale zonei de câmpie, au variat foarte mult, în funcție de soiul cultivat și de momentul recoltării. Determinările cu privire la acumularea cantitativă și calitatea nutritivă a tuberculilor de cartof au fost efectuate în funcție de soi și de cantitatea de îngrășăminte aplicate pe solurile nisipoase, în condițiile climatice din sudul Olteniei.

Cuvinte cheie : calitate; producție; soi; sol nisipos; tuberculi.

INTRODUCTION

Admission to the culture of the growing number of potato varieties has led to an increased genetic diversity and a high possibility to choose varieties that suffer less due to unfavorable factors of culture (Catelly, 1983). Expanding and maintaining valuable crop varieties depends much on cultural, economic requirements, especially the ecological resources to which a new genotype should have a high degree of adaptability (Catelly, 1988; Maxim and Saghin, 1990).

Steppe area offers good conditions for growing potatoes for consumption extratempuriu, and early summer, which led to the expansion of potato growing areas in the south. Sandy soils in southern Oltenia area offers favorable conditions for the early potato crop by high average temperatures to be recorded in February and March, temperatures contribute to the success of potato production and consumption early a date not recorded in any other area of the country.

Variety taken in culture, type and dose of fertilizer applied and ensure water supply are only part of the technological factors that lead to successful potato culture on sandy soils, where conditions of stress thermohidric the summer months without major losses in potato production. Choosing the appropriate variety should be done primarily by production destination. For eating early and early summer and mid early varieties is recommended that rapid accumulation dynamics and achieves very good yields under irrigation (Chiru, 1995, Chichea, 2000, Berindei and Chichea, 1997).

MATERIALS AND METHODS

In this experience to the behavior of potato varieties grown in different levels of fertilization.

Experience in the experimental field was located on a sandy soil with low nitrogen content (0.06%), well stocked extractable phosphorus (79.5 ppm), exchangeable potassium supplied medium

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(67 ppm), and reduced humus (0.55%) with a pH of 6.7.

Experience placement method was subdivided parcels after two factors: Factor A-variety: Tâmpa, Ruxandra, Redsec, Tresor, Dacia, Cosmos; Factor B: - agro three graduations: b1-N100P50K50; b2-N150P75K75; b3-N200P100K100. Technology-specific experience was the potato cultivation on sandy soils.

During the growing and harvesting were carried out observations and measurements of the dynamics of accumulation in tubers at 45 days after emergence, 55 springing days and physiological maturity, the production of marketable tubers per ha.

The experimental data were processed by variance analysis method.

RESULTS AND DISCUSSION

Climatic conditions affect the potato crop by the effect of temperature, precipitation, light, relative humidity of air.

Evolution of climatic factors in the sandy soils in southern of Oltenia, in 2008-2010, joined generally in the normal range for this area (*Table 1*). The monthly average temperature was between 7.2°C - 21.6°C in March and in June, close to the 1956-2010 annual average. During the growing season and absolute maximum temperatures were recorded between 22.8°C and 36.5°C, which on the background soil moisture led to a good behavior of the potato crop on sandy soils. Temperature affects physiological and biochemical process development that occur during growth, plant development and fruit and in

particular photosynthesis, respiration, transpiration, enzymatic activity, absorption of water and mineral salts (Burzo and Dobrescu, 2005; Milică C.I. *et al.*, 1982). Absolute minimum temperatures during the growing season ranged from -5.4°C in March to 8.3°C in June.

Rainfall in terms of their quantity and distribution during the growing influence success or failure of a crop by soil or excess water from the atmosphere. The amount of precipitation during the growing season ranged between 34.7 mm and 82 mm, close to the annual average. Water deficit during the vegetation period of potato was supplemented by irrigation. The water is one of the most important ways to capitalize on higher fertilizer and other technological shackles imposed culture.

In terms of average production of marketable tubers harvested at 45 days after emergence (*Fig. 1*) best results were obtained for variants cultivated varieties: Tresor with production of 30.4 t/ha fertilized with N150P75K75; Cosmos with an average production of 25.6 t/ha fertilized with N150P75K75.

Production of marketable tubers harvested at an average of 55 days of vegetation (*Fig. 2*) ranged between 10.5 t/ha in variety with Ruxandra fertilized with N100P50K50 and 24.2 t / ha of variety Tresor fertilized with N150P75K75. Results showed good variety and Cosmos which carried 23.9 t/ha, fertilized with N150P75K75.

In Fig. 3 presents the results on the average yields achieved depending on the variety grown and agro applied to potato plant physiological maturity. In terms of production of marketable tubers harvested at maturity, it ranged from 21.07 t/ha for the variety grown Ruxandra fertilized with

N100P50K50 and 43.5 t/ha for the variety grown Redsec fertilized with N200P100K100. Variety Redsec registered a good production of 37.9 t/ha fertilized with N150P75K75, Tampa variety with a production of 35.9 t/ha fertilized with N200P100K100.

Table 1 - Climatic elements during the planting and growth of potato tubers grown on sandy soils in southern of Oltenia (Average 2008-2010)

Climatic elements	Month calendar			
	III	IV	V	VI
Average temperature, °C	7,2	12,8	17,7	21,6
Absolute maximum, C ⁰	22,8	24,7	32,9	36,5
Absolute Minimum, °C	-5,4	1,0	5,3	8,3
Rainfall, mm	34,7	45,9	51,6	82,0
Humidity, %	67,0	75,0	70,2	71,6
Temperature annual average 1956-2010	5,6	11,7	16,7	21,3
Rainfall annual average 1956-2010	36,5	45,9	60,4	68,2

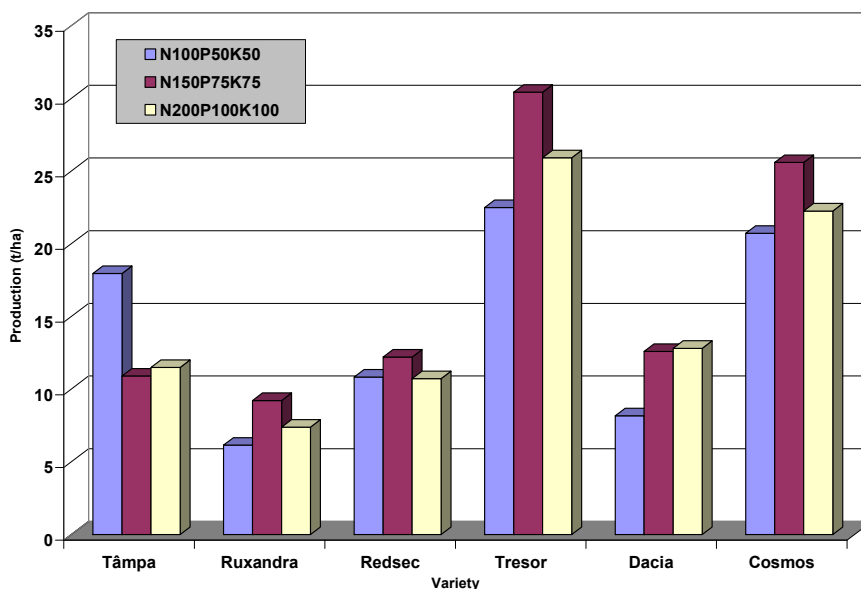


Figure1 - Influence of fertilization on the production of marketable tubers at 45 days after plant emergence depending on plant

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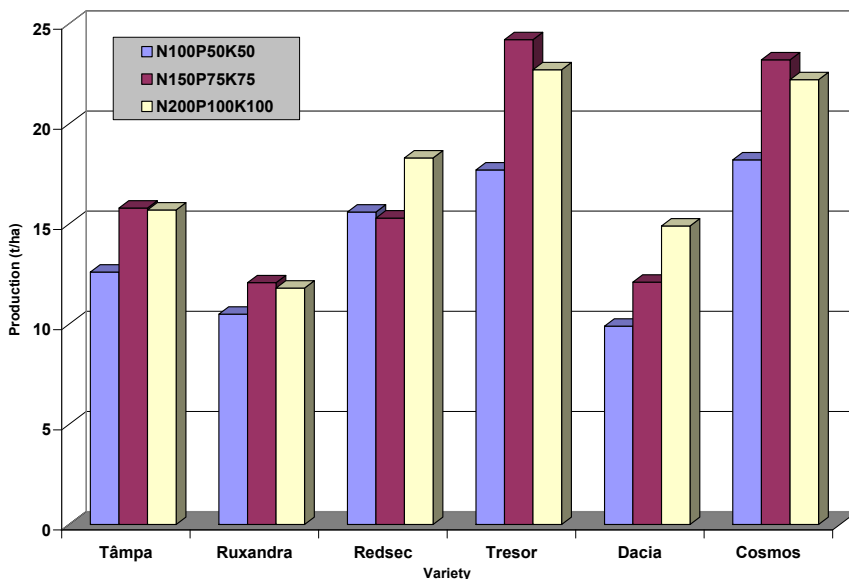


Figure 2 - Influence of fertilization on the production of marketable tubers at 55 days after plant emergence depending on plant

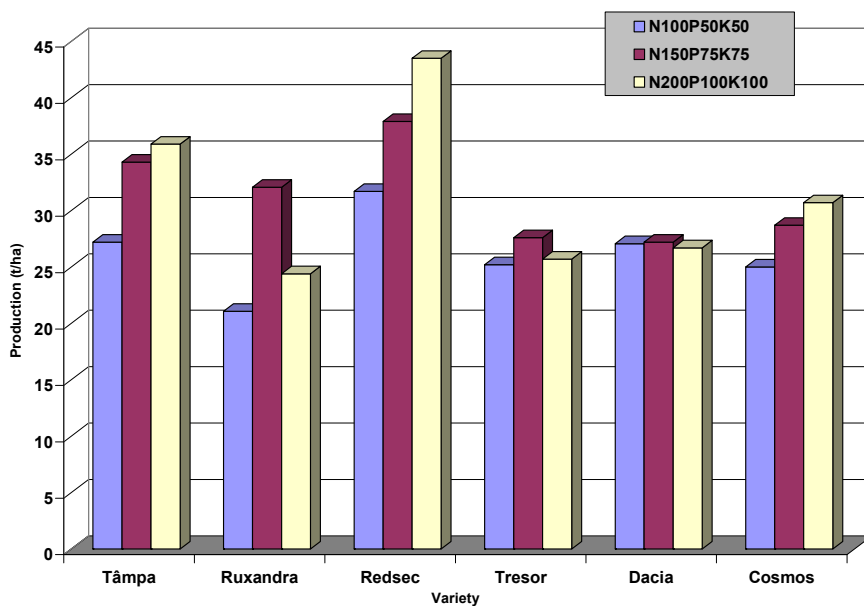


Figure 3 - Influence of fertilization on the production of marketable tubers at harvest depending on variety

If we analyze the influence of the administered dose of fertilizer on biochemical composition of potato tubers (Table 2), best results were obtained N150P75K75 fertilization level (22.57% total solids, 5.14% soluble solids, 1.85% reducing sugars, 0.16% acidity, vitamin C 19.34

mg/100g fresh substance). Differences between the versions are not very big potato crop is placed after a crop of alfalfa.

In most varieties studied vitamin C increased slightly with increasing dose of fertilizer from N100 to N200.

Table 2 - The biochemical composition of potato tubers depending on the dose of fertilizer

Agrofond	Total dry, %	Water, %	Soluble solids, %	Carbohydrates Reducing, %	Titrateable acidity, g acid malic/ 100 g fresh substance	Vitamin C, mg/100 g fresh substance
A1 N100P50K50	22,12	77,43	4,98	2,01	0,16	18,03
A2 N150P75K75	22,57	77,88	5,14	1,85	0,16	19,34
A3 N200P100K100	20,6	79,4	5,08	1,88	0,17	18,44

CONCLUSIONS

The results revealed that the variety is the most important technological links in fighting climate conditions.

The dynamics of accumulation of asimilatelor was intense, ranging between 200 - 1200 kg / ha / day.

Production of marketable tubers increased with delayed harvesting until the maturity of each variety, from 4.2 t/ha in variety Ruxandra, the first harvest, up from 43.5 t/ha, the variety Redsec at the last harvest.

The results on the quality of potato tubers as revealed differences depending on variety and fertilizer according to the system.

The best results regarding the influence of the administered dose of fertilizer were obtained N150P75K75

fertilization level (22.57% total solids, 5.14% soluble solids, 1.85% reducing sugars, 0.16% acidity, 19.34 mg/100g vitamin C fresh substance).

REFERENCES

- Berindei M., I. Chichea, 1997** - Cartoful timpuriu (Early Potatoes). Editura Grand, București
- Burzo I., A. Dobrescu, 2005** - Fiziologia plantelor de cultură. Vol. II. Fiziologia culturilor de câmp (Physiology of crop plants. Vol II. Physiology of field crops), 603-671. Editura Elisavaros, București
- Cately T., 1983** - Promovarea soiurilor de cartof în vederea asigurării producției pentru toate scopurile (Promotion of potato varieties to ensure production for all purposes). Producția vegetală, Horticultura, București
- Cately T., 1988** - Cartoful - banalitate sau miracol ? (Potato - banality or miracle ?) Editura Ceres, București

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- Chichea I., 2000** - Cartoful timpuriu și de vară (Potato and early summer). Editura Alma, Craiova
- Chiru S., 1995** - Soiul de cartof Rustic (Potato variety Rustic). Anale ICPC Brașov, Vol XXII
- Maxim S., Gh. Saghin, 1990** - Comportarea soiurilor de cartof admise în cultură în județul Suceava (Reaction of potato varieties in culture permitted in Suceava County). Anale ICPC Brașov, vol. XVII
- Milică C.I., N. Dorobanțu, Polixenia Nedelcu, V. Baia, T. Suciu, Florica Popescu, Viorica Teșu, Ioana Molea, 1982** - Fiziologia plantelor (Plant Physiology). Edit. Didactică și Pedagogică, București