

THE INFLUENCE OF CLIMATIC FACTORS AND TECHNOLOGY IN SOME POTATO VARIETIES GROWN ON SANDY SOILS

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ABSTRACT

Less favorable conditions on sandy soils in southern Oltenia limited number of species and varieties grown in the area. Drought and high temperatures in recent years (maximum 43⁰ C in air, ground 70⁰ C) acted as dehydrating forces on plants, disrupting their metabolism.

Very high air temperature in July and August at 30 to 38.4⁰ C relative humidity decreased to 25%, high soil surface temperature and lack of rainfall during the growing season, producing an imbalance of the water balance of plants.

Excessive sweating can dehydrate plants leaf level, close stomata and diminish gas exchange in photosynthesis.

INTRODUCTION

Research on the behavior of potato varieties and influence of agrotechnical (irrigation and fertilization) were made in other areas of the potato crop: Chichea et al (1994), Berindei and Chichea (1997), Draica (1995), Chichea (2000).

Early potato effectively exploit the climatic conditions of the region in the period from April to June. Research conducted in this paper, followed the choice of varieties with high photosynthetic potential to obtain high yields and efficient in economic terms.

MATERIAL AND METHOD

Fertilization on sandy soils increases photosynthetic efficiency of plants and production. At potato were studied three varieties grown on three agrofunds. Varieties were studied :Tresor, Carrera, Riviera. Agrofunds used during the growing season were:

A1-N₁₀₀P₅₀K₅₀;

A2-N₁₅₀P₇₅K₇₅;

A3-N₂₀₀P₁₀₀K₁₀₀

Determinations: foliar transpiration rate PRO LC +;

-rate photosynthesis with PRO LC +;

-radiația active in photosynthesis;

-recording climatic factors when measurements: air temperature, relative humidity, soil surface temperature, soil moisture

RESULTS AND DISCUSSION

During the vegetation measurements were performed on stages of vegetation.

In May (intensive phase tubers) (table 1) climatic conditions are optimal physiological processes and conduct photosynthesis rate values were high in all variants ranging during the day with the variety and time measurements.

At 9 hour values between 22.03 micromoles CO₂ / m² / s Carrera variety fertilized with N150 P75 K75 and 26.90 micromoles CO₂ / m² / s from plants fertilized with N200 P100 K100;

At 12 hour values between 18.34 micromoles CO₂ / m² / s Riviera variety and 25.87 micromoles CO₂ / m² / s Carrera variety fertilized with N200P100K100;

At 15hour values between 14.08 micromoles CO₂ / m² / s variety Tresor (N150P75K75) and 24.97 Riviera variety fertilized with N200 P100 K100.

In this tubers intense growth phase of photosynthesis higher values recorded during the determination of all the doses of fertilizers varieties. Fertilization increased vegetative growth at the expense of production.

Leaf transpiration rate is influenced by the degree of hydration at which takes place each soi. Values transpiration rate increased from morning until 13 hour with increased atmospheric drought when maximum values were recorded in all variants.

At 9 hour, the values ranged from 2.77 mmol H₂O / m² / s Tresor variety fertilized with N100P50K50 and 3.80 Riviera variety fertilized with N150P75K75 dose;

At 12 hour values ranged between 2.43 mmol H₂O / m² / s variety Carerra (N150P75K75) and 4.19 mmol H₂O / m² / s variety Tresor (N200P100K100) .It observed that high doses enhances evaporation through solution concentration due to sweat soil and plant growth effort to remove water from the soil.

At 15 hour values recorded were between 3.77 mmol H₂O / m² / s variety Carerra (N100P50K50) and 6.14 mmol H₂O / m² / s Riviera variety (N150P75K75).

Note variety Riviera leaf transpiration rate showed high values at 15 hour under the action cumulative of climatic factors supporting heavier atmospheric drought than Carerra variety.

Table 1

Influence of fertilization on physiological processes in potato tubers intense growth

Variety	The dose of fertilizer	Photosintesys rate micromoles CO ₂ /m ² /s			Transpiration rate mmoli H ₂ O/m ² /s		
		Hour 9	Hour 12	Hour 15	Hour 9	Hour 12	Hour 15
Tresor	N100P50K50	26,65	23,34	18,22	2,77	3,90	5,45
	N150P75K75	25,11	22,42	14,08	3,65	2,95	3,89
	N200P100K100	24,90	22,25	22,07	3,17	4,19	5,55
Carera	N100P50K50	25,29	24,81	20,21	2,92	3,21	3,77
	N150P75K75	22,03	20,20	18,24	2,98	2,43	4,06
	N200P100K100	26,90	25,87	24,47	3,32	4,07	6,11
Riviera	N100P50K50	25,80	19,16	25,61	3,21	3,04	5,38
	N150P75K75	24,70	24,27	17,30	3,80	3,02	6,14
	N200P100K100	26,40	18,34	24,97	3,71	4,03	6,08

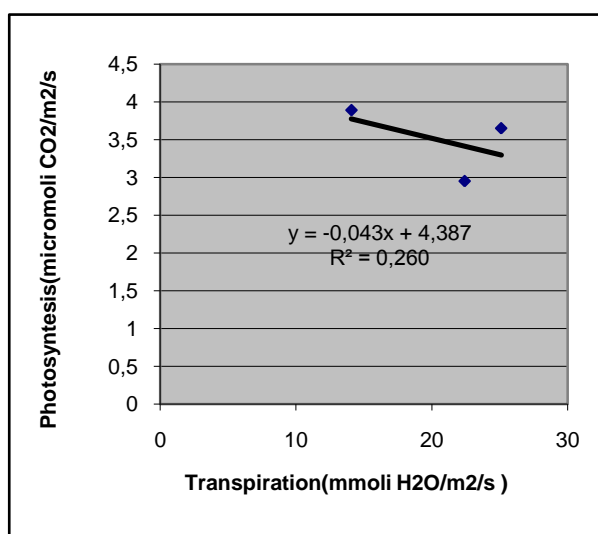


Fig.1.The corelation between of photosynthesis and transpiration atTresor variety(N150P50K50)

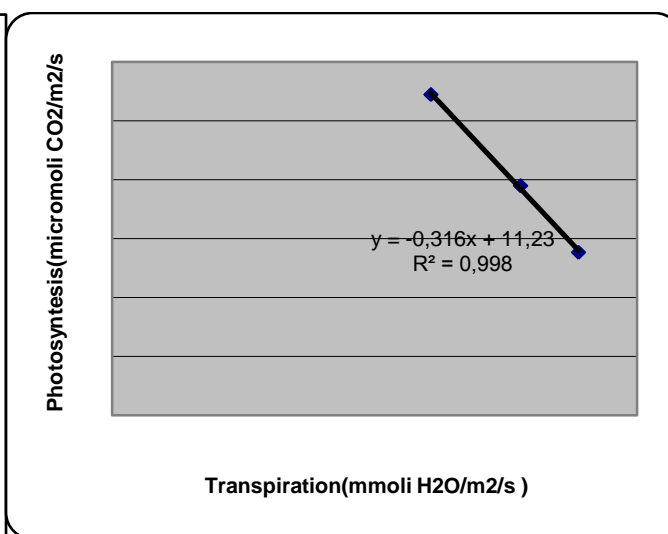


Fig. 2.The corelation between of photosynthesis and transpiration at Tresor variety(N100P75K75)

In June (table 2) during tuber maturation the photosynthesis rate values decreased with physiological maturation of the leaves in varieties with short vegetation period. Values were between photosynthesis rate:

- at 9 hour, 8,17micromolesCO₂ / m² / s (Tresor) and 17,00micromoles CO₂ / m² / s (Riviera);
- at hour 12, 9.20 micromoles / m² / s (Carerra) and 20.85 micromoles CO₂ / m² / s (Tresor);
- at hour 15 hours, 13.02 micromoles CO₂ / m² / s (Carerra) and 29.69 micromoles CO₂ / m² / s (Tresor).

Minimum values were recorded Carerra variety fertilized with the highest dose that is not justified by the production of 58 tons / ha compared to plants fertilized with N100 P50 K50 dose where production has registered 53 tons / ha.

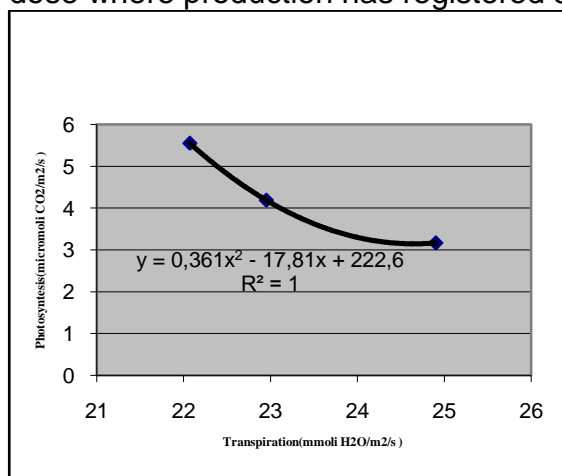


Fig.3. Thecorelation between of photosynthesis and transpiration atTresor variety(N200P100K100)

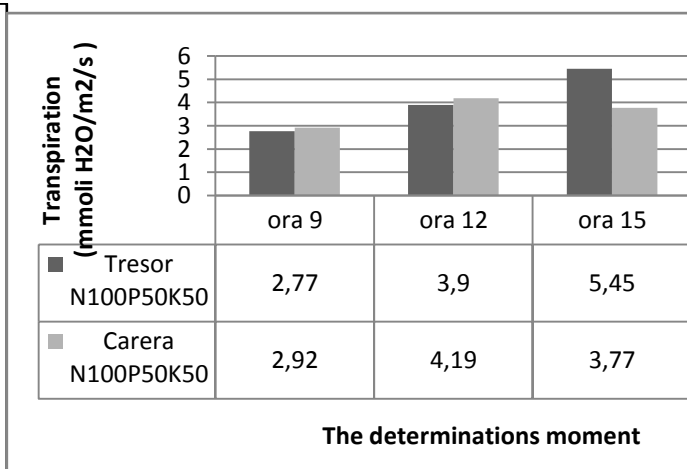


Fig. 4. The diurnal variation a transpiration at applied doses N100P50K50

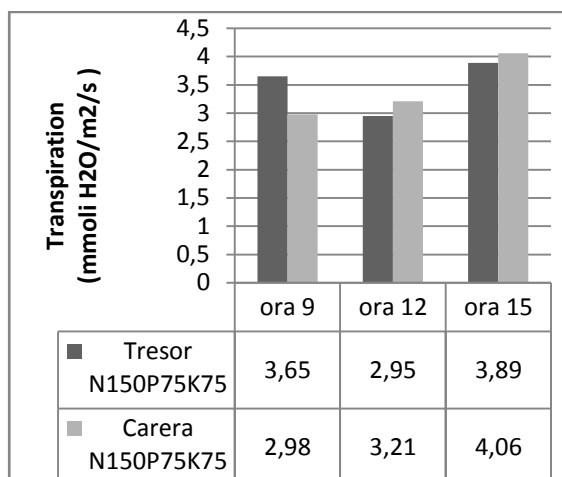


Fig.5The diurnal variation a transpiration at applied doses N150P75K75

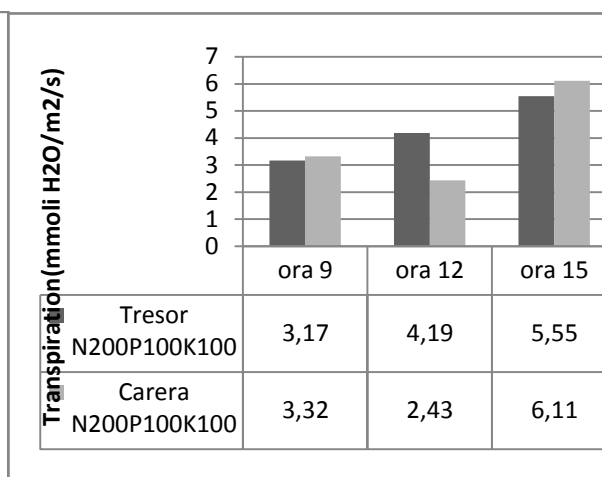


Fig.6 The diurnal variation a transpiration at applied doses N200P100K100

Tresor variety although the rate of photosynthesis was maximal, some substances are used in vegetative growth, production being reduced to 41.4 tons / ha.

Leaf transpiration rate recorded following:

- at 9 hour, 1.29 mmol H₂O / m² / s (Carerra) and 3.39 mmol H₂O / m² / s (Riviera)
- 12 hour, 1.59 mmol H₂O / m² / s (Carerra) and 4.47 mmol H₂O / m² / s (Tresor);
- at 15 hour, 2.10 mmol H₂O / m² / s Carerra) and 5.57 mmol H₂O / m² / s (Riviera).

Note that the Carerra variety low values were recorded at the rate of transpiration versus Riviera variety which registered maximum at 15 hour. Soiul Carerra recorded high values of photosynthesis rate, transpiration rate and low values of water was harnessed effectively by high production 58 t / ha.

Table 2

Influence of fertilization on physiological processes in potato tuber maturation stage

Variety	The dose of fertilizer	Photosintesys rate micromoles CO ₂ /m ² /s			Transpiration rate mmoli H ₂ O/m ² /s		
		Hour 9	Hour 12	Hour 15	Hour 9	Hour 12	Hour 15
Tresor	N100P50K50	9,90	20,85	29,69	1,60	4,47	3,35
	N150P75K75	8,17	16,73	20,93	1,28	4,05	4,33
	N200P100K100	8,83	16,74	20,21	1,40	3,97	5,53
Carera	N100P50K50	12,57	14,58	16,44	1,67	3,71	2,79
	N150P75K75	10,38	13,92	16,85	1,29	2,75	2,10
	N200P100K100	13,21	9,20	13,02	1,78	1,59	4,71
Riviera	N100P50K50	11,64	21,67	18,22	2,19	3,46	4,66
	N150P75K75	15,19	19,76	16,61	2,67	3,38	5,57
	N200P100K100	17,00	13,65	15,45	3,39	2,98	2,80

Moderate doses nutrient balance remained positive physiological processes influencing the production of varieties studied ranged from 30.6 tons / ha variety Tresor and 58.8 tons / ha variety Carerra.

CONCLUSIONS

Photosynthesis rate showed a diurnal variation is influenced by climatic factors, since determinations of variety and stage of vegetation studied and the dose of fertilizer.

Leaf transpiration rate shows a diurnal variation with high values in action at 12 to 38⁰ C air temperature and relative humidity decreased to 25%.

Riviera variety recorded higher values than foliar transpiration variety Carerra rate effectively harnessing water evaporated. Variety Carerra recorded high values at the rate of photosynthesis on agrofunds N100P50K50, N150P75 K75 /ha and to a maximum yield of 58 tonnes / ha.

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