Fruit Growing Research, Vol. XXXIV, 2018 DOI 10.33045/fgr.v34.2018.17
http://publications.icdp.ro/index.php

COMPORTAREA UNOR SPECII DE ARBUSTI FRUCTIFERI PE SOLURILE NISIPOASE DIN SUDUL OLTENIEI

BEHAVIOR OF SOME SMALL FRUIT AND SHRUB SPECIES ON SANDY SOILS IN SOUTHERN OLTENIA

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Abstract

On the sandy soils of Southern Oltenia small fruit sand shrubs have been studied since the 1980. The studied species were: strawberry, raspberries, blackberries, red and black currants and sea buckthorn. Strawberry behaves very well on sandy soils. If in 1984 the first harvest took place on 27 May and the harvest time was 41 days, in 2013 the first harvest was made on May 14 and the harvest time was only 24 days. Also, fruit production was almost double compared to 1984 (21.1 t/ha). The cultivated varieties, the cultivation method, and localized irrigation together with the other technological factors led to these results. The currants gave good results in sandy soil conditions. Between 1984 and 1992, by precocity and productivity at redcurrants were noticed the varieties 'Jonkheer van Tets' (7.4 t / ha), followed by 'Erstlingaus Vierlanden' (4.2 t / ha). In the period 1983-1995 at blackberries the varieties studied were: 'Thornfree', 'Smoothstem', 'Evergreen', 'Loganberry' and highlighted on production the varieties: 'Thornfree' (10.9 t/ha) and Smoothstem (7.1 t/ha). Under irrigation conditions, on sandy soils, were obtained the favorable pedoclimatic conditions, specific for the raspberry culture, the highlighted varieties were: 'The Latham', 'Scopsca Alena', 'Rubin' with productions of 8,9-9,2 tons / ha. Sea buckthorn was studied during the years 1985-1995, both as a species within a range of medicinal plants and within the fruit growing sector, to establish the culture technology.

From the observations and determinations made, the sea buckthorn behaves very well in the conditions of the sandy soils, with productions of 11.0-13.0 t/ha. The vitamin C content averaged 130mg / 100g of fresh fruits.

Cuvinte cheie: arbuști fructiferi, specii, soluri nisipoase
Key words: fruit shrubs, species, sandy soils

1. Introduction

An important group of fruit species, small fruit sand shrubs can contribute substantially to the diversification of fruit production, both for fresh consumption and for the processing industry. The diversity of soils that they valorize due to their high ecological plasticity, the precocity of fruiting, the high production they provide, the richness in nutrients (especially in vitamins and mineral salts), make small fruits and shrubs worthy partners to stand beside other trees fruit species spread in our country, (Cociu, 1990).

The researches done in our Country on strawberry, given the extremely favorable climate and soil conditions that this species finds in many regions of our Country, the existence of a large outlet for production and high rentability, show the high interest of the growers and breeders of this valuable fruit species. The application of differentiated technologies, according to the variety and the conditions of culture, ensures the achievement of large production, constant and quality from one year to the other (Bologa Constanţa, 1997; Cepoiu N., Manolache C., Ţepordei S., 2006, Nuţă Alina Constantina, 2014, Pop Delia Florentina, 2014).

In the species of sea buckthorn, lonicera, raspberry, cranberry, have been researched the influence of technological factors on fruit production and their quality (Ancu Irina, Mladin G., Mladin Paulina, Ancu S., 2011; Chiţu Viorica, Chiţu E., Ancu Irina, Mladin Paulina, Nicolae Silvia, 2012; Sava Parascovia, Gherasimova Elena, Tcaci Valentina, Crivaia Parascovia, 2013; Sava Parascovia; 2016, Ancu Irina, Stanciu Cosmina Luminiţa, Sturzeanu Monica, Sestraş Adriana, 2017).

On sandy soils the research carried out since 1980 up to date on some species of shrubs have highlighted the favorable climatic conditions for these species.

2. Material and Method

The studies were conducted in the experience fields of the Research-Development Station for Plant Crop on Sands Dăbuleni on species: strawberry, raspberry, blackberry, red currant, hazelnut and sea buckthorn, following their behavior on sandy soils.

On strawberry, the following varieties were studied: 'Senga Sengana', 'Red Gaunthlet', 'Gorella', 'Winlland', 'Fresno', 'Talisman', 'Pocahontas', 'Surprise de Halle', 'Muncheberger Fruhe', 'Regina', 'Freja' between 1980-1983, also 'Clery' and 'Joly' varieties in period 2011-2105.

On redcurrant, the studied varieties were: 'Jonkheer van Tets', 'Erstlingaus Vierlanden', 'Roşu de Olanda' in the period of 1984-1992.

On blackcurrant the studied varieties were: 'Big Black', 'Bogatar', 'Tinker', 'Record', 'Cotswold Cross' in 1984-1992. During the years 1991-1995 researches were carried out regarding the influence of chemical fertilizers on the obtained productions.

3. Results and discussion

Small fruits and shrubs are species with moderate demands on climatic and edaphic (pedological) factors therefore they behave well in Romania. The results obtained regarding the behavior of some species of small fruits and shrubs on the sandy soil revealed that the pedoclimatic conditions in the area are favorable for these species.

Small fruits (raspberries, blueberry, gooseberries, blackberry) have low demands on light, and sea buckthorn is a light-loving species. In the area of sandy soils in Southern Oltenia, the sum of hours of sunshine exceeds 2000 h and in the period April-September exceeds 1700-2000h, which makes this area to have a significant heliothermal resource.

The temperature requirements of small fruits and shrubs are different from average temperatures between 7.0-11.5 °C, but also resist extremes between -15°C, -40°C in winter, up to + 35°C in the summer.

Fruits shrubs react very favorably to fertile, mild soils such as alluvial, sand loose, sandy-clay and even clay soils, rich in humus, provided they are well drained. Thus, sea buckthorn has a great capacity to adapt to different climatic conditions, adapts well to different water hydric conditions, supporting from temporary excess of water to drought and summer heat.

Due to this ecological plasticity and based on the results obtained so far on sandy soils, the cultivation of fruit shrubs can be an alternative to fruit growing on these soil types, in the context of current climate change. Strawberry behaves very well on sandy soils.

Researches carried out by Tudor A., 1984, showed that production between 6.6-13.9 tons/ha can be achieved by the crop if is located on places with a high degree of fertility and where the sand is not shattered by wind. For the plants to be protected from the negative effects of the wind, rye strips were recommended (Table 1).

They were remarked by earliness the varieties: 'Winlland', 'Fresno', 'Regina' and 'Freja', and from a qualitative point of view were remarked: 'Regina', 'Senga Sengana', 'Red Gaunthlet' and 'Talisman' (Tudor, 1984). Researches on strawberry culture were resumed in 2010-2015, new varieties grown on polyethylene mulches and drip irrigated (Table 2) (Toma et al., 2013).

If in 1984, the first harvest took place on 27 May and the harvest time was 41 days, in 2013 the first harvest was made on May 14 and the harvest time was only 24 days. Also, fruit production was almost double compared to 1984. The variety taken into the culture, the method of cultivation, the irrigation located along the row, together with the other technological factors led to these results (Fig 1).

The strawberry culture on bilonated terrain and mulched with PE foil under fertilizing conditions is very cost-effective, the profit being 51325 lei/ha with a profit rate of 94.6% for the 'Clery' variety and 43459 lei/ha, with a profit rate of 89.7% for the 'Joly' variety (Table 3).

The blueberry gave good results in sandy soil conditions. Tudor A., et al., 1994 showed that the production results were better for red currant compared to black currant at which significant vegetative growths were obtained, that were positively uncorrelated with fruit production. Between 1984 and 1992, precocity and productivity at redcurrant were remarked the 'Jonkheer van Tets' variety (7.4 tons/ha) followed by 'Erstlingaus Vierlanden' (4.2tons /ha) (Table 4).

Fruit production in blackcurrant varieties was much lower compared to red currant (Table 5).

Compared to other species of small fruit species, the vegetation and fructification phases in the blueberry, start earlier in the spring. As a calendar date, it differs from year to year, depending on temperature, precipitation and variety.

Fruits small fruit species and shrubs are known as tree species capable of efficiently use of large amounts of fertilizer. On the sandy soils in Southern Oltenia, the research in this regard shows that the applied fertilizer dose differs according to the species. Thus, at the 'Thornfree' variety, the best results

were obtained at fertilization with $N120P_2O_5$ 120 K_20 160 (9.1 t / ha), productions statistically assured, as very significant (Negrescu Aurelia et al., 1995).

Sea buckthorn was studied in the period 1985-1995, both as a species within a range of medicinal plants and within the fruit growing sector for the establishment of culture technology. From the observation and determinations made (unpublished), the sea buckthorn behaves very well in the conditions of sandy soils, with productions of 11.0-13.0 tons/ha. The vitamin C content averaged 130mg / 100g of fresh fruits.

4. Conclusions

The sandy soil area offers optimal conditions for small fruit and shrubs, where the sum of hours of sunshine exceeds 2000 h, making this area a significant heliothermal resource.

Strawberry works very well on sandy soils. If in 1984 the first harvest was carried out on May 27, and the harvest time was 41 days with yields of 6.6-13.9 t / ha, in 2013 the first harvest was carried out on May 14, and the harvest time was only 24 days. Also, fruit production was almost double compared to 1984 (21.1 t / ha). The variety in culture, the cultivation method, localized irrigation along the rows, together with the other technological factors led to these results.

The blueberry good results in sandy soil conditions. In the period 1984-1992, by the precocity and productivity of redcurrant, the variety Jonkheer van Tets (7.4t/ha) followed by 'Erstlingaus Vierlanden' (4.2t/ha) and the blackcurrant 'Tinker' variety with a production of 1.8 t/ha.

In the blackberry species, the 'Thornfree' variety, the best results were obtained by fertilization with $N120P_2O_5$ 120 K_2O 160 (9.1 t / ha), production statistically ensured as very significant.

References

1. Ancu Irina, Stanciu Cosmina Luminiţa, Sturzeanu Monica, Sestraş Adriana, 2017. Agrobiological assessment of some Romanian sea buckthorn genotypes, Fruit Growing Research, Vol. XXXIII, p. 6-11.
2. Ancu Irina, Mladin Gheorghe, Mladin Paulina, Ancu S., 2011. Resurse genetice, ameliorarea speciilor pomicole.Evaluarea calităţii fructelor la selecţiile valoroase de lonicera fructiferă (*Lonicera caerulea var. kamtschatica*), Genetic resources, breeding of deciduous fruit trees species Evaluation of fruit quality at fruit selections valuable of blue honeysuckle (*Lonicera caerulea var. kamtschatica*), Scientific Papers, R.I.F.G. Pitesti, Vol. XXVII, p.1-6.
3. Bologa Constanta, 1997. Cercetări privind sortimentul de căpşun pentru zona de nord-vest a ţării, Universitateade Ştiinţe Agricole şi Medicină Veterinară, Facultatea de Horticultură Bucureşti.
4. Cepoiu N., Manolache C., Ţepordei S., 2006. Cultura căpşunului în câmp şi în spaţii protejate, Editura Ceres, Colecţia Agricultură şi horticultura.
5. Chiţu Viorica, Chiţu E., Irina Ancu, Mladin Paulina, Nicolae Silvia, 2012. Impactul aplicării fertilizanţilor foliari asupra calităţii producţiei de afin, Foliar nutrients impact on fruit quality and yield of highbush blueberry, Fruit Growing Research, Vol. XXVIII, p.1-6.
6. Negrescu Aurelia, Tudor A., Croitoru Mihaela, Ploae Marieta, 1995. Influența fertilizării asupra proceselor de creştere şi fructificare la murul cultivat pe solurile nisipoase,(nepublicat);
7. Nuţă Alina Constantina, 2014. Cercetări privind perfecţionarea tehnologiilor de cultură la specia căpşun, Universitatea de Ştiinţe Agronomice şi Medicină Veterinară Bucureşti Facultatea de Horticultură.
8. Pop Delia Florentina, 2014. Cercetări privind comportarea unor soiuri de căpşun în sistem clasic şi ecologic în condiţiile pedoclimatice din DepresiuneaTransilvaniei, Universitatea de Ştiinţe Agricole şi Medicină Veterinară Cluj-Napoca, Şcoala Doctorală, Facultatea de Horticultură.
9. Popescu M., Pădureanu Tatiana, Voica Elena, Tudor A., 1989. Comportarea arbuştilor fructiferi pe nisipurile din sudul Olteniei, Revista Horticultura, Nr. 6, pag. 14-16.
10. Sava Parascovia, 2016. Eficienţa economică a producerii fructelor de zmeur în Republica Moldova Fruit Growing Research,Vol. XXXII, p. 39-43;
11. Sava Parascovia, Gherasimova Elena, Tcaci Valentina, Crivaia Parascovia, 2013. Acumularea substanțelor nutritive în fructele de cătină alba. Acumulation of nutrients in sea buckthorn fruits, Fruit Growing Research, Vol. XXIX, p. 32-35.
12. Toma V., Aurelia Diaconu, MilicaDima, 2013. Comportarea soiurilor de căpşun 'Joly' şi 'Clery' pe solurile nisipoase de la Dăbuleni, Revista Horti Magazin.
13. Tudor A.,1984. Cercetări privind stabilirea sortimentului de căpșuni pe nisipurile ameliorate din sudul Olteniei, LucrăriȘtiințifice, Vol. VI, p. 243-251.
14. Tudor A., Rodica Ţârcomnicu, 1994. Comportarea unor specii şi soiuri de arbuşti fructiferi pe solurile nisipoase din sudul Olteniei. Lucrări Ştiinţifice, Vol. VIII, p. 145-151.

Tables and Figures

Table 1.Fruit production on some strawberry varieties (1980-1983) (Tudor A.,1984)

Variety	Production (tons/ha)		Average fruit weight (g)	Soluble dry mater content (%)	Tasteful qualities
	Production (tons/ha)	Significance			
Senga Sengana	13.9	x	13.1	9.6	very good
Reg Gaunthlet	12.1	-	9.2	10.4	good
Gorela	11.6	-	17.4	10.0	good
Winlland	11.3	-	12.8	10.0	good
Frezno	10.9	-	11.4	11.1	very good
Talisman	10.6	-	7.6	10.0	good
Pocahontas	10.4	-	12.4	11.6	good
Surprisse de Halle	10.0	-	6.1	11.3	very good
Munchebergerfruhe	9.8	-	5.3	11.3	good
Regina	6.7	0	7.0	11.3	suitable
Freja	6.6	0	10.2	11.0	suitable

DL5% - 2.98 DL1% - 4.03 DL0.1% - 5.35

Table 2. Strawberry production of varieties 'Clery' and 'Joly' (Toma et al., 2013)

Variety	Production		The average fruit weight (g)
	tons/ha	%	
Clery	21.1	100.0	21.5
Joly	15.3	72.5	34.5

Table 3. Economic efficiency of cultivation of strawberry varieties 'Clery' and 'Joly' on the sandy soils of Southern Oltenia (2013)

Variety	Production (t/ha)	Production costs (lei/ha)	Production value (lei/ha)	Profit (lei/ha)	Rate profi (%)
Clery	21.1	54245	105570	51325	94.6
Joly	15.3	48449	91908	43459	89.7

Table 4. Fruit production in some red currant varieties, average years 1984-1992 (Tudor A., et al., 1994)

Variety	Medium production (tons/ha)	Significance
Jonkheer van Tets	7.4	x
Erstlingaus Vierlanden	4.2	
Roşu de Olanda	3.0	
Average	**4.9**	

DL5% -2.97 DL1% -4.08 DL0.1% -5.61

Table 5. Fruit production in some black currant varieties, average yeras 1984-1992 (Tudor A., et al., 1994)

Variety	Medium production (tons/ha)	Significance
Negre mari	1.5	-
Bogatâr	1.7	-
Tinker	1.8	-
Record	1.1	-
Cotswold cross	1.6	-
Average	1.6	

DL 5% - 1.51 DL 1% - 2.03 DL 0.1% - 2.67

Table 6. Influence of fertilization on fruit production at blackberry variety Thomfree (1991-1995) (t ons/ ha) (Aurelia Negrescu et al., 1995) (unpublished)

Dose of fertilizer (kg/ha)	Production (1991-1995) (t/ha)	%	Difference	Significance
N0P0K0	3,8	100	000	
N50P0K0	5,4	141	+1,587	
N0P60K80	4,4	114	-0,579	
N60P60K80	5,7	162	+1,922	x
N120P120K160	9,1	236	+5,280	xxx
N180P180K220	7,7	199	+3,811	xxx

DL 5% -1.903 DL 1% - 2.586 DL 0.1% - 3,506

Fig. 1. Strawberry on sandy soil