THE EFFECT OF MULCH AND DENSITY ON THE RHUBARB YIELD

EFECTUL MULCIULUI ŞI DENSITĂŢII ASUPRA PRODUCŢIEI DE REVENT

COJOCARU A. [1]***, MUNTEANU N.***[1]***, STOLERU V.***[1]***, STAN T.***[1]***, IPĂTIOAIEI C.***[1]***, VOICU MIIA***[1]
e-mail: cojocaru.alexandru@yahoo.com

Abstract. *The aim of the present work has been to study the influence of technological factors (density and methods of mulching), on the total yield of rhubarb, in the case of Victoria and Glaskin's perpetual cultivars and the local population "De Moldova". Applying differential cultivation technology, the rhubarb yield varies according to the mulching system and crop density. The highest total production was obtained at straw mulching and density of 13.330 plants·ha*$^{-1}$*. Statistically assured yields were also obtained at the same density but without mulching. The total yield varied within wide limits according to the two technological factors, ranging from 26.37 t·ha*$^{-1}$ *to 43.72 t·ha*$^{-1}$*.*
Key words: cultivar, local population, yield, density

Rezumat. *Scopul lucrării de faţă a fost acela de a studia influenţa unor factori tehnologici (densitate şi metode de mulcire), asupra producţiei totale de revent, in cazul cultivarelor Victoria, Glaskin's perpetual şi populaţia locală „De Moldova". Prin aplicarea diferenţiată a tehnologiei de cultivare, producţia de revent variază în funcţie de sistemul de mulcire şi de densitatea culturii la înfiinţare. Cea mai ridicată producţie totală s-a înregistrat în cazul în care mulcirea s-a realizat cu paie, iar plantarea s-a făcut la o densitate de 13.330 plante/ha. Producţii, de asemenea, asigurate statistic au mai fost obţinute şi în cazul acelorași densităţi, dar în situaţia nemulcirii. Producţia totală a variat în limite foarte largi în funcţie de cei doi factori tehnologici, variind de la 26,37 t/ha la 43,72 t/ha.*
Cuvinte cheie: cultivar, populaţie locală, producţie, densitate

INTRODUCTION

The rhubarb (*Rheum rhabarbarum* L.) is a less known and spread crop in Romania. It is a perennial vegetable species, adapted to cold temperate climate (Ciofu *et al*., 2004; Indrea *et al.*, 2007).

Rhubarb originated in the Himalayas, where its root was an important medicine believed to purge the body of ill humors (Stan *et al.*, 2003).

In our country rhubarb is more cultivated in the western part of the country and it is used for compote, jam and other deserts (Treptow H, 1985).

[1]University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

In recent years, rhubarb products have been spread by the supermarkets on all over the country. So, it is a good opportunity for farmers to cultivate this species in other parts of the country as well, not only in the traditional ones.

For this reason, our research was focused on evaluating the possibilities to cultivate rhubarb in the environmental conditions of the Eastern part of Romania.

To achieve this goal, our objective was to study the influence of the planting distances and mulching methods on the crop and, mainly, on the yield (Stoleru, 2013).

The distance between plants in the row and between rows is a technological factor influencing crop density, which is the number of plants per unit area. This technological factor can be determined directly from the feeding soil surface, light regime etc. (Loughton, 1969).

Mulching is a technique through which the surface between cultivated plants is covered with a thin layer of different materials, a process which clearly shows a number of features highlighted over time through experience and practice: preventing the barnyard grass and weeds emergence, keeping moisture in the soil and allowing faster soil warming, improving air system and soil porosity, keeping clean the edible parts in contact with soil, favorably influencing production, precocity and quality (Bakker *et al.*, 1985).

MATERIAL AND METHOD

Experiment site. To achieve the goal and objectives of this research work, an experimental design was done at "V. Adamachi" Experimental Station of the Agronomic University, using root cuttings of the Victoria cultivar (fig. 1), Glaskin's perpetual cultivar (fig. 2) and the local Population "De Moldova" (fig. 3). The harvested area of the experimental plots covered the 12 plants.

Fig. 1 Rhubarb – Victoria (original)

Fig. 2 Rhubarb – Glaskin's perpetual (original)

Fig. 3 Rhubarb – Local population „De Moldova"

Considering the importance of studying factors in the growing technology, their ability to change, and taking into account the possibilities of organizing experience, a hierarchy of factors was established, as follows:

1. A factor – density, with two graduations: 13.330 plants·ha^{-1} and 10.000 plants·ha^{-1};

2. B factor – mulching system, with four graduations: mulching with straw, mulching with black polyethylene film of 15 µ, mulching with black polyethylene film of 30 µ and unmulched.

Collection and processing of the experimental data. The experimental data collection was carried out by observations and weight measurements, according to the experimental technique used in experiments. During 2016, a total of eight harvestings were made: 16.04, 29.04, 11.05, 26.05, 8.06, 23.06 and 8.07.

The experimental variants were compared with the experimental mean, using the reported percentages and differences. The influence of the experimental factors was assessed using ANOVA. The significance of differences was assessed on the basis of LSD (least significant difference) for three degrees of confidence (95%, 99%, 99.9%).

RESULTS AND DISCUSSION

Applying differential cultivation technology, the rhubarb production varies according to the mulching system and crop density.

Regarding the influence of the density x mulch combination, the total yield of rhubarb crop ranged from 26.37 t·ha^{-1}, in the case of 10.000 plants·ha^{-1} density and mulching with black polyethylene film of 15 µ (a_2m_2), to 43.72 t·ha^{-1}, for 13.300 plants·ha^{-1} density and mulching with straw (a_1m_1), compared with the experimental average of 35.47 t·ha^{-1} (table 1).

The best yields were obtained for the 13.330 plants·ha^{-1} density and mulching with straw (a_1m_1), respectively unmulching (a_1m_4), with an average yield of 43.72 t·ha^{-1}, respectively of 42.43 t·ha^{-1}. The lowest yields were obtained in the case of 10.000 plants·ha^{-1} density and mulching with black polyethylene film of 15 µ (a_2m_2), respectively with black polyethylene film of 30 µ (a_2m_3), with an experimental average of 26.37 t·ha^{-1}, respectively of 28.03 t·ha^{-1}.

Table 1

Total yield of rhubarb crop

Variants	Total yield (t/ha)	% to the average	Difference to average (t/ha)	Significance of differences
a_1m_1	43,72	123,26	8,25	***
a_1m_2	35,24	99,35	-0,23	ns
a_1m_3	32,70	92,19	-2,77	00
a_1m_4	42,43	119,62	6,96	***
a_2m_1	38,87	109,59	3,40	**
a_2m_2	26,37	74,34	-9,10	000
a_2m_3	28,03	79,02	-7,44	000
a_2m_4	36,40	102,62	0,93	ns
x□ (Average)	35,47	100,00	0,00	-

LSD 5% = 0,97 t.ha; LSD 1% = 1,74 t.ha; LSD 0,1% = 3,94 t.ha
a_1 –13.330 plants.ha; a_2 –10.000 plants.ha;
m_1 – mulching with straw; m_2 – mulching with black polyethylene film of 15 µ, m_3 - mulching with black polyethylene film of 30 µ, m_4 - unmulched

CONCLUSIONS

1. Regarding the influence of the density and mulch methods on the rhubarb total yield during 2016, it ranged from 26.37 t·ha^{-1} for 10.000 plants·ha^{-1} density and mulching with black polyethylene film of 15 µ, to 43.72 t·ha^{-1} for variant mulching with straw, planted at 13.330 plants·ha^{-1} density.

2. The best yields were obtained for the 13.330 plants·ha^{-1} density and mulching with straw, respectively unmulching, with an average yield of 43.72 t·ha^{-1}, respectively of 42.43 t·ha^{-1}.

REFFERENCES

1. **Bakker J. J., Schroen G., Roelands C., 1985** – *With rhubarb cultivars there are large differences in yield and stem colour*. Groenten en Fruit, 41, 15, pp 62-63, 65.
2. **Ciofu Ruxandra, Stan N., Popescu V., Chilom P., Apahidean S., Horgos A., Berar V., Lauer K. F., Atanasiu N., 2004** – *Tratat de Legumicultura*. Editura Ceres Bucuresti.
3. **Indrea D., Apahidean S., Apahidean Maria, Maniutiu D., Sima Rodica, 2007** – *Cultura Legumelor*. Editura Ceres Bucuresti.
4. **Loughton A.; 1969** – *Rhubarb forcing*. Publications. Department of Agriculture, Ontario, 346, pp 15.
5. **Stan N., Munteanu N., Stan T., 2003** – *Legumicultura*, Vol III. Editura " Ion Ionescu de la Brad " Iasi.
6. **Stoleru V., 2013** - *Managementul sistemelor legumicole ecologice*. Editura "Ion Ionescu de la Brad" Iasi.
7. **Treptow H., 1985** – *Rhubarb (Rheum species) and its uses*. Flauss. Obst., 52, 8, pp. 419-422.