INFLUENCE OF PLANTING DISTANCES AND MULCHING METHODS INFLUENCE ON RHUBARB CROP

INFLUENȚA DISTANȚELOR DE PLANTARE ȘI A MULCIRII ASUPRA PRODUCȚIEI LA REVENT

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Abstract. The aim of the present work has been to study the influence of technological factors (planting distance and methods of mulching), on the early and total yield of rhubarb, Victoria cultivar. Applying differential cultivation technology, rhubarb yield varies according to mulching system and crop density. The highest early production was obtained at density of 9090 pl.ha^{-1} (0,75 m x 1,1 m) and straw mulching. Statistically assured yields were also obtained at the same density but where used biodegradable film mulching of 30 µ. Total yield varied within wide limits according to the two technological factors, ranging from 7,817 kg.ha^{-1} to 42,632 kg.ha^{-1}.
Key words: cultivar, yield, density

Rezumat. Scopul lucrării de față a fost acela de a studia influența unor factori tehnologici (distanțe de plantare și metode de mulcire), asupra producției timpurii și totale de revent, in cazul cultivarului Victoria. Prin aplicarea diferențiată a tehnologiei de cultivare, producția de revent variază în funcție de sistemul de mulcire și de densitatea culturii la înființare. Cea mai ridicată producție timpurie s-a înregistrat în cazul în care mulcirea s-a realizat cu paie iar plantarea s-a făcut la distanțe de 0,75 m x 1,1 m. Producții, de asemenea, asigurate statistic au mai fost obținute și în cazul acelorași distanțe de plantare dar în situația în care mulcirea s-a efectuat cu folie biodegradabilă de 30 µ. Producția totală a variat în limite foarte largi în funcție de cei doi factori tehnologici, variind de la 7.817 kg/ha la 42.632 kg/ha.
Cuvinte cheie: cultivar, producție, 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 is 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 compot, fam and other desert (Treptow, 1985).

In the last time rhubarb products are spread by the supermarket on all over the country. So it is a good opportunity for farmers to cultivate this species also in other parts of the country, not only in the traditional ones.

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

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

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

Mulcing 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 by over time through experience and practice: preventing the crus 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

Management of experiment. To achieve the goal and objectives of this research work, an experimental was done at "V. Adamachi" Experimental Station of the Agronomic University, using root cuttings of Victoria cultivat (Fig. 1). Harvested area of experimental plots covered the 6 plants.

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

1. A factor – planting distance, with four graduations: 0,75 x 1,10 m, 1,00 x 1,10 m; 1,25 x 1,10 m and 1,50 x 1,10 m;
2. B factor – mulching system, with three graduations: mulching with straw, mulching with black polyethylene film of 15 μ and mulching with black polyethylene film of 30 μ.

Fig. 1 - Rhubarb – Victoria (original)

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Collection and processing the experimental data. The experimental data collection was carried out observations and weight measurements, according to the experimental technique used in experiments. During 2014 were made a total of four harvesting: 29.04, 27.05, 3.07 and 15.09.

The experimental variants were compared with the experimental mean, using the percentage reporting and differences. The influence of 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, rhubarb production varies according to mulching system and crop density.

Regarding to the influence of planting distances and mulching distances, during 2014, it ranged from 7,81 t/ha at 1,50 x 1,10 m planting distance, mulching with black polyethylene film of 30 μ to 42.63 t/ha at 1 x 1,10 m planting distance, mulching with black polyethylene film of 30 μ. (Table 1).

Table 1

Dynamics of harvesting at rhubarb crop

Variant	Harvest time				Yield per plant (kg/plant)	Total yield (t/ha)
	29.04.	**27.05.**	**3.07.**	**15.09**		
d_1 x m_1	0,67	0,48	1,70	0,64	3,49	42,29
d_1 x m_2	0,63	0,23	1,47	0,55	2,88	34,90
d_1 x m_3	0,44	0,51	1,65	0,43	3,03	36,72
d_2 x m_1	0,49	0,19	1,02	0,68	2,38	21,63
d_2 x m_2	0,77	0,45	1,30	0,73	3,25	29,54
d_2 x m_3	0,69	0,43	2,58	0,99	4,69	42,63
d_3 x m_1	0,52	0,30	0,62	0,27	1,71	12,43
d_3 x m_2	0,39	0,45	1,16	0,50	2,50	18,17
d_3 x m_3	0,47	0,33	0,79	0,70	2,29	16,64
d_4 x m_1	0,37	0,35	1,17	1,28	3,17	19,21
d_4 x m_2	0,62	0,27	0,39	0,15	1,43	8,66
d_4 x m_3	0,48	0,24	0,36	0,21	1,29	7,81

d_1 – 0,75 x 1,10 m; d_2 – 1,00 x 1,10 m; d_3 – 1,25 x 1,10 m; d_4 – 1,50 x 1,10 m; 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

Influence of planting distances and mulching methods on rhubarb early production.

The differences obtained between experimental variants and experimental mean average, ranged from -3,58 t/ha for distances of 1,50 x 1,10 m, up to 5,99 t/ha for 0,75 x 1,10 m.

The total yield in case of a early rhubarb crop ranged from 4,36 t/ha, for distances 1,50 x 1,10 m and mulching with straw, to 13,93 t/ha, for distances 0,75 x 1,10 m and mulching with straw (Table 2).

Table 2

Early yield at rhubarb crop

Variants	Early yield (t/ha)	% to the average	Difference to average (t/ha)	Semnificance of differences
d_1 x m_1	13,93	175,44	5,99	***
d_1 x m_2	10,42	131,23	2,48	**
d_1 x m_3	11,51	144,96	3,57	***
d_2 x m_1	6,18	77,83	-1,76	0
d_2 x m_2	11,08	139,54	3,14	***
d_2 x m_3	10,18	128,21	2,24	**
d_3 x m_1	5,96	75,06	-1,98	0
d_3 x m_2	6,10	76,82	-1,84	0
d_3 x m_3	5,81	73,17	-2,13	0
d_4 x m_1	4,36	54,91	-3,58	000
d_4 x m_2	5,39	67,88	-2,55	00
d_4 x m_3	4,36	54,91	-3,58	000
x̄(Average)	**7,94**	**100**	**0,00**	-

LSD 5% = 1,47 t/ha; LSD 1% = 2,29 t/ha; LSD 0,1% = 3,01 t/ha
d_1 – 0,75 x 1,10 m; d_2 – 1,00 x 1,10 m; d_3 – 1,25 x 1,10 m; d_4 – 1,50 x 1,10 m; 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

The influence of planting distances and mulching methods on rhubarb total yield.

Negative differences distinct significantly, compared to the average have been obtained when Victoria rhubarb cultivar is planted at distances 1,50 x 1,10 m and mulching with black polyethylene film of 30 μ, 1,55 x 1,10 m mulching with black polyethylene film of 30 μ and 1,25 x 1,10 m and mulching with straw.

Positive differences compared to the average have been obtained when

Victoria rhubarb cultivar planted at distances of 1,00 x 1,10 m mulching with black polyethylene film of 30 μ, and distances of 0,75 x 1,10 m mulching with straw. (Table 3).

The total production ranged from 7,81 t/ha, for distance 1,50 x 1,10 m and mulching with black polyethylene foil 30 μ, up to 42,29 t/ha for variant with straw mulching, planted at distances of 0,75 x 1,10 m. (Fig. 2).

Table 3

Total yield at rhubarb crop

Variants	Early yield (t/ha)	% to the average	Difference to average (t/ha)	Semnificance of differences
d_1 x m_1	42,29	174,67	18,08	***
d_1 x m_2	34,90	144,15	10,69	***
d_1 x m_3	36,72	151,67	12,51	***
d_2 x m_1	21,63	89,34	-2,58	0
d_2 x m_2	29,54	122,01	5,33	***
d_2 x m_3	42,63	176,08	18,42	***
d_3 x m_1	12,43	51,34	-11,78	000
d_3 x m_2	18,17	75,05	-6,04	000
d_3 x m_3	16,64	68,73	-7,57	000
d_4 x m_1	19,21	79,34	-5,00	000
d_4 x m_2	8,66	35,77	-15,55	000
d_4 x m_3	7,81	32,25	-16,40	000
x(Average)	**24,21**	**100**	**0,00**	-

LSD 5% = 1,47 t/ha; LSD 1% = 2,29 t/ha; LSD 0,1% = 3,01 t/ha
d_1 – 0,75 x 1,10 m; d_2 – 1,00 x 1,10 m; d_3 – 1,25 x 1,10 m; d_4 – 1,50 x 1,10 m; 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
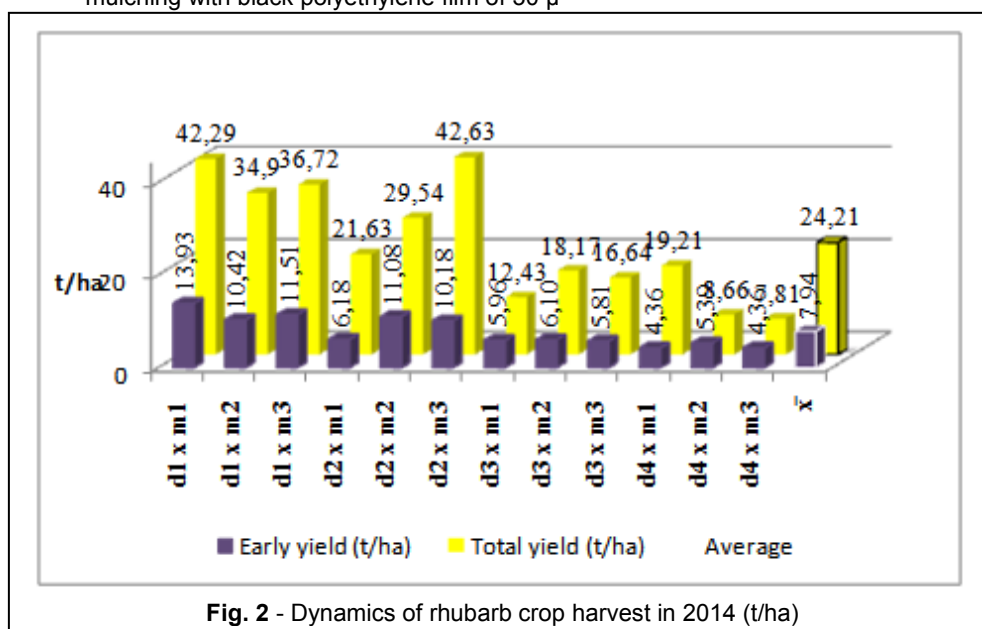

Fig. 2 - Dynamics of rhubarb crop harvest in 2014 (t/ha)

CONCLUSIONS

1. Regarding the influence of planting distances and mulching methods on rhubarb total yield during 2014, it ranged from 7,81 t/ha for distance 1,50 x 1,10 m and mulching with black polyethylene film of 30 μ, to 42,29 t/ha for variant mulching with straw, planted at distances of 0,75 x 1,10 m.

2. The yield in case of a early rhubarb crop ranged from 4,36 t/ha for distances 1,50 x 1,10 m and mulching with straw to 13,93 t/ha for distances 0,75 x 1,10 m mulching with straw.

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