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## THE INFLUENCE OF ESPACEMENT AND DENSITY OF BIFEROUS RASPBERRY SHOOTS ON THE PRODUCTIVITY OF THE PLANT

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### ABSTRACT

*In this article presented the experimental materials on the study of the influence of planting (espacement) scheme in the plantations of biferous (remontant) Redwing raspberry type on the development and productivity of the plant in the first and second year of vegetation. It was stated by the investigation that the privilege of close planting according to the scheme 2,0×0,3 meters comparing to thin planting of seedlings by the scheme 2,5 × 0,5 m. showed the production of mean yield in two years from the plantation 63,1 c/ha, that is, 1,9 times more than in thin espacement (2,5×0,5 m).*

**KEYWORDS:** *strawberry, biferous (remontant), scheme, density, area, fruitfulness, growth, development, yield.*

### INTRODUCTION

In recent years one of the most perspective ways of raspberry cultivation intensification is regarded using of biferous types and getting the yield even from the one year old shoots. In the cultivation of such kind of varieties all agrotechnical processes of plantation nursing have been simplified, decreased the amount of pests and diseases, created the opportunities for the application of harvesting techniques.

Standard scheme for planting (espacement) of raspberry varieties with traditional type fructification for the two-year old shoots is regarded 2,5×0,5 m in Uzbekistan condition. Biological and technological peculiarities of biferous varieties in the production of the yield only in one-year old shoots allow to increasing density of seedlings in view of fast growth of allotted plants in nutrient area [4].

### MATERIALS AND METHODS

While conducting research work we determined optimal density for plant shoots of biferous raspberry variety Redwing with interval from 8 to 16,6 thousand

plants in 1ha. Here the width of fertile bands (40 cm) was limited with soil tilling equipment's dimension while their pass in the inter-rows. Besides, we studied the possibility of formation of various widths of fertile bands rows from 40 to 100 cm. This experiment allows to determining the type of optimal density of plants and the means of the provision of the agrotechnical efficacy of suggested methods of raspberry cultivation. The experiment was conducted on Redwing raspberry variety in experimental base in Research institute of horticulture, viticulture and wine-making under the name M.M.Mirzayev [1, 2, 3, 5].

### RESULTS AND DISCUSSION

The conducted phenological observations showed that growth activity and development of raspberry shoots practically didn't depend on the planting scheme. The periods between separate phases of vegetation's in all experimental variants underwent similarly.

It was stated that the development of leaf apparatus of Redwing variety biferous raspberry depends on intensity of the development of the nutrients for the plants of allotted area and in the result of this

condition each leaf gets sunlight (solar radiation). Leaf formation of other selected shoots was mainly identical in all experimental variants and didn't depend on the scheme of plant espacement.

Most amounts of leaves in a shoot were observed in the first year of planting. In the second year of seedlings their density increase in fertile bands led to reduce of plant leaf formation relatively by 9-15% and 20-21%. The degree of leaf index (leaf surface place comes with plant area unit) in most cases depends on inter-row width. In experimental variants this indication was average 14% more in two-meters width than in the control variant with 2,5 m inter-rows. Therefore, in one-year old plants this difference was higher and reached to 24-29%.

The efficiency of biferous raspberry varieties cultivation is mainly connected with the increase of amount of biferous shoots per area unit. It was stated that in the first year of fruitfulness of plantation the proliferation of row bands of raspberry shoots didn't undergo proportionally with the density of plant seedlings. The variant of plants with the most density (16,6 thousand plants/ha) was twice higher than in the control, and the level constituted 37%. By increasing density of plants 1,2 times (scheme 2x0,5 m., 10

thousand plants/ha) the present difference on this indication was not observed compared to the control one. Full proliferation of shoots of fertile bands with balancing their density occurred in the second year of vegetation. In the condition of developed inter-row area of the seedlings due to intensive development of the root system of raspberry in this period maximum increase in the amount of forming shoots was observed in the second year of fructification.

More impact of the planting scheme of plants was observed on the formation of fertile shoots. This is due to the different quality of shoots formed from the replacement and root buds. It was stated that replaced shoots had more permanent flowering capacity. Close planting will provide more specific weight of replacement in young plantation following fruit-bearing shoots. In the first two years the preference of fructification was observed in thicker planting scheme (16,6 thousand plants/ha). In the control variant (8 thousand plants/ha) the increase of fruit-bearing shoots quantity was noted in average 37%. And in the second year, in 40 cm fruit-bearing band rows average 3,3 times more shoots were formed than in the first year (Table).

**Table**

**The influence of planting scheme of biferous raspberry variety Redwing on the formation of fruit-bearing row bands and fertility**

Plant espacement scheme, m	The quantity of biferous seedlings, pcs/linear metres (% total quantity)			Fructification, c/ha		
	In 2017	In 2018	average	In 2017	In 2018	Average in two years
2,5x0,5	6,64	12,8	9,7	20,9	39,4	30,1
2,0x0,5	6,44	13,7	10,0	24,7	50,9	37,8
2,0x0,3	9,21	14,3	11,7	45,5	70,8	58,2
HCP <sub>0,05</sub>	0,8	0,5		5,3	2,9	

One of the most important indications in raspberry cultivation is quantity of berries formed in the shoots, which may indicate productivity of plantation of biferous raspberry. Moreover, it was determined that well developed shoots of Redwing raspberry variety may form berries up to 200 pieces. For this, there is a necessity for high light level, non-competitive conditions and early awakening of buds. Therefore, high specific weight of shoots which may reach to this level of development is significant mainly for the first year of fructification. The impact of the density of plant espacement in both, in the first and in the second year of fructification didn't occur on this process. In the first year of fructification in separated shoots average 28 and 20% more berries were formed compared to the second year of fructification. By the quantity of berries per area unit and due to the most quantity of fertile shoots the privilege was noted in the variant of close plants. In the planting of 16,6 thousand plants/ha average 35% more berries were formed in two years than in the control variant. The variations of differences in some control years were in the range from 30 to 48%.

Plantation yield is a main criterion in any agrotechnical study. Close planting of biferous

raspberry pursues a main aim – increasing the quantity of fruit-bearing shoots in the first year after planting. The effect of this agrotechnical measure is progressively leveled together with plantation age according to overgrowth of plant rootstock. This was confirmed by our observations in our investigation. So, if the yield per area unit in the thickest planting (16,6 thousand plants/ha) increased to 81% in two years of investigation, then in the control variant (8 thousand plants/ha) this indication was 16%. And besides, the productivity in separated shoots in all variants of experiment mainly didn't differ from each other. The advantage of close planting biferous raspberry was observed during the two years of fructification period under our investigation. In the variant of planting scheme 2x0,3m (16,6 thousand plants/ha) average 41% berry yield was obtained in two years of investigation, and by the scheme 2x0,5m (10 thousand plants/ha) 20% more yield than in control variant of planting scheme 2,5x0,5m and distribution with 8 thousand plants/ha. Consequently, twice increase of plants per area unit allowed to almost 50% increase of plantation productivity.

## CONCLUSION

1. Growth activity and development of shoots, list apparatus as well don't depend on planting scheme of plants in the first year of vegetation of Redwing variety of biferous raspberry. In the second year of vegetation density increase of shoots in fertile bands led to reduce in leaf formation of plants by 9-15% and leaf place by 20-21%.

2. By the number of berries formed in plant and due to the most fruit-bearing shoots quantity, the privilege was noted in the plant which was cultivated under thick planting scheme (16,6 thousand plants/ha) and formed average 35% berry more than in control variant during the two years of our investigation.

3. The advantage of close planting of Redwing variety of biferous raspberry was observed during the two-year investigation period. In this period average 46% berry was obtained in the variant of planting scheme 2,0×0,3 m. (16,6 thousand plants/ha), while in planting scheme 2,0×0,5 m. (10,0 thousand plants/ha) 20% more berry was produced compared to control variant with scheme 2,5×0,5 m and espacement of 8,0 thousand plants/ha.

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