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THE IMPACT OF CONTOUR PRUNING ON WALNUT TREES, FRANQUETTE VARIETY

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Abstract. *The problem of finalizing the optimal productive parameters of the architecture of the fruit plantation in various cultivation conditions is considered one of the most priority in all countries with advanced nut cultivation. Research in the field has shown that climate change affects the physiology, phenology of species, the composition and dynamics of communities in biocenoses, productivity, fruit quality, etc. As trees age and fruiting intensifies, the intensity of vegetative growth, including that of extending the framework, decreases. At the same time, the possibility of replacing exhausted semi-skeletal branches with new ones is reduced. Measurements of annual branches were made at the end of the growing season according to the experiment scheme. The research was conducted in a 16-year-old walnut orchard of the Franquette variety in the center of the country. Contour cuts were performed in the spring until the start of vegetation, from 2.5 to 3.5 meters from the center of the crown. Following contour cutting of walnut trees of the Franquette variety, the walnut harvest decreased from 15% in the control variant compared to the V2 variant to 29% in the V4 variant. The number of fruits in one kilogram decreased depending on the degree of contour cutting performed in each variant according to the experimental scheme.*

Keywords*: contour cut, walnut, variety*

INTRODUCTION

Walnut cultivation is traditional for the inhabitants of the Republic of Moldova, but also for all countries located near the Black Sea and the Mediterranean Sea. The beginning of the 21st century meant a considerable leap in the consolidation of these cultures and, especially, walnut cultivation.

The problem of finalizing the optimal productive parameters of the architecture of the fruit plantation in various cultivation conditions is considered one of the most priority in all countries with advanced nut cultivation.

Research in the field has shown that climate change affects the physiology, phenology of species, the composition and dynamics of communities in biocenoses, productivity, fruit quality, etc.

Shortening of multi-year branches or reduction. It is carried out mainly with the transition to lateral branching in the required direction or to the short stump in the area of dormant buds, which are located near the ring that delimits annual growths on the branches.

In the case of shortening of multi-year branches, as well as shortening of one-year ones, the start of growth buds, including dormant ones, the growth of shoots and remaining branches is intensified.

The degree of activation of growth processes is directly dependent on the degree of shortening and is more pronounced near the cut. The older the wood on which the reduction is performed, the stronger the regeneration reaction and the further it extends from the place of cutting the branch.

Shortening of multi-year branches on 2-4-year-old wood is considered weak, on 5-7-year-old wood - medium, on wood older than 7 years - strong. The diameter of the branch at

the place of shortening should not exceed 5-6 cm in stone-bearing species and 7-8 cm - in seed-bearing ones, because larger wounds do not heal.

A moderate reaction without the formation of superfluous shoots, including "greedy" ones, is observed in the case of shortening skeletal and semi-skeletal branches by transferring them to a lateral branch with a diameter of at least 1/2 of that of the main branch at the insertion site.

Shortening of multi-year branches with transfer to the desired branching is widely used in the process of crown formation, in order to give the main branches the necessary direction and angle of inclination, to stimulate the formation of top branches and to carry out partial thinning of the crowns in places of excessive thickening.

During the period of full fruiting of trees, the main objective becomes shortening to 3-4-year-old wood of semi-skeletal branches with low fruiting potential for the purpose of cyclic renewal with new branches. To 2-3-year-old wood, some top branches are also shortened if it is necessary to reduce the fruit load in accordance with their growth vigor. Cyclic shortening of semi-skeletal branches to 3-4-year-old wood, in conjunction with other phytotechnical performance procedures, contributes to establishing a favorable ratio between growth and fruiting branches, maintaining them in a young, physiologically active and productive state, which ensures normal fruiting every year.

As trees age and fruiting intensifies, the intensity of vegetative growth, including that of extending the framework, decreases. At the same time, the possibility of replacing exhausted semi-skeletal branches with new ones is reduced.

Activation of regeneration and intensification of the growth of new shoots is required by shortening the frameworks in 3-4-year-old wood, when the length of the annual extension growth decreases to 12-15 cm and subsequently repeated in 5-7-year-old wood, when the length of the annual extension branches is only 8-10 cm. The reduction of skeletal branches in wood older than 7 years is not recommended, because the renewal of their economic fruiting is long-term.

The reduction of multi-annual branches in wood of different ages is also applied to maintain the dimensions of the crown within the designed parameters.

MATERIAL AND METHODS

The experiment was established in 2023 in the walnut plantation of the company SRL Samarvin in the city of Orhei, which was planted in 2007 with walnut trees of the Franquette variety. The planting distance is 10x10 m. The interval between the rows is maintained grassy with 5-6 mowings during the growing season. In 2023, the micro-sprinkler irrigation system was installed under the tree crown. Contour cuts were made in the spring of 2023 with the De Walt electric saw with a telescopic miner at a distance of 3.5m, 3.0m, 2.5m from the center of the crown on one side of the tree.

Measurements of annual branches were made at the end of the growing season according to the experiment scheme. Fruit harvesting was carried out on each tree separately by shaking and weighing on each side of the tree. Experiment 3 was established in 2025, also within the company SRL Samarvin, with 1-year-old walnut trees of the Chandler variety. After planting, the trees were shortened to a height of 1 meter. The land between the rows in the first year of vegetation was processed with a disk harrow, and later it will be grassed with plants from the spontaneous flora through frequent mowing. The irrigation system is also by

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microsprincler. The integrated protection of the experiments was carried out according to the chemical treatment schedule upon warning.

RESULTS AND DISCUSSIONS

In the walnut plantation of the Franquette variety planted in 2007 with a planting scheme of 10x10m. As part of the experiment with contour pruning of walnut trees, the influence of pruning on phytometric indices was investigated. Some of the trees with contour pruning were treated with paclobutrazol to determine the action of the product on the growth of annual branches.

Table 1.

Average length of annual branches depending on the degree of contour pruning in the Franquette variety, year 2025

Variant	Average length, cm	Total length, m
V1	15	120
V2	22	135
V3	29	144
V4	40	158

In 2025, the climatic conditions in terms of precipitation were favorable. In the control variant, the average length of annual branches was 15 cm and a total length of 120 m. The total length in this variant (V1) was 120 m. In the variants with contour cutting, the average length of annual branches has a higher growth dynamics compared to the control variant, from 47% in the V2 variant where the contour cutting was performed at 3.5 m from the stem, to 267% in the V4 variant where the distance to the base of the crown from the center was reduced to 2.5 m.
In the variant with contour cutting, the average length of annual branches was from 18 cm, 19% lower than in the V2 variant, The length of all annual branches in the V2 variant was 135 m.

In the V3 and V4 variants, the average length of annual branches increases by 31% (V3) compared to the V2 variant and by 93% more than of the control variant (V1). The growth difference between variants V4 and V1 is 25 cm or 267%. For the indicator, the total length of annual branches, the difference between variants V3 with and without the application of the growth retardant was 3 m or 2.1% and for variant V4 5.1%.
Following the contour pruning of 16-year-old Franquette walnut trees in 2023, the harvest in 2025 was significantly influenced by the pruning work carried out previously.

Table 2.

Walnut harvest of the Franquette variety depending on the degree of contour cutting, year 2025

Variant	Kg/tree	t/ha
V1	11,0	1,10
V2	9,4	0,94
V3	8,2	0,82
V4	7,9	0,79
DL 95%	3,1	3,78

In the control variant V1, the yield per tree was 11.0 kg and 1.1 t/ha. In the variant V2, after reducing the radius from the center to the periphery of the crown to 3.5 m at the base in 2024, the yield of nuts per tree decreased to 9.4 kg/tree and 0.94 t/ha. With the decrease in the volume of the crown of walnut trees, the yield decreases even more sharply. Thus, in the

variant V3 where the distance from the center of the crown was reduced to 3.0 m, the yield of nuts per tree was 8.2 kg/tree and 0.82 t/ha, respectively.

In variant V4 where the most severe contour pruning of trees was applied with a distance from the crown center of 2.5 m to the crown base, the harvest was 7.9 kg/tree and 0.79 t/ha. The difference in production between trees after contour pruning is significant compared to variant V1 which is the control.

Following contour pruning of walnut trees of the Franquette variety, the walnut harvest decreased from 15% in the control variant compared to variant V2 to 29% in variant V4. The number of fruits in one kilogram decreased depending on the degree of contour pruning performed in each variant according to the experimental scheme.

Table 3.

Influence of contour cutting on quality indicators of Franquette walnuts, year 2025

Variant	Fruit length**, mm**	Fruit width**, mm**	The number of fruits in **1 kg, buc**
V1	3,87	3,22	60
V2	3,91	3,25	56
V3	4,0	3,33	59
V4	3,96	3,35	51

The Franquette variety being a variety with terminal fruiting, following the contour cutting procedure the number of flowering buds was reduced. In the control variant V1 the number of nuts per kilogram is 60 pieces, with specific parameters for the variety, the average length of the fruits of 3.87 mm and the width of 3.22 mm. In the variants with contour cutting, where the cutting level was higher, both the length of the fruits and their width recorded a slight increase compared to the control variant. The largest nuts were recorded in the variant with the lowest number of fruits per kilogram (V4).

CONCLUSIONS

The first conclusions after using contour pruning on walnut trees of the Franquette variety, which has a terminal fruiting type, are as follows:

1. More aggressive contour pruning of 3.5m radius is carried out in the first 2 years with the aim of rejuvenating the fruiting area of the walnut tree crown.

2. The size of the walnuts increases slightly after contour pruning.

3. The application of growth retardant during the contour pruning period of 18-year-old walnut trees would aim to reduce the growth vigor of annual branches and minimize the degree of crown thickening in the area where the contour pruning was performed.

4. Increasing the productivity of the walnut plantation requires the application of key fertilizers that would stimulate the differentiation of fruit buds and reduce the deficit of elements that are not accessible due to the chemical composition of the soil

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