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VALORIZATION OF THE FRUITING POTENTIAL OF CHERRY DEPENDING ON THE VARIETY, CROWN SHAPE AND PRUNING PERIOD OF TREES

SPECIALITY 411.06 – FRUIT GROWING

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The doctoral thesis and abstract can be consulted at the UTM library and on the ANACEC website (www.anacec.md).

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CONTENTS

CONCEPTUAL REFERENCES OF THE THESIS

The relevance and importance of the topic addressed are evident, given the current trends in the fruit growing sector, which aim to achieve high-quality, sustainable, and economically efficient production. In the context of the Republic of Moldova, the adoption of modern techniques and sustainable and integrated systems is an essential strategy for adapting to local conditions and increasing the competitiveness of the sector [1*,2,4,9,18*]. The primary focus is on the correct placement of species, combining varieties and rootstocks according to the specific climate, soil, and biocoenosis, which allows for large yields, healthy, high-quality fruit, and reduced investment. The variability in vigor of different varieties and rootstocks makes it possible to control growth and adapt trees to less fertile soils, contributing to the sustainability and efficiency of the crop [1*,9,13,20*21*]. Pruning and crown training techniques are also fundamental to maximizing growth and fruiting potential. Continuous improvement of these techniques ensures that optimal crown parameters are maintained, promoting rapid and high-quality fruiting. Pruning during both dormancy and the growing season, depending on age and objectives, is essential for the health and productivity of the plantation [1*,2,18*,19*].

In conclusion, the implementation of modern, sustainable technologies adapted to local conditions, combined with careful management of pruning and tree training, are essential for achieving high-performance, competitive, and profitable cherry orchards in the Republic of Moldova and beyond [1*,2,8,14*,15,21*]. These sustainable strategies ensure not only increased production, but also the conservation of resources and the sustainable development of the fruit-growing sector.

The aim of this paper is to increase the productivity of intensively cultivated cherry orchards by identifying and optimizing the most effective combinations of variety-rootstock-crown shapes, variety-rootstock-pruning periods, and ensuring an optimal balance between vegetative growth and fruiting, with the end result of obtaining high-quality fruit.

To achieve the proposed **goal**, the following research objectives were established:

1. To evaluate the agrobiological and productive performance of different variety-rootstock combinations (varieties grafted onto Gisela 6 and MaxMa 14) in an intensive system, in order to select the most suitable and productive variants.
2. Compare the effectiveness of different crown shapes (improved thin fuse, cup, Kym Green Bush) on growth control and fruit quality in order to identify the optimal shape.
3. Establish the influence of the pruning period (dormancy, flowering, after harvest, early autumn) on vegetative-productive balance and fruit bud differentiation, in order to determine the optimal time for intervention.

4. Integrate the data obtained on the variety, rootstock, crown shape, and optimal pruning period to define a coherent technological package for intensive cherry cultivation.

Research hypothesis. There is an optimal combination of variety-rootstock-crown shape-pruning period which, when applied to intensive cherry orchards, will lead to a significant increase in yield and improve fruit quality compared to control variants or standard practices. Of the three crown shapes studied, a simple and compact shape of the Improved Thin Spindle system will ensure better crown lighting, more efficient growth control, and higher quality fruit production compared to traditional shapes. Also, pruning during the growing season (after harvest) will be more effective than pruning during dormancy in maintaining the optimal balance between vegetative growth and fruiting, by limiting vigor and stimulating the differentiation of fruit buds for the following year, thus contributing to large and stable yields. To validate this hypothesis, three cherry varieties grafted onto the medium-low vigor Gisela 6 rootstock were tested, using three crown shapes: Improved Thin Spindle, Cup, and Kym Green Bush. Five varieties grafted onto the medium-vigour vegetative rootstock MaxMa 14 were also evaluated at different tree pruning times: pruning during dormancy (control), pruning during flowering, pruning after harvest and early autumn pruning.

Summary of the research methodology and justification of the research methods applied.

The research was organized in stationary field experiments, carried out in the Staragro Group SRL cherry orchard between 2018 and 2024. Laboratory studies were also conducted at the "Agricultural Product Storage and Processing Technology" laboratory of the Faculty of Agricultural, Forestry, and Environmental Sciences, UTM. Cherry varieties from the world collection, grafted onto two vegetative rootstocks, were used for the research:

- ✓ **Gisela 6 rootstock: Early Star, Samba, Black Star varieties.**
- ✓ **MaxMa 14 rootstock: Ferrovia, Kordia, Regina, Skeena, Stella varieties.** The research conducted within the following scientific projects served as methodological support for the thesis:

- ✓ **State Project 29A (2015–2018):** Improvement of maintenance technologies for super-intensive cherry and apple orchards, development of fruit quality formation techniques at European level.
- ✓ **Project PS 44 (2020–2023):** Adaptation of sustainable and environmentally friendly fruit production technologies in terms of quantity and quality, depending on the integrity of the cultivation system and climate change.

To confirm the hypothesis, classical and modern research methods appropriate to the purpose and objectives set were used: morphological description, biometric assessments, physiological, chemical, and physical analyses, synthesis, tabular and graphical analysis, comparison of the materials obtained, mathematical and statistical methods of processing the results.

Degree of scientific novelty. A major innovation consists in identifying the stages of formation of grafted cherry trees on the Gisela 6 rootstock, trained in the form of an Improved Thin Spindle in an intensive cultivation system, as well as in the development of technological links specific to this system. This approach not only provides a new theoretical framework, but is also based on solid experimental data, thus substantiating the system of training and pruning trees during the growing season, while also taking into account the maintenance of their physiological balance [1*,2*,4*,18*,19*21*,43*]. The analysis of the theoretical and experimental values of the structural parameters of the cherry plantation suggests the need for further research to develop plantation structures aligned with the natural and environmental conditions specific to fruit production. The results obtained have been recognized internationally, receiving six awards at international invention salons, thus highlighting the significant contribution of the study to the field of modern fruit growing.

The practical value of the work. The research results expand and complement previous studies, providing a solid basis for modern fruit growing practices. The research contributes to deepening existing knowledge about the formation of the fusiform crown in terms of fruiting, cherry quality, productivity, and economic efficiency. The tree training methods proposed in the paper, together with the optimal pruning period and strategies for maintaining the physiological balance of cherry tree crowns, provide concrete and applicable evidence in modern orchards [1*,11*,19*,20*21*,43*]. These principles can be implemented to optimize fruit yields, thus ensuring competitive and economically efficient production.

Approval of scientific results. The research results accumulated in the thesis were presented, examined, and approved annually at the Department of Horticulture and the Council of the Faculty of Horticulture of the UASM, 2018-2022, and **discussed at 15 national and international scientific forums:** Conferences of Students, Master's and Doctoral Students, UASM, Chisinau (2020-2022); International Scientific Symposium "Modern Horticulture - Achievements and Perspectives", dedicated to the 85th anniversary of the founding of UASM, 2018; International Scientific Symposium "Agriculture For Life, Life For Agriculture", 2021, 2025, Bucharest, Romania; International Scientific Symposium - Agri-Food Sector - Achievements and Perspectives", November 19-20, Chisinau, 2021; International Scientific

Symposium. Horticulture, Food and Environment. Priorities and perspectives. Craiova, 2021, 2022, 2024; International Scientific Symposium "Life sciences today for tomorrow", 2021, 2024, Iași, Romania; International Scientific and Practical Forum "Theory and Practice of the Development of the Agro-Industrial Complex and Rural Areas," Lviv 2021; International Scientific Symposium "Regulation of Natural Resource Use: Achievements and Perspectives," 2021, 2022, Chișinău; International Agriculture Congress (UTAK 2021); International Agriculture Congress, 2022, Chairman, Türkiye; National Conference with international participation "Natural sciences in the dialogue of generations", 2024, Chisinau; International Scientific Conference "Genetics, Physiology and Plant Breeding" (VIII-th Edition), 2025, The VIII Edition of the National Conference with International. September 18-19, 2025.

National and international invention fairs: The 24th International Exhibition of Inventions. In Inventica, July 29-31, 2020. "Gheorghe Asachi" Technical University Iași-Romania; EUROINVENT – ICIR 2022, 2024. The International Conference on Innovative Research, May 26-28. Iași 2022; Pro Invent, 21st edition, October 25-27, Cluj-Napoca, 2023; Infoinvent, 18th edition, November 22-24, Chișinău, 2023; The 28th International Exhibition of Inventions "INVENTICA 2024" Iasi, Romania. The International Exhibition of Inventions and Innovative Entrepreneurship June 6-7, 2025, Chișinău. Pro Invent, 22nd edition, October 15-17, Cluj-Napoca, 2025.

Publications on the thesis topic. The research results and issues addressed were published in the following scientific works: I am co-author of the monograph "Scientific bases of intensive cherry cultivation technology"; 9 articles in journals from the Web of Science and SCOPUS databases; 9 articles in journals from the National Register of Profile Journals, category B; 8 articles in scientific papers published in the Republic of Moldova; 11 articles in international scientific conference materials (abroad); 7 articles in international scientific conference proceedings (Republic of Moldova) and a patent.

Implementation of scientific results: The research results are implemented in the enterprises of the Public Association, the Association of Fruit Producers and Exporters "Moldova Fruct" and in fruit growing courses for training specialists in the field of horticulture.

Thesis structure: The thesis contains an introduction, three chapters, conclusions and recommendations, a bibliography of 241 titles, 8 appendices, 126 pages, 30 tables, and 51 figures. The scientific results are published in 46 papers, including one patent.

Keywords: Prunus avium L.; rootstocks; varieties; tree training and pruning period; harvest; quality; effectiveness.

CONTENTS OF THE THESIS

The introduction argues the relevance of the research in the current context of fruit growing, motivated by the need to develop efficient technologies for obtaining sustainable harvests of high-quality cherries. In fruit tree research, cherry tree training and pruning systems are essential for maximizing production and ensuring consistent harvests, and have been the subject of numerous studies and practical experiments.

1. CHERRY CULTIVATION – ORIGIN AND EVOLUTION OF THE SPECIES, TREE CULTIVATION SYSTEMS

This chapter provides a detailed bibliographic summary of the importance, production, and evolution of cherry cultivation both globally and nationally. It analyzes the indicators for the utilization of cherry production, also at global and national level. It addresses the cultivation systems used for cherries, as well as the range of rootstocks and grafts used in modern orchards, highlighting the importance of choosing the appropriate biological material. It also specifies the main production resources, such as soil and biological material, as well as the technological processes involved in the implementation of the fruit tree system. At the same time, it analyzes the fruit tree system as a complex set of relationships between the variety-rootstock association, environmental, technological, and economic factors that determine the efficiency of the orchard [4,12,22]. In addition, aspects related to planting density, tree training and pruning methods, as well as early fruiting, disease and pest resistance [2,16,18] are detailed, thus highlighting the essential elements for the optimal development and management of cherry orchards.

It has been shown that cherry trees can be grown in different orchard systems and crown shapes depending on soil, light, heat, precipitation, etc., orchard size, available technology, labor, and the fruit market [2,11].

The training and pruning systems for large and small trees with a central axis and short axis, flattened and fusiform crown systems and their impact on fruiting, productivity, and fruit quality, as well as on maintaining a physiological balance between growth and fruiting, suitable for early harvesting, pruning, and harvesting fruit from the ground. The most common crowns in modern cherry orchards are spindle crowns of the Super Fuss Axis, Tall Fusiform Axis, Thin Spindle, Super Slender Axe (SSA), and Tall Spindle Axe (TSA), where the tree grows freely upwards and largely meets the requirements of intensive fruit cultivation, including pruning and harvesting from the ground or with side platforms [1*,3*,18,21*].

2. OBJECTS, METHODS, AND CONDITIONS FOR CONDUCTING RESEARCH

2.1. Research objects.

The investigations were conducted between 2018 and 2024 in the cherry orchards of Staragro Group SRL in Dubăsari.

2.2. Organisation and location of experiments.

Experiment 1. Influence of crown shape on the productive potential of cherry trees grafted onto Gisela 6 rootstock. The experiment was set up in the fall of 2015 with the Early Star, Samba, and Black Star cherry varieties grafted onto Gisela 6 rootstock, with trees planted at a distance of 4x2 m. The rows of trees are located in a north-south direction. Low-volume crown shapes were studied: C1 - Improved slender spindle; C2 - Cup; C3 - Kym Green Bush. Crown formation and tree vigor were controlled by the double sector pruning method [2] and by pruning branches that exceed half the growth vigor of the branches on which they are located, with the aim of optimizing the growth ratio of vegetative and reproductive organs to accelerate the entry of trees into fruiting. The semi-skeletal branches are periodically renewed by rotation once every 3-4 years.

Experiment 2. The influence of the cherry tree pruning period on the growth, fruiting, productivity, and quality of cherry fruit. The orchard was established with the Kordia, Regina, Stella, Ferrovia, and Skeena varieties, grafted onto the MaxMa 14 rootstock. The trees were planted in the fall of 2012 at a distance of 5x3 m, using the improved natural crown shape with reduced volume [8]. Maintenance and fruiting pruning of cherry trees was carried out during the dormant and growing seasons according to the following variants: **V1** – Pruning during the dormant season (control); **V2** – Pruning during flowering; **V3** – Pruning after harvest (July); **V4** – Pruning in early autumn (first ten days of September).

Pruning for maintenance and fruiting of cherry trees during the dormant and growing seasons was carried out by shortening, thinning branches, and reducing the stock: thin, drooping branches that produce small fruit were removed at the ring level; The main branches, secondary branches, and semi-skeletal branches were reduced to 30-40 cm in length at the base of the crown and to 8-10 cm at the top of the crown. The main branches and sub-branches were cut to 5-6 years old wood, and the semi-skeletal branches to 3-5 years old wood. The annual branches are shortened to a spur of about 20 cm in length or to one-third to one-half of their length, depending on their position [13,21*,30*].

The experiment was conducted using a block system, in 4 random repetitions, each variety being represented by 8 trees in each repetition. The trees were selected according to their growth vigor and uniform development [1*,2,22].

2.3. Research methods.

The research was carried out, in terms of tree training and pruning, according to the methodological guidelines for conducting investigations with fruit tree species. To determine the influence of the crown training system and the pruning period of cherry trees on tree growth, fruiting, and productivity, physiological, physical, and chemical analyses were performed [2].

Characteristics of the methods used for testing. Biometric analyses. Morphological studies of trees were carried out annually at the end of the growing season. For 32 trees in each variant, the height of the trees and the width of the crown, as well as the diameter of the trunk 20 cm above the grafting site, were measured. Based on these measurements, the SSTT was calculated. For 4 trees, the average and total length of the annual branches, the number of vegetative and fruiting branches were determined [1*].

The harvest was determined at the stage of fruit ripeness for each tree by weighing the fruit from 32 trees in the variant and calculating the arithmetic mean, and the yield was expressed in kg of fruit per tree and reported per hectare. During fruit harvesting, their distribution (kg/tree) was evaluated on biennial branches and on 1-, 2-, and 3-year-old bouquet branches on 4 identical trees from each variant. At the same time, the diameter of the fruit on biennial branches from shortened shoots was determined during the previous growing season. The shoots were shortened to 10, 20, 30, and 40 cm when they reached a length of 60-65 cm.

During the fruit development and ripening period, the diameter and weight of the cherries were determined using a template (VOEN, Germany) with holes of 24, 26, 28, 30, 32, 34, and 36 mm. These analyses were recorded on 20 cherries in four identical samples (n=80) from each variety. The average weight of the cherries was determined at harvest time by weighing a 1 kg sample of cherries with a digital scale (± 0.01 g) (AS 82/220.X2) and counting them at each repetition.

Physiological analyses. Photosynthetic potential was calculated based on the number of developing fruit formations, as well as the average and total length of annual branches. The leaf area per tree was determined at the end of the growing season on four typical trees from each variant. When determining the leaf apparatus in cherry trees, the physiological state of the trees is determined, including: tree selection; identification of control branches; shoot selection; selection of May bouquets and spurs; leaf collection; determination of leaf area [27*,48*].

Chemical analyses. The content of soluble substances in fruits was determined in the orchard using a digital refractometer ATAGO N-20E and DR201-95, expressing values in % Brix. Titratable acidity was determined by neutralization with 0.1 N NaOH solution in the presence of phenolphthalein, expressed as malic acid in %.

Physical analyses. The ripeness of the fruit was determined by the color of the skin, according to the CTIFL and SUS color charts. These analyses were recorded from the beginning of the change in fruit color from green to yellowish pink until full ripeness every 3 days using the

CTIFL color scale: yellowish pink, very light red, red, bright red, dark red, dark reddish brown, dark brown. The fruits were divided into 5 fractions according to their diameter (less than 24 mm; 24-25.9 mm; 26-27.9 mm; 28-29.9 mm; greater than 30 mm). Each fraction was divided into intact and cracked fruits, and then the proportion of cracked fruits was calculated. Cracked fruits were identified according to the location of the crack (protrusion): on the longitudinal and transverse cheeks; from the pedunculate pelvis (stem cavity); from the stilar point (above). Fruit hardness was measured using the AGROSTA 100 penetrometer manufactured by Firm Tech with a favorable measurement value for cherry fruit above 250 g/mm2 [13].The research results were subjected to statistical analysis using Microsoft Office Excel 2003, which allowed the level of significance to be assessed at 0.05 using the Tukey test [22] and led to the formulation of conclusions and practical recommendations.

Research conditions. During the research, the average annual air temperature was 10.6-12.7°C, being higher in 2019, 2020, 2023, and 2024. Thus, the average annual temperatures exceeded the 12°C limit in 4 out of 7 years, with the highest being in 2023 (13.1°C). At the same time, the lowest monthly air temperature was reported in 2018, 2019, and 2021, when the temperature in January and February fell below 0°C. Atmospheric precipitation ranged from 405 mm in 2019 to 671 mm in 2021. The highest amounts of water were recorded in 2018 (609 mm), 2021 (671 mm), and 2024 (595 mm). On average over 7 years, 530 mm of precipitation fell, of which over 65% was in the form of rain during the growing season.

Soil characteristics. The study was conducted in an orchard planted on typical loamy chernozem. The humus content ranges from 2.94% in the 0-20 cm horizon, 1.85% at a depth of 20-40 cm, and 1% or less at a depth of 80 cm. Carbonates originate from a depth of 20 cm, and the soil reaction at a depth of 0-40 cm is slightly alkaline, in the 40-60 cm layer it is moderately alkaline, and at a depth of 60-80 cm it is strongly alkaline [21]. The reaction of the soil solution pH (H20) is 7.5, and pH (KC1) is 7.20. The carbonate (CaC03) content in absolutely dry soil is - 5.36%, mineral nitrogen is 15-24 mg/kg, and the easily hydrolysed nitrogen content is very low, less than 100 mg/kg. The soil has a high content of mobile phosphorus - 30-45 mg/kg, but the high carbonate content can block its absorption. The soil is characterized by a very high content of exchangeable potassium of 200 mg/kg, but high temperature and drought conditions block the absorption of potassium from the soil during the period of maximum need. Based on the data, the required amount of mineral elements per hectare to be introduced into the soil was calculated: Nitrogen 95 kg; P2O5, 20 kg; K2O, 45 kg [8].

Agrotechnics. Agrotechnical measures are carried out in accordance with current agrotechnical guidelines. The orchard is irrigated by drip irrigation, and Watermark transducers installed at depths of 20, 40, and 60 cm in each plot are used to monitor soil moisture. The soil in the orchard was kept as cultivated land for the first two years after planting the trees, but in subsequent years, the distance between rows is kept artificially grassed. The 2.0-2.5 m wide strips between rows are mowed as needed, and the vegetative mass remains as mulch on site. Herbicides or 2-3 mechanical hoes with a cutter bar are applied along the row of trees. Soil maintenance, irrigation, fertilization, and protection of trees from diseases and pests are carried out as needed [1,3*,5,7,10,11,18*21*].

3. VARIABILITY OF GROWTH, DEVELOPMENT, AND PRODUCTIVITY INDICATORS OF CHERRY VARIETIES DEPENDING ON CROWN SHAPE AND PRUNING METHOD

3.1. Vegetative growth of cherry trees.

The growth of trees is assessed using crown parameters, which are presented in terms of height, width and length, diameter and cross-sectional area of the trunk, average and total length of annual growth [1*,8*]. The vegetative growth of cherry varieties was studied dynamically. The Early Star, Samba, and Black Star cherry varieties, grafted onto the Gisela 6 rootstock, during the growth and fruiting period, grew in height to 369.6-400 cm, being significantly larger in trees formed according to the improved thin crown system compared to the Kym Green Bush system, and was not always significantly ensured with the cup-shaped crown.

As the trees aged, the width of the crown also increased, reaching maximum sizes in years 6-7 after planting (Fig. 3.1). The length of the crown, which is a basic indicator in tree formation, especially for the formation of continuous rows in intensive orchards, ranges from 125-162 cm in the fourth year after planting to 240-250 cm in the seventh year.

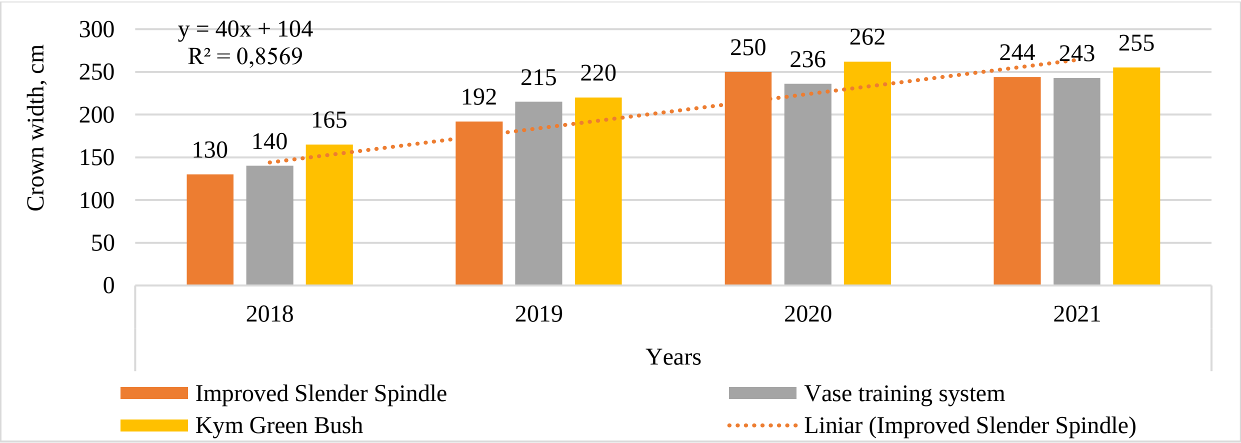


Figure 3.1. Crown width of Early Star cherry trees, depending on crown shape, cm (Gisela 6 rootstock, tree age 4-7 years), *p* < 0,05.

It has been observed that the crowns of Early Star, Samba, and Black Star cherry trees grafted onto Gisela 6 rootstock, planted at a distance of 4x2 m, at the age of 6-7 years, or grouped together in rows of trees, formed continuous rows. The crown width remained at approximately 250 cm, regardless of the crown shape. The height of cherry trees formed according to the Kym Green Bush system is lower compared to the cup shape and the improved thin spindle. The trees continue to grow and develop uniformly over the years, reaching a trunk diameter of 8.28-10.28 cm in 2021.

The height of cherry trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, grafted onto the MaxMa 14 rootstock, remained at approximately 370-400 cm during full fruiting. This height corresponds to the optimal parameters of modern cherry orchard structures grafted onto medium-vigour rootstocks [1*,18*,21*]. The width of the cherry tree crown in 2018-2021 ranged from 236-254 cm for the Ferrovia variety to 250-278 cm for the Stella variety. The crown length of the above-mentioned varieties ranged from 312-361 cm.

The crowns of Ferrovia, Kordia, Regina, Skeena, and Stella trees, during full fruiting, achieved optimal parameters of 370-400 cm in height and 236-278 cm in width at the base. The trees recorded trunk diameters ranging from 12.02-14.19 cm in 2019 to 13.51-16.01 cm in 2021, and the cross-sectional area of the trunk increased by 24.7-27.3%. During the fruiting period, trees have a lower growth rate compared to the growth period.

Trunk diameter and cross-sectional area. The increase in tree trunk thickness is an indicator that convincingly shows the influence of the variety-rootstock combination and technological processes on tree growth [20].

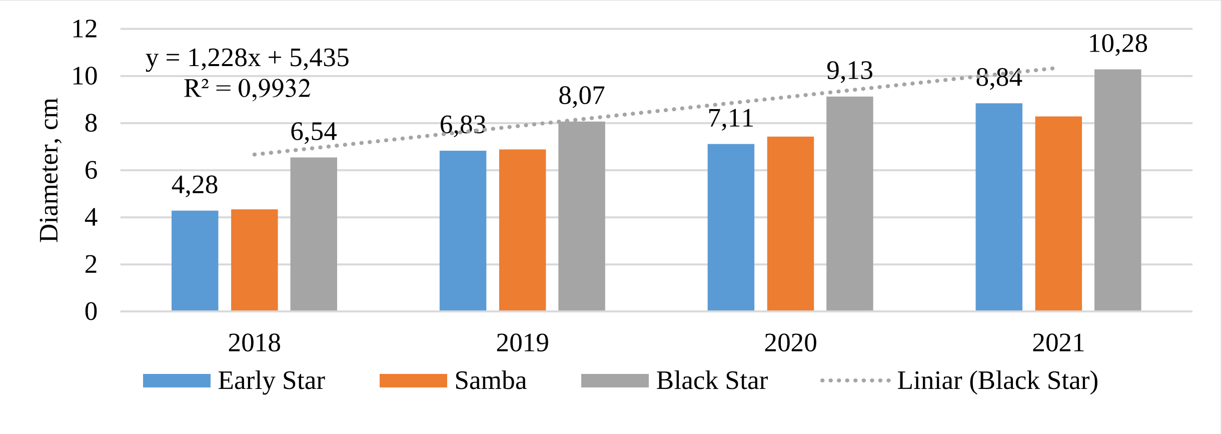


Figure 3.2. Diameter of cherry tree trunks, by variety, cm

(Gisela 6 rootstock, improved thin crown, tree age 4-7 years), $p < 0,05$.

The data presented in Figure 3.2 show that the Early Star, Samba, and Black Star cherry varieties continue to grow and develop uniformly over the years during the growth and fruiting period. For example, in the Black Star variety, with a thin crown, the trunk diameter increased from 6.54 cm in 2018 to 10.28 cm in 2021. This increase in trunk thickness was also recorded in the Samba and Black Star varieties, but at a slower rate, reaching 8.84 cm in the Early Star variety and 8.28 cm in the Samba variety in 2021.

Table 3.1. Cross-sectional area of cherry tree trunks, depending on variety and tree pruning period, cm2 (MaxMa 14 rootstock, tree age 10 years, year 2021)

Pruning period	Variety				
	Ferrovia	Kordia	Regina	Skeena	Stella
Dormant pruning (control)	155,62	180,89	183,28	150,36	194,48
Pruning at full bloom	168,25	178,28	201,21	148,41	184,96
Post-harvest pruning	174,28	186,89	195,47	154,74	177,57
Early autumn pruning	169,17	184,72	188,35	143,27	180,17

The diameter of the trunk of the cherry trees, grafted onto MaxMa 14 rootstock, aged 7-10 years, recorded a diameter of 10.22-11.42 cm in 2018 and increased to 13.84-15.74 cm in 2021 with no significant difference between varieties and tree pruning periods. SSTT did not record significant values during the study years depending on the tree pruning period, but increased by 24.7-27.3% in 2021 compared to 2019 (Table 3.1). Thus, it can be observed that trees throughout the fruiting period have a lower growth rate compared to the tree growth period, confirmed by data presented by other researchers [3,6].

The structure of the vegetative ensemble in cherry trees. In determining the structure of the vegetative ensemble in cherry trees, the relationship between the angle of inclination of the crown, the height and width of the crown at the base and at the top, the area left free between the crowns, and the distance between neighboring rows was used [1*,21*]. Based on the morphological parameters of the crown, the level of soil coverage with the crown projection, the lateral surface area, and the volume of the crown were calculated (Table 3.2).

Table 3.2. Structure of the vegetative ensemble of Early Star cherry trees, depending on age and crown shape (Gisela 6 rootstock, tree age 4-7 years), $p < 0,05$.

Training system	Crown height (cm)	Crown width (cm)		Ground cover (%)	Lateral crown surface area (m²/ha)	Crown volume (m³)	
		at base	at top			tree	ha
2018 season, tree age – 4 years							
Improved Slender Spindle	377	210	80	52,5	20850	10,9	13666
Vase training system	340	220	195	55	21875	14,1	17637
Kym Green Bush	318	235	240	58,7	21900	15,1	18881
2021 season, tree age – 7 years							
Improved Slender Spindle	385	244	82	61	21300	12,5	15688
Vase training system	348	243	186	60,7	22050	14,9	18661
Kym Green Bush	319	255	260	63,7	22450	16,4	20535

The crowns of Early Star, Samba, and Black Star trees during the growth and fruiting period, covered the soil with a canopy projection of 61.0-63.7%, the lateral surface area of the tree canopy was 21,300-22,450 thousand m²/ha, and the canopy volume was 15,688-20,535 m³/ha. Trees trained using the cup and Kym Green Bush systems had the highest values, 29.1-38.2% in

2018 and 18.9-30.9% in 2021, compared to the improved slender spindle crown shape. The mentioned varieties form a continuous fruit wall in the direction of the row, which at the age of 4 receives over 50% of solar energy, and at the age of 7 – over 60%.

The structure of the vegetative ensemble in cherry trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties grafted on the MaxMa 14 rootstock, during the period of full fruiting, is interdependent between the height and width of the crown at the base and at the top (Fig. 3.3). Thus, for the varieties mentioned at the age of 8 years, the level of soil coverage with the crown projection was 49.0-53.1%, and at the age of 11 years – it was 48.1-51.1%. The lateral surface area of the crown represents optimal values of 16663-17882 m2/ha in 2018 and 17882-18581 m2/ha in 2021 for solar energy reception. The crown volume, per tree and per unit area, is also at the optimal level to ensure large yields of quality fruit. Thus, for the medium-vigour Ferrovia variety, at the age of 8 years, the crown volume was 12857 m3/ha, and at the age of 11 years – it was 13746 m3/ha, while the Stella variety, being vigorous, has a larger crown volume of 14,385 m3/ha at the age of 8 and 14,505 m3/ha at the age of 11.

Analyzing the values of the cherry plantation structure and the production potential in the experimental cherry orchards, in relation to the data presented in the specialized literature [8], it can be mentioned that the data obtained in cherry orchards with the Early Star, Samba, Black Star, grafted onto Gisela 6 rootstock, planted at a distance of 4x2 m, during the growth and fruiting period of the trees, as well as the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, grafted onto MaxMa 14 rootstock, planted at a distance of 5x3 m, during the fruiting period, fall within the optimal indicators, which allow for favorable lighting and aeration of the crown to obtain large harvests of quality fruit.

It was found that, for the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, the level of soil utilization with crown projection (48.1-51.1%), lateral surface area (17882-18581 m2/ha) and crown volume (13746-14505 m3/ha) reached optimal values to ensure high yields of quality fruit. It has been shown that the crown area is 14.1-15.9 thousand m^2/ha, but the volume of the vegetative mass decreases as the distance between rows decreases. At a distance of 5.5 m, 11.2 thousand m3/ha are obtained, and at a distance of 3.5 m between rows – only 6.8-7.8 thousand m3/ha. The information analysis established that the production potential of the plantation, calculated based on the volumetric density coefficient of the lateral surface of the crown, gradually increases as the height of the crown decreases and its width at the top increases.

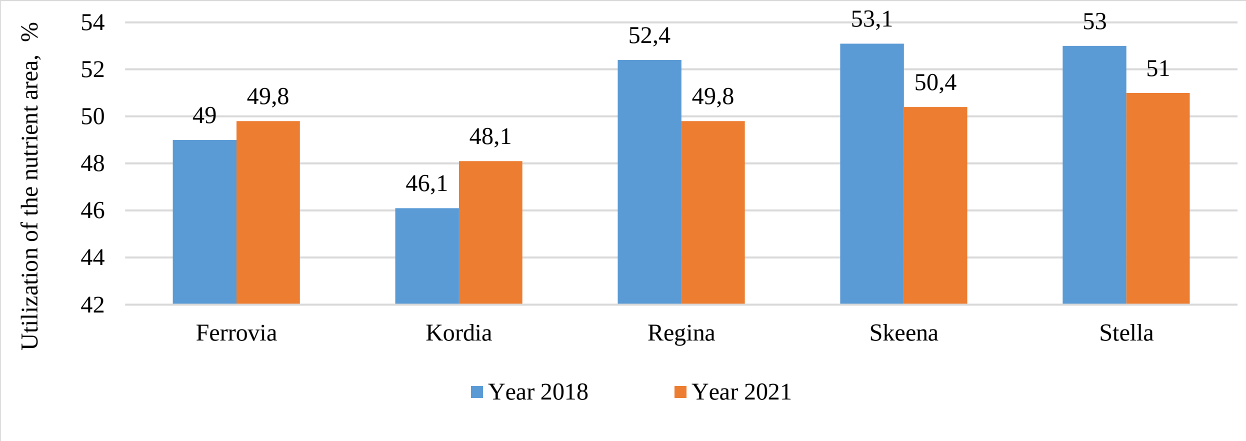


Figure 3.3. Utilization of the nutrient area and productive volume of the canopy of cherry trees (MaxMa•14 rootstock, tree age 7-10 years), $p < 0,05$

Average and total length of annual branches. The growth of annual branches is determined by the variety, the age of the trees, and the shape of the crown (Fig. 3.4). In the Early Star, Samba, and Black Star varieties, the length of annual branches has decreased continuously over the years from 75.4-92.4 cm in the 4th year after planting, 65.8-70.1 cm in the 5th year, 49.6-54.2 cm in the 6th year, and only 45.2-49.5 cm in the 7th year after planting, and the highest values of total length were recorded in the 6th (45.2-50.2) and 7th (42.2-48.2 m) years after planting the trees, when a balance between growth and fruiting is established.

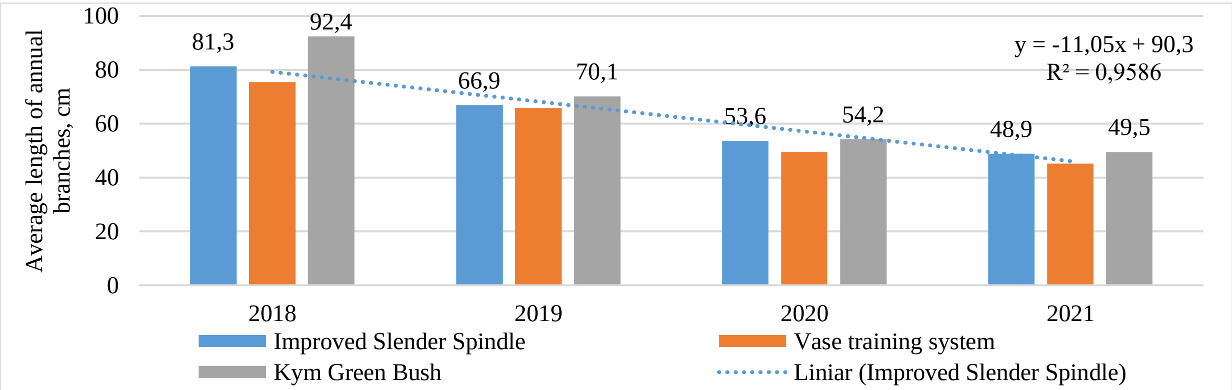


Figure 3.4. Average length of annual branches of Early Star cherry trees depending on crown shape, cm (Gisela 6 rootstock, tree age 4-7 years), $p < 0,05$

Thus, at the beginning of the growth and fruiting period of the trees, the total length increases, and towards the end of this period, the growth per tree slows down to the optimum level in order to obtain consistent yields of quality fruit. In addition, a balance is established between growth and fruiting [2].

The average length of annual branches on cherry trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties differs from one variety to another and depending on the tree pruning periods (Table 3.3). The highest annual growth was recorded during early autumn pruning, but this was not always statistically significant compared to pruning during the dormant period. The annual growth of the mentioned varieties was higher when pruning in early autumn (30.4-51.6

cm), and the total length of annual branches (75.4-91.7 m/tree) was lower as a result of pruning during the growing season, but the values were not always statistically significant.

Table 3.3. Average length of annual branches of cherry trees by variety and pruning period, cm (MaxMa 14 rootstock, tree age 10 years, year 2021)

Pruning period	Variety				
	Ferrovia	Kordia	Regina	Skeena	Stella
Dormant pruning (control)	45,1	38,7	42,7	49,5	41,7
Pruning at full bloom	39,7	42,8	40,0	50,2	42,2
Post-harvest pruning	51,2	45,3	40,0	52,3	35,5
Early autumn pruning	42,3	44,2	43,9	51,6	42,5

The total length of annual branches on cherry trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties varies from one pruning period to another. Thus, in 2018, annual growth was 60.1-81.0 m/tree, being higher in the case of pruning during dormancy and flowering. Pruning after harvest and in early autumn reduced the amount of annual growth as a result of pruning during the growing season. In 2019, the length of annual growth (58.1-85.4 m/tree) is practically at the same level as in 2018. In the following years - 2020-2021 - the length of annual branches increased and amounted to 64.7-95.2 m/tree in 2020 and 65.6-87.8 m/tree in 2021.

3.2. Formation and location of reproductive organs in cherry trees.

Modern technologies in fruit growing ensure a generalized intensive system with natural low-volume crown shapes, such as Spindle Tall, Super Spindle, etc., which are more suitable from a biological and technological point of view. In modern orchards, tree formation and pruning ensure the earliest possible formation of an optimal crown volume with fruiting branches in order to obtain early and consistent yields [2,4,18,19]. The number of bouquet branches on cherry trees varies depending on the shape of the crown (Fig. 3.5).

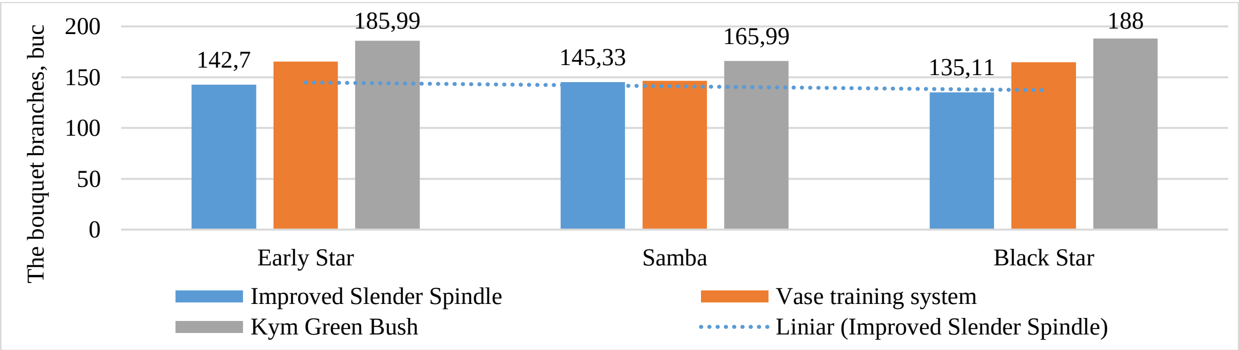


Figure 3.5. Number of bouquet branches on cherry trees, depending on variety and crown shape, pcs (Gisela 6 rootstock, planting distance 4x2 m, tree age 6 years, year 2020), $p < 0{,}05$

In Early Star, Samba, and Black Star trees, trained using the Kym Green Bush system, the number of bouquet branches (165.99-185. 99 per tree), but also the number of flower buds on the annual branches (314.01-321.44 per tree), was significantly higher compared to the improved slender spindle and cup crown shapes. Cherry trees formed according to the Kym Green Bush system recorded the highest number of flower buds (344.5-361.3 pcs/tree), which is statistically justified, compared to the improved slender spindle crown shape (255.7-262.4 pcs/tree). The cup-shaped crown maintains an intermediate behavior between the Kym Green Bush system and the improved slender spindle shape.

Ten-year-old cherry trees (Table 3.4) form over 183.0 bouquet branches. The density of May bouquets (183-264.5 pcs/tree) in the Kordia, Regina, Skeena, and Stella varieties was higher on 2- and 3-year-old branches. The number of buds on annual branches varies depending on their diameter and length. The highest values of differentiated buds were found on branches 20-60 cm long, when trees were pruned during the growing season. The difference between varieties and the pruning period is not statistically significant, but the Skeena variety differs from other varieties in that it has a greater number of bouquet branches.

Table 3.4. Number of bouquet branches in cherry trees according to variety and pruning period, pcs (MaxMa 14 rootstock, tree age 11 years, year 2021)

Pruning period	Variety				
	Ferrovia	**Kordia**	**Regina**	**Skeena**	**Stella**
Dormant pruning (control)	185,0	197,6	221,6	228,8	196,1
Pruning at full bloom	200,7	183,6	225.9	232,3	183,0
Post-harvest pruning	198,5	201,8	197,3	264,5	215,2
Early autumn pruning	183,3	188,7	190,4	255,6	240,4

Ferrovia cherry trees at the age of 10 form 98.1-119.7 bouquet branches on 2-year-old wood, 31.7 on 3-year-old branches, and only 2.2-7.5 on 4-year-old wood. The density of bouquet branches in the Kordia, Regina, Skeena, and Stella varieties is also higher on 2- and 3-year-old branches. Knowing the number of bouquet branches, one can also determine the number of flower buds on the tree, because each 2-year-old bouquet branch develops an average of 4 generative buds and one vegetative bud. Each generative bud forms 3 flowers, and the vegetative bud develops into spurs, bouquets, mixed branches, and tresses. [1*,21*].

The number of flower buds in the 9th year after planting is 221.3-260.7 pieces/tree. (tab. 3.5.). Pruning after harvest (270.7-303.3 pcs/tree) and in early autumn (263.3-339.3 pcs/tree) contributed to the formation of flower buds on annual branches.

Table 3.5. Number of flower buds on annual branches in cherry trees depending on variety and pruning period, pcs (MaxMa 14 rootstock, tree age 9 years, 2020)

Pruning period	Variety				
	Ferrovia	**Kordia**	**Regina**	**Skeena**	**Stella**
Dormant pruning (control)	242,3	221,3	238,6	220,0	242,7
Pruning at full bloom	244,0	251,3	232,0	240,0	223,6
Post-harvest pruning	273,3	271,0	289,3	303,3	270,7
Early autumn pruning	263,3	300,0	298,3	339,3	281,6

The number of buds on cherry trees varies depending on the varieties studied, the diameter, and the length of the annual branches (Fig. 3.6). The formation of flower buds on annual branches of the Early Star variety, depending on their length, shows that as the length of annual branches increases, the total number of buds increases (e.g., from 16.2 to 18.5), but the number of flower buds decreases (from 8 to 7.4 and below). Shorter branches (20-40 cm) produce a greater number of flower buds compared to longer ones. This regularity in the formation of flower buds is also confirmed for the Samba and Black Star varieties, indicating a common trend: shorter branches have a higher proportion of flower buds, while longer branches have fewer flower buds. Thus, shorter branches may be more productive in terms of flowering.

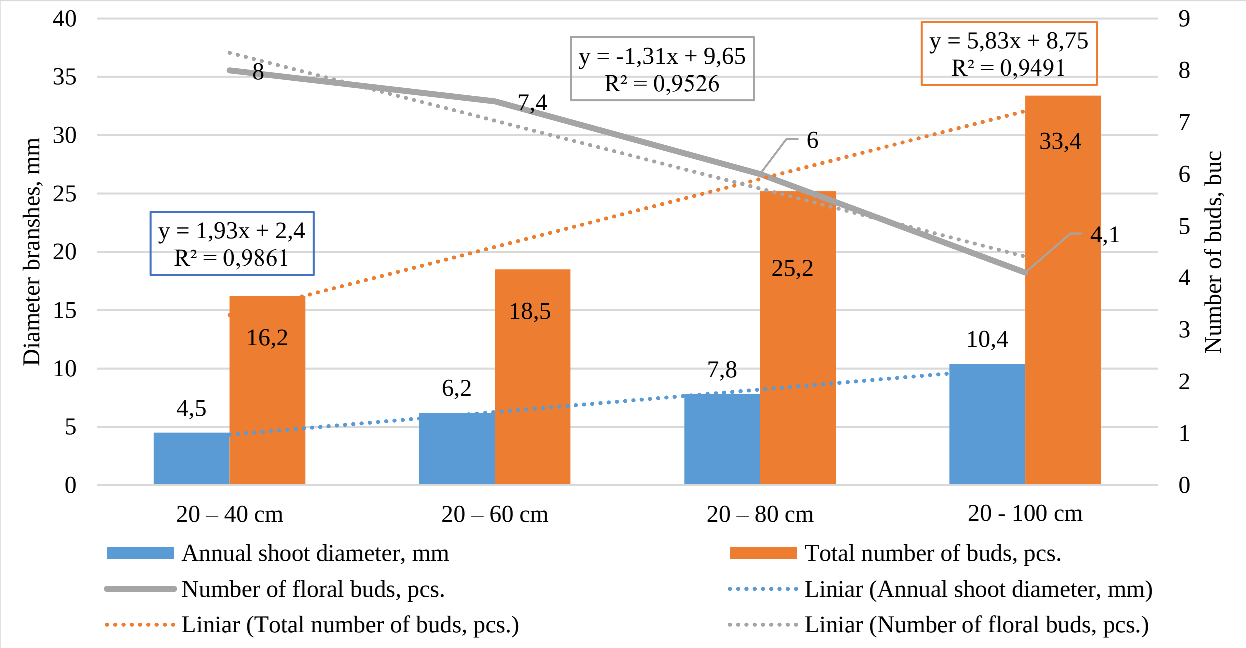


Figure 3.6. Distribution of buds on Early Star cherry trees, according to the diameter and length of annual branches, per tree (Gisela 6 rootstock, tree age 7 years, year 2021), $p < 0,05$.

In the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, at the age of 10, the deposition of fruit buds on annual branches decreases as they grow in length and thickness. According to the data presented (Fig. 3.7), the deposition of fruit buds on the annual branches of the nominated varieties, at the age of 10, decreases as these branches grow in length and thickness.

For the Ferrovia variety, for example, on annual growths with a diameter of 5.3 cm and a length of 20-40 cm, an average of 17.4 buds were formed, of which 7.1 are flower buds. In contrast, on longer annual branches, 20-80 cm, only 4.7 buds were differentiated. Thus, the density of fruit buds is higher on shorter branches, with an optimal length between 20 and 60 cm, where the studied varieties form between 5.1 and 8.1 fruit buds on branches 20-40 cm long, and between 4.2 and 6.9 buds on branches 20-80 cm long. On longer branches, 20-100 cm, bud deposition decreases to 2.4-4.5.

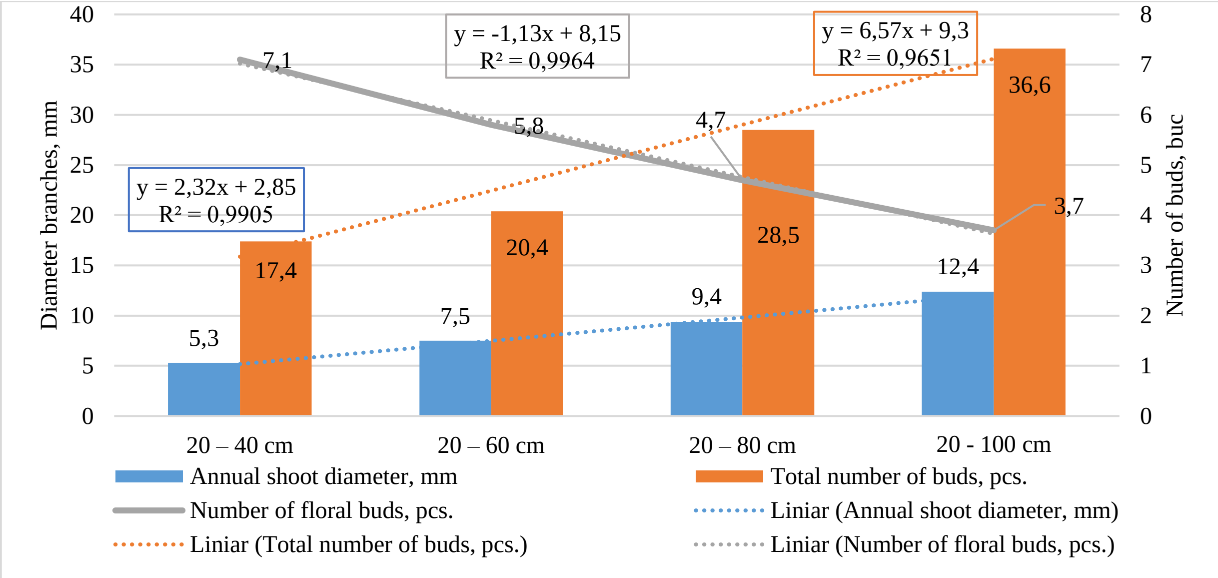


Figure 3.7. Distribution of buds on cherry trees in Ferrovia, according to the diameter and length of annual branches, buc (MaxMa 14 rootstock, tree age 10 years, year 2021), $p < 0,05$.

This trend indicates that, as annual growth in length and thickness increases, the number of differentiated fruit buds decreases, with bud formation being most favorable on branches 20-60 cm long. Thus, to maximize fruit bud production, it is advisable to manage growth to maintain branches at this optimal length.

3.3. Photosynthetic activity of cherry trees.

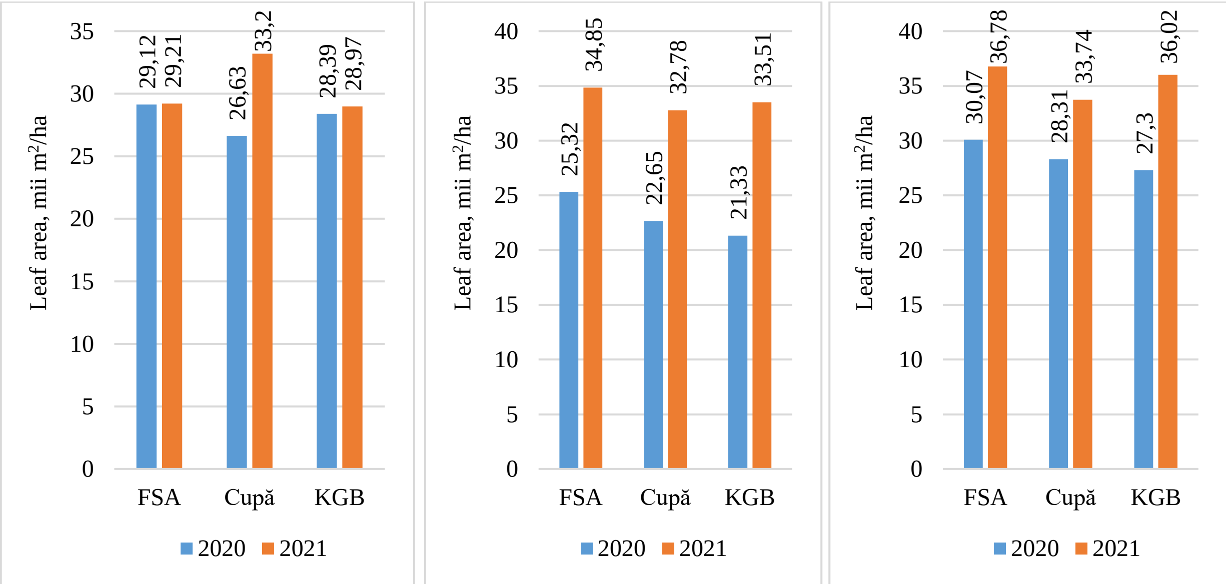
Leaf area is a basic index for light interception and determining photosynthetic productivity, water and nutrient use in primary plant production [1*, 21*]. The leaf area of cherry trees was studied in 2020-2021, separately on shoots and leaf rosettes, and differs from one variety to another (Table 3.6).

In the Early Star, Samba, and Black Star varieties, the leaf area on shoots ranged from 12.64 to 18.65 m²/tree. The area on rosettes ranged from 4.43 to 5.65 m²/tree. The Samba variety stood out with a smaller area on shoots (12.64-15.23 m²/tree) compared to Early Star and Black Star. The total area per tree ranged from 17.07 m²/tree for Samba to 24.06 m²/tree for Black Star, indicating significant differences between varieties. Thus, in the sixth year of vegetation, the leaf area per unit area had optimal values of 21.33-30.07 thousand m²/ha for modern cherry orchards.

Table 3.6. Leaf area of Black Star cherry trees depending on crown shape (Gisela 6 rootstock, tree age 7 years, year 2021)

Training system	Leaf area on shoots, m²/tree	Leaf area on spurs, m²/tree	Total leaf area, m²/tree	Leaf area, thousand m²/ha
Improved Slender Spindle	23,62	5,81	29,42	36,78
Vase training system	21,46	5,54	26,99	33,74
Kym Green Bush	23,18	5,64	28,82	36,02

If we refer to the foliage apparatus in terms of crown shape, we note that trees managed according to the improved thin crown shape had a larger leaf area (25.32-30.07 thousand m²/ha) compared to trees managed according to the cup shape (22.65-28.31 thousand m2/ha) and the Kym Green Bush crown shape (21.33-28.39 thousand m2/ha) (Fig. 3.8). The Early Star, Samba, and Black Star varieties, during the growth and fruiting period, regardless of crown shape, form a leaf area 3-3.5 times larger on shoots than on leaf rosettes (bunches).



a) b) c)

Figure 3.8. Leaf area of sweet cherry trees depending on canopy shape and cultivar: a)*Early Star* cultivar, b) *Samba* cultivar, and c) *Black Star* cultivar, thousand m²/ha (*Gisela 6* rootstock, tree age 6–7 years), $p < 0.05$.

It is certified that the leaf area of the Early Star, Samba, and Black Star varieties was 12.64-18.65 m²/tree (71-77%) on shoots and 4.43-5.65 m²/tree on rosettes. In the sixth year after planting, trees trained to the improved thin spindle crown had a larger leaf area (25.32-30.07 thousand m²/ha) compared to trees managed according to the cup crown (22.65-28.31 thousand m²/ha) and the Kym Green Bush crown shape (21.33-28.39 thousand m²/ha).

In the Kordia, Regina, Skeena, and Stella varieties, the leaf area changes in a similar way to the Ferrovia variety (Table 3.7.). Thus, pruning during dormancy, during flowering, and after fruit harvest favored an increase in leaf area compared to pruning in early autumn.

It was found that the Ferrovia, Kordia, Regina, Skeena, and Stella varieties formed a photosynthetic potential (28.12-40.17 m²/tree) that was optimal for intensive orchards of moderate density, being higher in the Skeena variety. The highest values, distinctly significant at 35.20-37.30% for the Ferrovia variety, 18.10-29.80% for the Kordia variety, 7.40-23.14% for the Regina variety, and 29.10-33.10% for the Skeena variety, were found in trees pruned during dormancy, during flowering, and after harvest.

We note that cherry trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, grafted onto the MaxMa 14 rootstock, planted at a distance of 5x3 m, at the age of 9-10 years, create an optimal photosynthetic apparatus for intensive orchards of moderate density. At the same time, we conclude that the tree pruning period is a procedure of major importance in cherry orchard maintenance technology.

Table 3.7. Leaf area of Ferrovia cherry trees, depending on the pruning period, buc
(MaxMa 14 rootstock, tree age 10 years, year 2021)

Pruning period	**Leaf area on shoots, m²/tree**	**Leaf area on spurs, m²/tree**	**Total leaf area, m²/tree**	**Leaf area, thousand m²/ha**
Dormant pruning (control)	30,82	7,22	38,04	25,33
Pruning at full bloom	31,61	7,01	38,62	25,71
Post-harvest pruning	31,18	6,83	38,00	25,31
Early autumn pruning	23,20	4,92	28,12	18,72
DL 5%	-	-	1,56	-

Leaf index. The leaf index of Early Star, Samba, and Black Star trees grafted onto Gisela 6 rootstock and planted at a distance of 4x2 m, by year and crown shape, was increasing (Table 3.8.). Thus, in the Samba variety at the age of 6, the leaf index was 2.1-2.5, and at the age of 7 it increased by 36-57.1%. In Early Star trees, the leaf index ranged from 2.6 to 3.3, and in Black Star trees, it increased from 2.7-3.0 in 2020 to 3.3-3.6 in 2021, or by 17.8-33.3%.

Table 3.8. Leaf index of cherry plantations by variety and crown shape (Gisela 6 rootstock, tree age 6-7 years), $p < 0,05$

Training system	**Early Star**		**Samba**		**Black Star**	
	Year 2020	**Year 2021**	**Year 2020**	**Year 2021**	**Year 2020**	**Year 2021**
Improved Slender Spindle	2,9	2,9	2,5	3,4	3,0	3,6
Vase training system	2,6	3,3	2,2	3,2	2,8	3,3
Kym Green Bush	2,8	2,8	2,1	3,3	2,7	3,6

The leaf index for the Ferrovia, Regina, Skeena, and Stella varieties (1.8-2.7) was lower when trees were pruned in early autumn. It should be noted that a higher leaf index indicates greater leaf density and, in general, more favorable growing conditions, but an IF that is too high can lead to mutual shading of the leaves and low photosynthetic efficiency. Depending on the type of crop and environmental conditions, the optimal leaf index may vary.

3.4. Production potential.

Fruit yield is the basis for calculating the efficiency of cultivation technology, including rootstock-scion association, planting distance, crown shape, tree pruning period and method, and orchard management [2,7, 20*21*, 24*]. This results in cultivation systems that are suitable for solar energy conversion, with a high coefficient per tree.

Over the years, the thin crown training system has recorded the highest fruit yields (2.35-8.80 kg/tree) compared to cup crown shapes (1.85-6.62 kg/tree) and Kym Green Bush (2.05-7.61 kg/tree), but this was not always significantly assured. Cherry fruit production during the growth and fruiting period was 5.14-6.16 t/ha for the Early Star variety, 8.43-10.88 t/ha for the Samba variety, and 7.66-9.84 t/ha for the Black Star variety (Fig. 3.9). The data obtained show that the Early Star variety had a lower productivity compared to the Samba and Black Star varieties. This decrease in yield for the Early Star variety is due to the fact that the variety with an earlier fruit ripening period is exposed to more unfavorable conditions (rain, frost) for the development of reproductive organs (flowers, fruits).

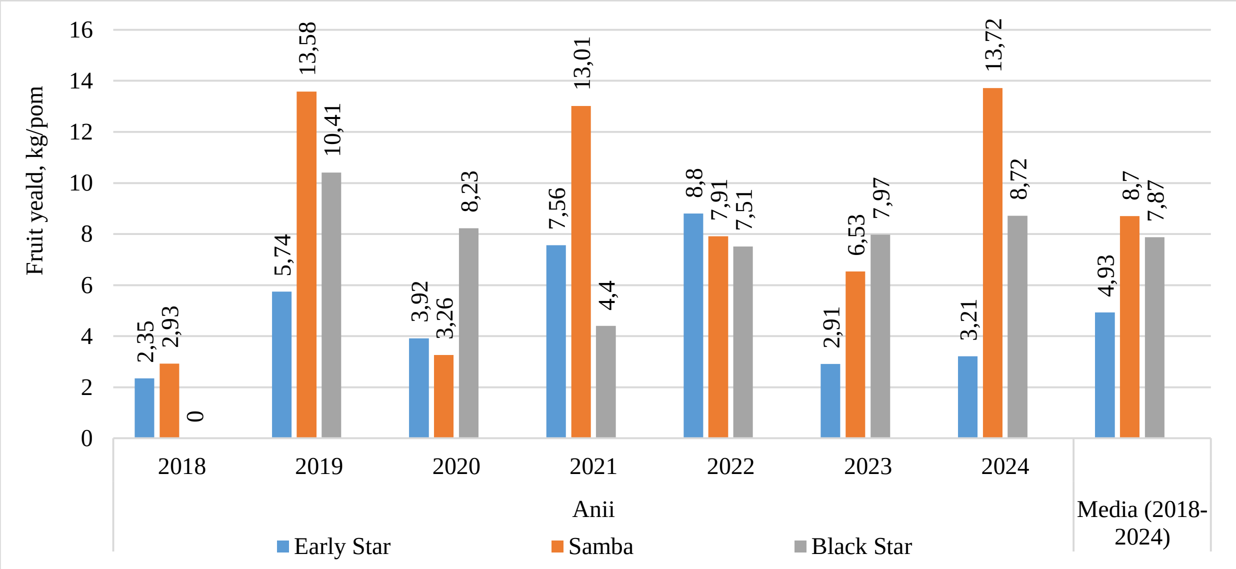


Figure 3.9. Influence of cultivar on the fruit yield of sweet cherry trees, kg/tree
(*Gisela 6* rootstock, planting distance 4 × 2 m, improved slender spindle canopy, tree age 4–10 years), $p < 0.05$.

When considering the influence of crown shape, it can be observed that the improved slender spindle crown during the growth and fruiting period of the trees has advantages over the cup and Kym Green Bush crowns. For example, in the Samba variety, fruit production (8.70 t/ha) was significantly higher in most years compared to cup-shaped and Kym Green Bush crowns. The same pattern was recorded for the Early Star and Samba varieties, in the sense that the highest significantly different values of 11.8-18.4% (cup) and 20-29% (Kym Green Bush) were found in trees trained according to the improved thin spindle crown. The yield was found to be 5.14-6.16 t/ha for the Early Star variety, 8.43-10.88 t/ha for the Samba variety, and 7.66-9.84 t/ha for the Black Star variety, being higher in cherry trees trained according to the improved slender spindle crown.

The fruit yield of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties, grafted onto the MaxMa 14 rootstock, planted at a distance of 5x3 m, was high throughout the fruiting period compared to the Early Star, Samba, and Black Star, grafted onto the Gisela 6 rootstock, planted at a distance of 4x2 m, during the growth and fruiting period.

The fruit production of cherry trees during the fruiting period was 8.49-10.08 kg/tree for the Ferrovia variety, 17.79 and 19.78 kg/tree for the Kordia variety and between 14.47 and 16.38 kg/tree for the Regina variety, being higher in the variant with pruning in the first ten days of September and statistically assured by 6.4-54.5% in the years 2021-2023, compared to pruning during the vegetative rest period.

The Skeena and Stella varieties, being self-fertile varieties with predominant fruiting on May clusters, have a more consistent productivity compared to the Ferrovia, Kordia, and Regina varieties. Over the years, the Skeena variety has had an average yield of 19.45-21.05 kg/tree, and the Stella variety - 17.19-19.21 kg/tree. The highest yields for both varieties were recorded in 2018, 2021, 2022, and 2024. Thus, in 2021, the yield of the Skeena variety in V4 was 10.7% higher than in V1, and the yield of the Stella variety was 18.2% higher. Significant differences were also recorded in other years, but not always statistically significant. Analyzing the yield of the studied varieties, it can be noted that the self-fertile varieties Skeena and Stella are more productive than the self-sterile varieties Ferrovia and Regina in the conditions of the Republic of Moldova.

The fruit yield per unit area (Fig. 3.10) was low for the Ferrovia variety (5.73-6.7 t/ha) and average for the Kordia (11.83-13.15 t/ha), Regina (9.65-10.88 t/ha), Skeena (12.94-14.0 t/ha) and Stella (11.45-12.85 t/ha) varieties, compared to the data presented by other authors [8,14,18].

It was found that crowns with a width of 230-240 cm at the base and 80-100 cm at the top, occupying 48.1-51.0% of the nutrition area, with a volume of 11,902-14,505 thousand m^3/ha, allow for a cherry harvest of 11.83-13.15 t/ha for the Kordia variety, 9.65-10.88 t/ha for the Regina variety, 12.94-14.0 t/ha for the Skeena variety, and 11.45-12.85 t/ha for the Stella variety. The self-fertile varieties Skeena and Stella are more productive than the self-sterile varieties Ferrovia, Kordia, and Regina in the conditions of the Republic of Moldova. Pruning trees after harvest and in early autumn has many advantages for obtaining high fruit yields compared to pruning during the dormant season. This practice not only maximizes yield, but also allows for more efficient use of labor in warmer climatic conditions. It has been confirmed that the yield of cherry varieties is genetically determined, but is influenced by the variety-rootstock combination, the climatic conditions of the growing area, and the agrotechnical procedures used in orchard management. In intensive cherry orchards, the tree pruning period plays a decisive role in ensuring labor productivity in tree training and pruning, fruit harvesting, and obtaining high yields of quality fruit [2, 20*, 21*].

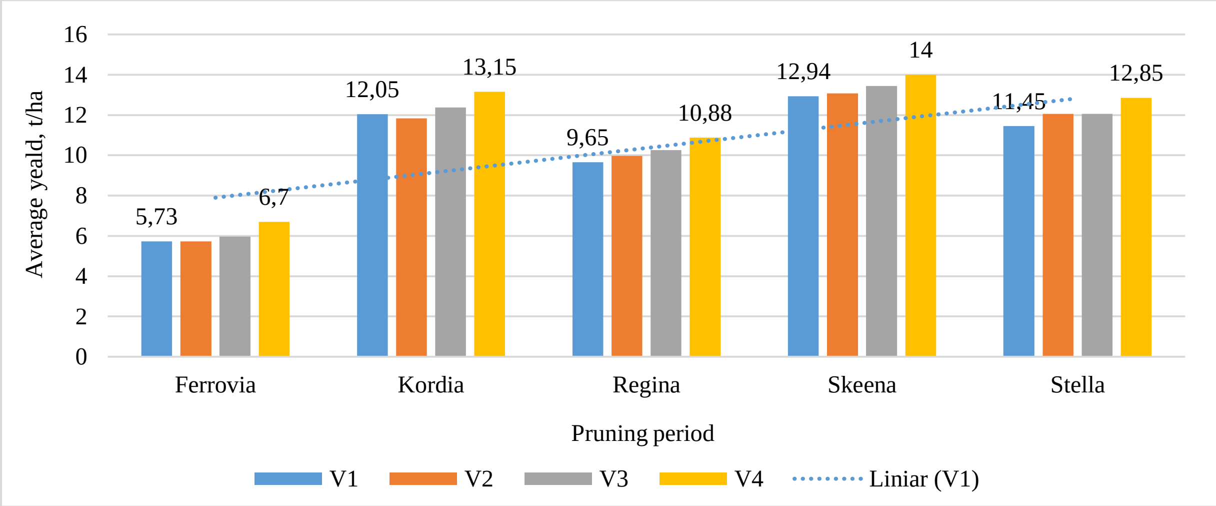


Figure 3.10. Influence of cultivar and pruning period on the average fruit yield of sweet cherry trees, t/ha (MaxMa 14 rootstock, tree age 7–13 years), $p < 0.05$.

3.5. Quality parameters of cherry fruit.

Fruit diameter monitoring began when the skin color changed from green to pink-yellow until full maturity, every 3 days, using the CTIFL color chart. In 2020, the phenophases of cherry fruiting took place similarly to 2019, practically simultaneously, with a difference of 1-2 days (Table 3.9.).

Table 3.9. Monitoring of fruit diameter in cherry varieties during development from the moment the fruits are pinkish-yellow, mm (Gisela 6 rootstock, improved thin crown, tree age 6 years, 2020), $p < 0,05$

Variety	Date	Diameter, mm	Date	Diameter, mm	Date	Diameter, mm
Early Star	22.05	16,10	25.05	19,80	31.05	22,80
Samba	01.06	16,40	05.06	20,70	09.06	24,80
Blak Star	10.06	18,00	14.06	23,00	18.06	27,30

From the moment the fruits were yellowish-pink in color until full ripeness, their diameter increased from 16.1-18.0 mm to 22.8-27.3 mm. In the first days of cherry ripening, the growth rate of cherries from pinkish-yellow to red was 22.9% for the Early Star variety, 26.2% for the Samba variety, and 27.7% for the Black Star variety. Subsequently, the growth rate of cherries decreases and is only 15.1% for the Early Star variety, 19.8% for the Samba variety, and 11.8% for the Black Star variety. It should be noted that the diameter of cherries in the ripening phenophase increases more intensely until the skin turns red and decreases to a dark red color. In the fruit ripening phenophase, their diameter increases by 41.6-51.7%.

The Ferrovia, Kordia, Regina, Skeena, and Stella varieties increase their diameter by 50.5-65.9% during the fruit ripening period. In 2020, the onset of the fruit ripening phenophase varied from June 9 for the Stella variety to June 20 for the Regina variety, and full ripening was practically at the same level as in 2019 (Table 3.10.).

Table 3.10. Monitoring of fruit diameter in cherry varieties during development from the moment the fruits are yellowish-pink in color, mm (MaxMa 14 rootstock, tree age 9 years, 2020), $p < 0,05$

Variety	Date	Diameter, mm	Date	Diameter, mm	Date	Diameter, mm
Ferrovia	12.06	16,7	16.06	25,4	19.06	28,1
Kordia	14.06	18,5	18.06	23,9	22.06	28,1
Regina	20.06	17,3	25.06	24,0	29.06	28,6
Skeena	15.06	16,6	19.06	23,9	24.06	27,6
Stella	09.06	15,2	12.06	22,6	15.06	26,6

Thus, at the beginning of cherry ripening, the growth rate was high at 29.1-52.1%, then slowed to 10.6-19.1% from red to dark red. In conclusion, we note that the cherry fruits of the studied varieties showed intense growth in the first phase of cherry ripening, then slowed down at full ripeness.

It was found that Black Star cherries are larger (28.4 mm) than Early Star (24.8 mm) and Samba (23.2 mm) cherries. During the fruit ripening phenophase, their diameter increases by 41.6-51.7%, being more intense until the skin turns red and then decreases to a dark red color. Cherries of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties increase their diameter by 50.5-65.9% during the fruit ripening period, registering an intense increase in the first phase of cherry ripening, then decreasing at full maturity. For the Skeena variety, the highest values for larger diameter fruits were recorded when cut in the first ten days of September, with 34.2% having a diameter greater than 28 mm and 45.5% having a diameter of 26-27.9 mm.

Proportion of fruit by diameter. In 2019, the yield of the Skeena variety was 8.79-9.92 t/ha (Table 3.11.).

Table 3.11. Distribution of fruits according to the pruning period and their diameter for the Skeena cherry variety (MaxMa 14 rootstock, tree age 8 years, 2019)

Pruning period	Yield, t/ha	Diametrul fructelor, mm			
		< 24	24-25,9	26-27,9	> 28
		Proportion of fruits, %			
Dormant pruning (control)	8,79	7,2	18,5	45,7	28,6
Pruning at full bloom	8,99	5,7	20,1	47,6	26,6
Post-harvest pruning	8,85	8,1	18,6	48,4	24,9
Early autumn pruning	9,92	4,4	15,9	45,5	34,2
DL, 5%	0,56	-	-	-	-

The highest percentage of fruit was found in cherries with a diameter of 26.0-27.9 mm (45.5-48.4%), followed by those with a diameter of 28 mm and above (24.9-34.2%). The highest values for larger fruits were recorded during harvesting in the first ten days of September, with 34.2% having a diameter greater than 28 mm and 45.5% having a diameter of 26.0-27.9 mm. In 2020, the harvest (9.26-10.46 t/ha) was at the same level as in 2019 (8.79-9.92 t/ha), and the proportion of fruits larger than 28 mm decreased significantly and was only 9.2-15.8%. It should be noted that pruning in the first ten days of September reduced the percentage of fruits with a diameter of 24 mm and smaller (4.4-4.5%) and increased the number of fruits with a diameter of 28 mm (19.5-51.9%).

Fruit ripeness testing. Fruit size varies depending on orchard management and climatic conditions, being significantly larger in the Samba and Black Star varieties compared to the Early Star variety (Table 3.12.). The cherries of the studied varieties are of high quality, especially the Black Star variety, which had a diameter of 30.48 mm and a weight of 12.5 g. The soluble dry matter in the fruit was 17.4-19.2%, titratable acidity - 0.69-0.72%, and fruit firmness - 2.79-3.04 kg/cm2. We note that the quality parameters for the Early Star, Samba, and Black Star varieties, grafted onto the Gisela 6 rootstock, are specific to the variety and differ little from climatic conditions.

Table 3.12. Influence of variety on cherry fruit quality (Gisela 6 rootstock, tree age 6 years, year 2022)

Variety	Fruit diameter, mm	Fruit weight, g	Fruit firmness, kg/cm^2	Soluble solids content, %	Titratable acidity, %
Early Star	28,58	10,71	2,79	17,40	0,71
Samba	30,23	11,92	3,04	18,50	0,69
Blak Star	30,48	12,05	2,89	19,20	0,72
DL 5%	1,53	0,65	-	-	-

The evolution of fruiting phenophases. The climatic conditions recorded in the experimental orchard in 2021 prompted us to study the evolution of the phenophases of the fruiting organs in the cherry varieties under study [18*,21*]. We note that the rainfall and frost recorded in the second half of April and the first ten days of May, accompanied by an unexpected warming of the weather, caused damage to cherry blossoms and fruits. After abundant flowering, there were 2-3 pronounced physiological fruit drops, which greatly reduced the quantity of cherries. At the same time, the rains caused a severe attack of Monilia laxa and aphids on the cherry trees, which was stopped by a complex treatment combined with foliar fertilizers.

Distribution of cherry fruits and cracked fruits by diameter. The susceptibility of the studied varieties to cracking during fruit ripening was determined in 2021 [21*]. There was a high variability in cracked cherries, depending on their diameter. In the Early Star variety, 35.4% of the fruits cracked, but fruits larger than 30 mm in diameter cracked 100%, and in the Blak Star variety, only 5.4% of the fruits were exposed to this phenomenon. In the Ferrovia, Kordia, Skeena, and Stella varieties, the most intense degree of cracking occurred in fruits with a diameter of 28.0-29.9 mm (25.2-29.9%) and with a diameter greater than 30.0 mm (23.9-50%), while cherries with a diameter of less than 26 mm did not crack. Fruits with a larger diameter are more prone to cracking than those with a smaller diameter. The Samba and Regina varieties were tolerant to rain-induced cracking.

Fruit quality parameters have a significant impact on consumer perception, shelf life, and nutritional value. In 2019, the soluble dry matter was higher (17.3-17.7°Brix) than in 2020 (16.6-17.1°Brix), and the titratable acidity of the fruit was lower, at 0.57-0.59% in 2019, compared to 0.64-0.68% in 2020. The firmness of the fruit also differs depending on the year, being 2.97-3.25 kg/cm² in 2019 and 2.75-3.02 kg/cm² in 2020. The bioactive quality parameters of the fruit were not influenced by the pruning period (Table 3.13.).

The Regina variety is characterized by a higher amount of soluble dry matter in fruit of 18.12-19.27°Brix in 2019 and 17.29-18.31°Brix in 2020, compared to the Kordia variety. The titratable acidity of the fruit was also higher, at 0.65-0.68% in 2019 and 0.75-0.78% in 2020, compared to the Kordia variety. The firmness of the fruit was 3.05-3.35 kg/cm2 in 2019 and 2.65-2.90 kg/cm2 in 2020. The bioactive quality parameters of Skeena fruit differ slightly from those of Kordia and Regina, being at a high level. Thus, the soluble dry matter (18.5-19.2°Brix) and titratable acidity in the fruit (0.63-0.75%), as well as the fruit firmness (2.95-3.41 kg/cm2) are at the optimal level for medium-ripening cherries.

Table 3.13. Influence of tree pruning on the bioactive parameters of fruit quality in the Regina cherry variety (MaxMa 14 rootstock, tree age 8-9 years)

Pruning period	**Soluble solids content (%)**		**Titratable acidity (%)**		**Fruit firmness (kg/cm^2)**	
	a. 2019	**a. 2020**	**a. 2019**	**a. 2020**	**a. 2019**	**a. 2020**
V1 (m)	18,77	17,84	0,67	0,76	3,35	2,65
V2	18,33	17,52	0,65	0,78	3,05	2,94
V3	18,12	17,29	0,66	0,75	3,31	2,78
V4	19,27	18,31	0,68	0,76	3,35	2,90
DL, 5%	0,76	0,82	0,02	0,04	0,19	0,13

As the soluble dry matter content of the fruit decreased, the titratable acidity increased, which had a big impact on the quality of the fruit. The size of the fruit can influence buying decisions, but it needs to be uniform to make sure it looks good. An impressive color is often associated with freshness and ripeness, and a balance between sweetness and acidity is essential to achieve a pleasant taste [103]. Producers and traders are encouraged to monitor these parameters to offer high-quality products.

The bioactive quality of cherries is specific to each variety and varies slightly depending on when the trees are pruned. The Kordia, Regina, and Skeena varieties with dark brown skin had an optimal content of soluble substances in the fruit (17.29-19.27°Brix), titratable acidity (0.65-0.78%), and firmness (2.65-3.35 kg/cm2).

3.6. Economic efficiency of cherry production, depending on variety, crown shape, and tree pruning period.

In determining economic efficiency, the average fruit yield over 7 years, the selling price of cherries, and production costs (tree training and pruning, fruit harvesting, etc.) were taken into account. The economic efficiency of cherry production, depending on the variety and crown shape, during the growth and fruiting period of the trees (Fig. 3.11), showed that economic indicators increase depending on the level of productivity and fruit quality.

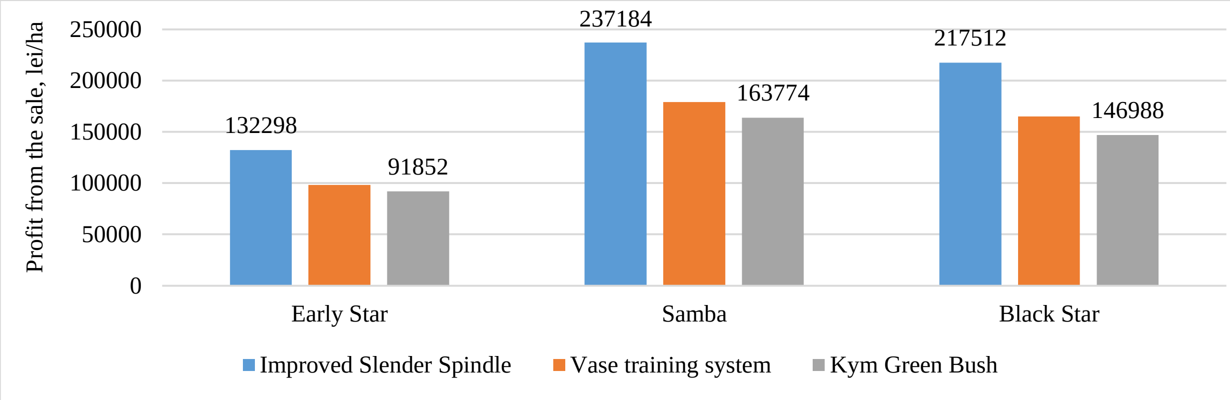


Figure 3.11. Profit from the sale of production, depending on variety and crown shape (Gisela 6 rootstock, tree age 4-10 years)

The economic effect of fruit production differs depending on the cultivation system, the combination of variety and rootstock, environmental factors, agrotechnical management, fruit quality, harvesting time, and harvesting practices. During the growth and fruiting period of the trees, the yield (7.66-10.88 t/ha) of the Samba and Black Star varieties, grafted onto the Gisela 6 rootstock, planted at a distance of 4x2 m, the profit from the sale of the production (146,988-237,184 lei/ha) and the level of production profitability (114.1-159.1%) were higher in the case of crown formation according to the improved thin spindle system.

Table 3.14. Economic efficiency of cherry fruit production, depending on variety and tree pruning period. (MaxMa 14 rootstock, tree age 7-13 years)

Pruning period	Average yield (2018–2024), t/ha	Revenue from fruit sales, lei/ha	Production cost, lei/ha	Profit from fruit sales, lei/ha	Production profitability, %
Ferrovia					
Dormant pruning (control)	5,73	206280	82012	124268	151,5
Pruning at full bloom	5,73	206280	80512	125768	156,2
Post-harvest pruning	5,96	214560	82824	131736	159,0
Early autumn pruning	6,70	241200	93480	147720	158,0
Skeena					
Dormant pruning (control)	12,94	465840	166271	299569	180,1
Pruning at full bloom	13,07	470520	150043	320477	213,5
Post-harvest pruning	13,44	483840	152800	331040	216,6
Early autumn pruning	14,00	504000	150700	353300	234,4

The economic efficiency of cherry production of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties (Table 3.14) demonstrates that the variety and timing of tree pruning are determining factors in the production of sustainable and market-competitive fruit.

During the peak production period, the Kordia, Regina, Skeena, and Stella varieties, grafted onto the MaxMa 14 rootstock and planted at a distance of 5x3 m, stand out with a higher yield (9.65-14.0 t/ha), higher profit (225,329-353, 300 lei/ha) and profitability (179.9-234.4%) when trees are pruned during the growing season, especially during autumn pruning, while the Skeena and Stella varieties, being self-fertile varieties, achieved the highest economic indices.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The research, carried out between 2018 and 2024, aimed to increase the productivity of cherry orchards by identifying the most appropriate tree training and pruning systems for obtaining efficient harvests of competitive fruit and maintaining the physiological balance between growth and fruiting, led to the following conclusions:

1. The analysis of bibliographic sources shows that the problem of achieving sustainable cherry production and the use of vegetative rootstocks and self-fertile varieties remains relevant from a theoretical and practical point of view. Solving problems focused on promoting sustainable integrated agricultural systems based on geographical conditions, natural soil fertility, and the use of low- and medium-vigour rootstock-variety combinations, simple crowns, and tree pruning during the growing season are current issues for fruit growing in the Republic of Moldova [1*].

2. The soil and climate conditions in the central fruit-growing area of the Republic of Moldova are favorable for cherry cultivation. The orchard was planted on typical loamy-clay chernozem suitable for growing the Early Star, Samba, and Black Star, grafted onto Gisela 6 rootstock, and the Ferrovia, Kordia, Regina, Skina, and Stella varieties, grafted onto MaxMa 14 rootstock, which allowed for the correct and methodologically appropriate assessment of tree formation and pruning [18*,35*43*].

3. The crowns of Early Star, Samba, and Black Star trees, at the age of 6-7 years, formed a continuous wall in the direction of the row with a width of approximately 250 cm, regardless of the shape of the crown [1*]. The structure of the vegetative ensemble was characterised by a ground cover projection of 61-63.7%, a lateral crown area of 21,300-22,450 thousand m²/ha, a crown volume of 15,688-20,535 m³/ha, being higher in trees formed according to the cup and Kym Green Bush systems by 29.1-38.2% in 2018 and by 18.9-30.9% in 2021, compared to the improved slender spindle crown shape. During the fruiting period, trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties reached 370-400 cm in height and 236-278 cm in width at the base of the crown and an increase in the cross-sectional area of the trunk by 24.7-27.3%. The crown

projection soil coverage level was 48.1-51.1%, the lateral surface area was 17,882-18,581 m²/ha, and the crown volume was 13,746-14,505 m³/ha. During the fruiting period, the trees have a lower growth rate compared to the growth period, and the values indicated are optimal for ensuring high yields of quality fruit.

4. Analysis of the information has established that the production potential of the plantation (65.5-71.7%), calculated based on the volumetric density coefficient of the lateral surface of the crown, gradually increases with a decrease in the height of the crown and an increase in its width at the top. The crown area in modern plantations, regardless of crown parameters, is 14.1-15.9 thousand m²/ha, but the volume of the vegetative mass decreases with a decrease in the distance between rows from 11.2 thousand m³/ha at a distance of 5.5 m to 6.8-7.8 thousand m³/ha at a distance of 3.5 m between rows.

5. The length of annual branches in the Early Star, Samba, and Black Star varieties recorded higher values (75.4-92.4 cm) during the tree's growth period and decreased (45.2-49.5 cm) during the fruiting period when a balance between growth and fruiting is established (42.2-48.2 cm). The length of the annual branches of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties was greater during autumn pruning (30.4-51.6 cm), and the total length (75.4-91.7 m/tree) was shorter as a result of pruning during the growing season.

6. The formation and location of productive organs differ depending on the shape of the crown and the pruning period of the trees. The Kym Green Bush system formed a greater number of bouquet branches (165.99-185.99 pcs/tree) on 2- and 3-year-old branches, compared to the improved slender spindle and cup crown shapes. The density of bouquet branches (183-264.5 pcs/tree) in the Kordia, Regina, Skeena, and Stella varieties was higher on 2- and 3-year-old branches. The number of differentiated buds on annual branches varied depending on the pruning period, diameter, and length, with higher values when the branches were 20-60 cm long.

7. During the growth and fruiting period of the trees, 71-77% of the leaf area was formed on shoots, being higher in trees formed after the improved thin crown (25.32-30.07 thousand m²/ha). The trees of the Ferrovia, Kordia, Regina, Skeena, and Stella varieties formed an optimal photosynthetic potential for intensive orchards of moderate density (28.12-40.17 m²/tree), being higher in the Skeena variety. The highest values, distinctly significant at 35.2-37.3%, were obtained for the Ferrovia variety, with 18.1-29.8% for the Kordia variety, 7.4-23.14% for the Regina variety, and 29.1-33.1% for the Skeena variety. were on trees in the variants with pruning during dormancy, during flowering, and after harvesting.

8. The yield of trees grafted on Gisela 6, during the growth and fruiting period, was 5.14-6.16 t/ha for the Early Star variety, 8.43-10.88 t/ha for the Samba variety, and 7.66-9.84 t/ha for

Black Star, being higher in cherry trees formed after the improved thin spindle crown. During the complete fruiting period, crowns with a width of 230-240 cm at the base and 80-100 cm at the top occupy 48.1-51.0% of the nutrition area, forming a volume of 11,902-14,505 thousand m^3/ha, which allows for yields of 9.65-14.0 t/ha, being higher in the self-fertile varieties Skeena and Stella compared to the self-sterile varieties Ferrovia, Kordia, and Regina. Pruning trees after harvest and in early autumn results in high fruit yields and rational use of manpower in hot weather, and the yield of cherry varieties is genetically determined but influenced by the variety-rootstock combination, the climatic conditions of the growing area, and the agrotechnical procedures used in orchard management [19*].

9. During the fruit ripening phenophase, the diameter of Early Star, Samba, and Black Star varieties increases by 41.6-51.7%, and in the Ferrovia, Kordia, Regina, Skeena, and Stella varieties by 50.5-65.9%, showing intense growth in the first ripening phase when the skin turns red, then decreasing until full maturity at a dark red color. The Kordia, Regina, and Skeena varieties, with dark brown skin, had optimal content of soluble substances in the fruit (17.29-19.27 °Brix), titratable acidity (0.65-0.78%), and firmness (2.65-3.35 kg/cm2). The quality of cherries is specific to each variety and varies slightly depending on when the trees are pruned [2*].

10. In 2021, 35.4% of Early Star fruit cracked, with 100% of fruit larger than 30 mm in diameter affected, while only 5.4% of Blak Star fruit cracked. In the Ferrovia, Kordia, Skeena, and Stella varieties, the most intense cracking occurred in fruits with a diameter of 28-29.9 mm (25.2-29.9%) and larger than 30 mm (23.9-50%), while cherries smaller than 26 mm did not crack. Fruits with a larger diameter are more prone to cracking than those with a smaller diameter. The Samba and Regina varieties were tolerant to rain-induced cracking [24*].

11. The economic efficiency of fruit production differs depending on the cultivation system, the combination of variety and rootstock, environmental factors, agrotechnical management, fruit quality, and harvesting time and practices. During the growth and fruiting period of the trees, the effectiveness of the thin spindle crown shape was identified in the Samba and Black Star varieties, grafted onto the Gisela 6 rootstock, planted at a distance of 4x2 m, with a yield of 7.66-10.88 t/ha, a profit from the sale of production of 146, 988-237,184 lei/ha and a production profitability level of 114.1-159.1%. During the production period, the economic efficiency of pruning trees during the growing season, especially during autumn pruning, was demonstrated in the Kordia, Regina, Skeena, and Stella varieties, grafted onto the MaxMa 14 rootstock, planted at a distance of 5x3 m, with a yield of 9.65-14.0 t/ha, a profit of 225,329-353,300 lei/ha and a profitability level of 179.9-234.4%, with the highest economic indices being achieved by the self-fertile varieties Skeena and Stella.

TECHNOLOGICAL RECOMMENDATIONS FOR THE MODERNIZATION OF SWEET CHERRY CULTIVATION

Based on the results obtained during the 2018–2024 period, the following technological guidelines are proposed for the establishment and management of sweet cherry orchards:

1. Optimization of scion–rootstock combinations and training systems

To achieve high economic returns and superior fruit quality, the technology should be differentiated according to orchard planting density:

- ✓ **High-density intensive system (over 1,250 trees/ha):**

Recommended combinations: *Samba* and *Black Star* cultivars grafted onto *Gisela 6* rootstock.

Training system: Improved slender spindle (SP: 4 × 2 m) [10*, 43*].

- ✓ **Medium-density intensive system (approx. 660 trees/ha):**

Recommended combinations: *Kordia*, *Regina*, *Skeena*, and *Stella* cultivars grafted onto *Maxma 14* rootstock.

Training system: Improved natural form, with reduced canopy volume (SP: 5 × 3 m).

2. Pruning management and physiological balance

In modern orchards grafted onto low- and medium-vigor rootstocks, it is recommended to reconfigure the pruning schedule:

- ✓ **Optimal timing:** Pruning should be carried out during the growing season (post-harvest), with priority given to the first decade of September [1*, 18*].
- ✓ **Technological benefits:**

Physiological balance: Maintains the optimal ratio between vegetative growth and fruiting processes.

Vigor control: Limits excessive vegetative growth and stimulates flower bud differentiation for the following year.

Sustainability: Prevents premature tree exhaustion and ensures consistent yields in both quantity and quality.

Operational efficiency: Optimizes labor management by performing operations under favorable thermal conditions.

3. Perspectives and research directions

To enhance the resilience of the fruit-growing sector, it is necessary to further develop integrated studies that correlate:

1. The interdependence between canopy architecture and “green pruning” practices. Advanced fertigation systems and water stress management.

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42. **ȘARBAN, V.** The impact of the pruning time yeld and size of the fruit of sweet cherry trees of the Stella and Skeena varieties grafted on Maxma 14. În: Materialele Simpozionului Științific Internațional: Tendințe moderne în învățămîntul superior. UTM, Chișinău, 05-06 octombrie, 2023. p. 42. ISBN 978-9975-64-360-3.

Patents

43. BALAN, V., RUSSU, S., BUZĂ, C., **ȘARBAN, V.** Procedeu de formare a pomilor de cireş în formă de fus subțire ameliorat. Brevet MD de scurtă durată nr. 1802. Nr. depoz.: s 2024 0011.Data publ.: 2024.02.09. In: MD - BOPI 12/2024.

(*Note: * from the list of own publications) [*].*

ANNOTATION

Șarban Vasile, "Valorization of the fruiting potential of cherry depending on the variety, crown shape and pruning period of trees", PhD thesis in agricultural sciences, Technical University of Moldova, Chisinau, 2025.

Structure of the thesis: The thesis contains an introduction, three chapters, conclusions and recommendations, bibliography of 241 titles, 8 annexes, 126 pages, 30 tables, 51 figures. The scientific results are published in 46 papers, including a patent.

Keywords: *Prunus avium L.*; rootstock; varieties; tree formation and pruning period; harvest; quality; effectiveness.

The purpose of the research: consists in increasing the productivity of cherry plantations cultivated in an intensive system, by identifying and optimizing the most efficient combinations between variety-rootstock-crown shapes, variety-rootstock-pruning periods and ensuring an optimal balance between vegetative growth and fruiting, with the final result of obtaining fruits of superior quality.

Main objectives of the research: To evaluate the agrobiological and productive performance of different variety-rootstock combinations (varieties grafted on Gisela 6 and MaxMa 14) in an intensive system, in order to select the most adapted and productive variants. To compare the effectiveness of different crown shapes (Fus subțire ameliorat, Cupă, Kym Green Bush) on the control of growth and fruit quality, in order to identify the optimal shape. To establish the influence of the pruning period (dormant, flowering, after harvest, early autumn) on the vegetative-productive balance and the differentiation of fruit buds, in order to determine the optimal moment of intervention. To integrate the obtained data on the variety, rootstock, crown shape and optimal pruning period to define a coherent technological package for intensive cherry cultivation.

The scientific problem addressed and the novelty of the research. The development and implementation of technologies aimed at the use of small-volume crowns and pruning during the vegetation period, in the intensive cherry cultivation system, is a priority task for modern fruit growing. The study focused on assessing the interdependence between crown shape, the degree of intervention and the optimal period for pruning. For the first time, the stages of tree formation in a superintensive system were identified and the related technological links were developed. A major original contribution is represented by the development of the "improved thin spindle" crown design and management methodology. The management system and pruning periods necessary to maintain the physiological balance of trees are substantiated theoretically and experimentally. The analysis of the structural parameters of the plantation suggests the need for continued research to develop fruit-growing structures adapted to specific pedoclimatic conditions. The applied value and originality of the proposed solutions are confirmed by the six distinctions obtained at international invention salons, attesting to the significant impact of the work on modern fruit-growing.

Main results: The identification of specific methods of forming and pruning cherry trees led to obtaining qualitatively superior harvests, while ensuring the maintenance of the physiological balance of the trees. The use of vegetative rootstocks in combination with self-fertile varieties for the development of sustainable fruit-growing systems was scientifically argued. These are based on low and medium vigor variety-rootstock associations, adapted to local pedoclimatic conditions. A complex assessment of the dynamics of vegetative growth, the process of differentiation and location of reproductive organs, as well as the intensity of photosynthetic activity of cherry trees under intensive cultivation conditions was carried out. It has been demonstrated that the adoption of this management system, correlated with the application of pruning during the vegetation period (in green), guarantees an optimal ratio between the growth and fruiting processes, ensuring constant production and high-quality fruits. The main biochemical and commercial parameters that define the quality of cherry fruits depending on the applied technology have been elucidated. The economic efficiency has been demonstrated depending on the combination of variety-rootstock, crown shape and pruning period.

Theoretical significance and applicative value: The methodology for forming and maintaining the thin spindle-shaped cherry crown has been developed. The effect of the cherry pruning period on maintaining physiological balance in order to obtain quality, constant and competitive yields has been determined. The tree formation methods established in the work, the timing of pruning and maintaining the physiological balance of the cherry crown provide evidence that can be used in modern orchards to obtain large, competitive and efficient fruit yields.

Implementation of scientific results: The research results are implemented in the enterprises of the Public Association, the Association of Fruit Producers and Exporters "Moldova Fruct" and in fruit growing courses for the training of specialists in the horticultural field.

ȘARBAN VASILE

VALORIZATION OF THE FRUITING POTENTIAL OF CHERRY DEPENDING ON THE VARIETY, CROWN SHAPE AND PRUNING PERIOD OF TREES

411.06 – FRUIT GROWING

Abstract of doctoral thesis in agricultural sciences

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