

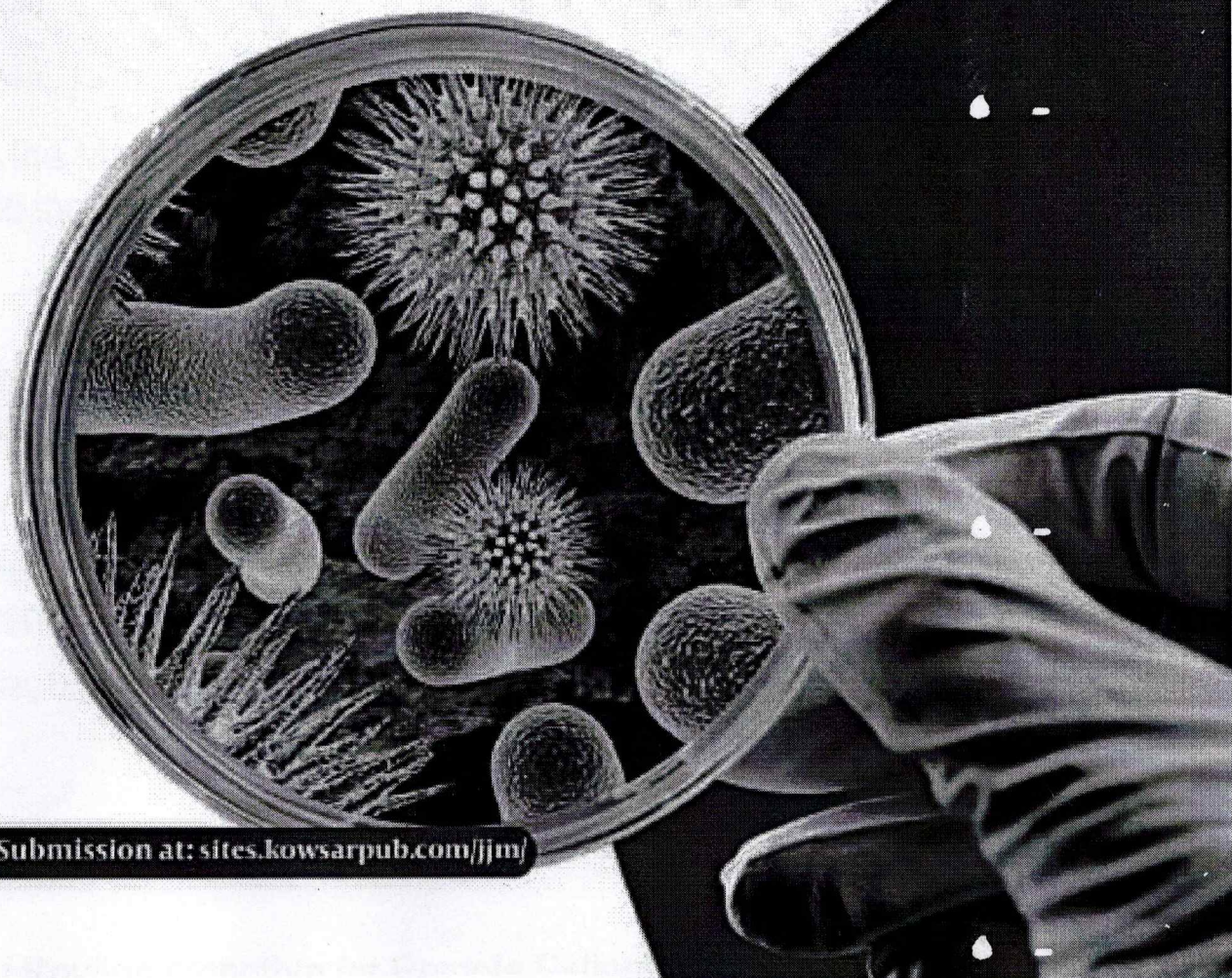


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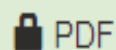


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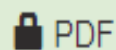


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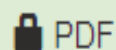


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## Depending on the Methods and Degree of Cutting on the Influence of the Crown Size, the Leaf Surface to Increase the Productivity of Photosynthesis

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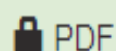


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# Depending on the Methods and Degree of Cutting on the Influence of the Crown Size, the Leaf Surface to Increase the Productivity of Photosynthesis

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**Abstract:** The most necessary condition for increasing the productivity of fruit trees in intensive orchards is the optimal and efficient use of solar radiation, as well as an increase in leaf surface area. For an apple tree, the size of the leaf surface, the illumination of tree crowns and the increase in the productivity of photosynthesis are often determined by a combination of cultivar-rootstock combinations, the method of pruning and forming trees, and the size of tree crowns.

**Key words:** Intensive orchards, fruit trees, variety-rootstock combinations, leaf surface, illumination of branches, photosynthesis productivity, productivity, crop quality.

**Introduction.** Care and cultivation of fruit crops is an important branch of agriculture, which has its own characteristics, high stable yields and good product quality.

In recent years, intensive orchards have been laid in Uzbekistan, the cultivation of fruit trees in these orchards is carried out on a scientific basis, taking into account the formation of young trees, methods and levels of pruning, as well as the biological characteristics of varieties.

However, it should be noted that scientific works in this area give sound scientific recommendations, which study the biological properties of fruit varieties, fruiting and the formation of crop elements, but in these studies, the methods and levels of anti-aging and moderate cyclic pruning of fruit trees have not been fully studied.

In the production conditions of the country, methods of rejuvenating normalizing pruning methods are widely used, aimed at maintaining the cyclic renewal of fruit-bearing branches for 3-4 years and the degree of shortening of fruit-bearing branches, depending on the growth of shoots.

Place of the experiment, object and research methodology. Scientific research is carried out in 2009-2011 in the farm "Amin Khayotbogi" of the Bukhara district of the Bukhara region. In recent years, tree pruning has been widely used in production testing of methods and degrees of anti-aging pruning.

The Bukhara region is located in a desert zone, soil formation occurs in a hot and dry climate. The climate of the Bukhara region is sharply continental, with an average annual rainfall of 125-175 mm, mainly observed in early spring, late autumn and winter, the average temperature is 26-30°C, and the average relative humidity is 40-60%. According to the results of agrochemical studies on pastures, old and new irrigated areas, the amount of humus is very low. The amount of humus in the soil of the arable layer is 0.8-1.4%; the amount of nitrogen is 0.06-1.2%. The total amount of phosphorus is 0.11-0.18%, the amount of exchangeable potassium is 1.5-3.0%. The soil of the farm "Amin Khaetbogi" is old-irrigated, consisting of slightly saline soils, with the formation of a shallow water surface [2,3,5 and 7].

The main goal of this scientific experiment is to use in the production of the most optimal and effective rejuvenating methods and degrees of pruning in the branches that yield the crop, in the productive branches, ensuring sustainable and continuous growth in fruit yield in intensive apple orchards by studying the method and degree of pruning, increasing the efficiency of fruit growth, high-quality fruit yields and the widespread introduction of high-yielding varieties, methods and levels of pruning in production conditions. Intensive apple orchards of the farm "Amin HayotBogi" varieties 6x4 m RenetSimirenko, Golden Delicious, Firstborn of Samarkand planted in 2004, planting scheme 6x4m, rootstock MM-106. Watered in the garden at the rate of 3200-3500 m<sup>3</sup>/ha, watered 4-5 times during the year.

Experimental part. In order to study the method of pruning and rejuvenation of fruit-bearing branches on apple varieties, a system of experiments was carried out, presented in table No. 1 below.

**Table 1**  
**Experienceoptions**

Options for applying the anti-aging pruning method on growing branches that have already yielded	The number of remaining fruiting buds, pcs.
Recommended cutting method used in production conditions (control)	No cutting branches
A method of rejuvenating and normalizing pruning of a 3-year cyclic rotation.	4-8 8-12 12-16 No cutting branches
The method of rejuvenating pruning on a 4-year cyclical rotation.	4-8 8-12 12-16 without cutting branches

In this experiment, the determination of the methods and degree of pruning and shortening of fruit-bearing branches with a 3- and 4-year cycle of alternating rejuvenating and normalizing pruning methods in overgrowing branches was studied.

In the control variant in Bukhara, the pruning method is used, which consists in pruning apple trees, where dry, diseased branches that interfere with the growth of each other are removed.

Against the background of the pruning, (control) method used in production, a 3-4-year cycle annually rejuvenates 3-4 growing branches of each apple tree, the next year leaving 2-3 combined buds to obtain new growing and high-yielding fruits on shortened branches.

**Research methods:** During the experiment to study the biometric characteristics of the apple tree, crown illumination and photosynthetic productivity, fruit productivity and quality.

Calculations were carried out on the study of the aboveground part of the apple tree - trunk, trunk thickness, growth of average and total annual branches, branch sizes.

At the end of each period of the year, metric measurements were taken on the trees planted in the garden for calculation. At the same time, the length and thickness of the branches obtained during the pruning process were measured, and the number of buds in them was determined.

In the studied apple varieties, the leaf surface area was determined by the “string” method of A. A. Nichiparovich (1961) by the accumulation of leaf surface and dry matter on accounting trees.

The distribution of sunlight in the branches of trees was measured using a Yu-16 lux meter, during the period when the leaves have optimal sizes. The counts were carried out on 15.06-16.06, in the afternoon at 8:00, 12:00, 15:00, and 18:00 hours relative to the illumination of the open field.

The productivity of photosynthesis was determined on three accounting trees according to the method of A. S. Ovsyannikov (1965).

The dynamics of crop formation was studied according to the variety study method (VNIIS, 1976).

Yields on apple trees were studied on each remaining tree. The productivity of the branches was determined per  $1\text{m}^2$ ,  $1\text{m}^3$  and  $1\text{cm}^2$ .

**Experimental results.** The most important condition for increasing the productivity of fruit trees, including apple trees, is the efficient use of solar radiation and an increase in leaf surface area. The leaf size of an apple tree is often determined by the vigor and combination of fruit varieties of the grafted seedlings, the order in which the trees are pruned and shaped, and the actual thickness of the leaf area.

The growth of the biomass of a plant organism, including the useful and economic biomass of the crop, is photosynthesis. All leaves work with very different productivity, for example, how photosynthesis changes depending on how they are located in the trunk of a tree and how they provide solar radiation, photosynthetic productivity changes accordingly, creating the basis for increasing the productivity of a tree.

The task of those specialists and scientists involved in fruit care in intensive orchards is to increase the productivity of photosynthesis as a result, ultimately due to the correct placement of the leaf surface in the tiers of branches of each tree, compliance with the levels of formation and pruning of trees. The optimal level of such total illumination in open areas is considered to be 50-70%. When the normal level of radiation increases or decreases at some point, the process of photosynthesis proceeds at a normal level and leads to the normal growth of fruit-bearing fruit trees and contributes to good growth and a stable annual crop.

It cannot be said that it is possible to increase the yield by bringing the leaf surface area to a normal level. All leaves must work productively and productively enough.

Practical differences in the increase in serum function, productivity and activity of the leaf surface Very high serum activity and productivity of photosynthesis depend on the type of leaf location, the time of its formation, the size of the leaf surface, structure, age, the presence of acceptors - organs or tissues that they intensively involve assimilators in building your body, performing physiological processes or providing a supply of nutrients in the winter-spring periods of the year.

The intensity of photosynthesis is also determined by the influence of the environment, external factors. They depend on light, temperature, carbon dioxide concentration, air mixture in the leaf, humidity and the amount of mineral nutrients.

The results of scientific research and production tests have shown that the leaf area of ten-year-old apple trees during the period of growth and development is optimal for an apple tree. Depending on the shape of the tree and the planting scheme (416 pcs/ha), a decrease in the size of the assimilated surface was observed due to an increase in the degree of rejuvenation with the method of shortening from a three- to four-year rejuvenation cycle. It has been established that their number decreases until fruit-bearing buds appear, and increases per hectare.

Also, according to the results of many years of research and production testing, it was found that the leaf surface area of each tree decreased with an increase in the pruning rate.

**table 2**  
**The influence of the method and degree of pruning on the level of biometric indicators, the size of the leaf surface, (2010).**

Anti-aging pruning options with a 3-4 year cycle.	Number of buds left on fruit branches (pcs.)	Crown area,		surface Leaf area size	
		m <sup>2</sup> / tree	m <sup>2</sup> /ha	m <sup>2</sup> / tree	m <sup>2</sup> /ha
Apple variety Golden Delicious					
Control	Without pruning	13,4	5574	42,2	17555
3 year cycle	4-8	11,8	4909	33,2	13811
	8-12	12,0	4992	35,0	14560
	12-16	12,5	5200	38,0	15801
	No cutting branches	12,6	5242	39,6	16474
4 year cycle	4-8	12,0	4992	35,0	14560
	8-12	12,4	5158	37,0	15392
	12-16	12,8	5242	33,0	16234
	No cutting branches	13,0	5408	40,2	16723
Apple variety Renet Simirenko					
Control	No cutting branches	14.2	5907	44,0	18304
3 year cycle	4-8	12,4	5158	34,5	14350
	8-12	12,8	5325	36,2	15236
	12-16	13,0	5408	38,8	16141
	No cutting branches	13,7	5659	40,6	16890
4 year cycle	4-8	12,8	5242	36,0	14976
	8-12	13,4	5574	37,8	15726
	12-16	13,6	5659	39,6	16474
	No cutting branches	14,0	5824	41,2	17139
Apple variety Pervenets Samarkand					
Control	No cutting branches	12,6	5242	39,6	16474
3 year cycle	4-8	11.2	4659	30,2	12563
	8-12	11,6	4825	31,4	13068

	12-16	12,0	4992	32,6	13552
	No cutting branches	12.2	5075	35,0	14560
4 year cycle	4-8	11,4	4742	31,6	12971
	8-12	11,9	4950	32,9	13645
	12-16	12.2	5078	33,0	13728
	No cutting branches	12,4	5158	36,4	15142
least significant difference (LSD) 095 P%		4.2		3,8	
		4.0		2.2	

Table 2 shows that the leaf area of apple orchards for the variety Golden Delicious is 11.8-13.0 m<sup>2</sup>/tree, for the variety Renet Simirenko 12.4-14.0 m<sup>2</sup>/tree, and for the variety Pervenets Samarkand 11.2 -12.4 m<sup>2</sup>/tree. These figures are confirmed by other scientific results obtained during the care of intensive apple orchards, as well as tests carried out under industrial conditions.

This is one of the most necessary requirements when regulating the illumination rate of the branches of fruit trees is the selection of a site with the required exposure, a unit of tree feeding area (planting pattern), a shaping system, a method and degree of pruning, etc.

In our experiments, it was noticed that the leaves of the branches of a fruit tree are not illuminated to the same extent. This can be seen in the deeper part of the trunk and on the sides where the light falls. . Depending on the age of the tree, the size of the trees and the biomass of nutrients, as well as the growth of the leaf surface affects the nature of the distribution of solar radiation varies.

In general, according to the results of our research and production testing, it was found that the best indicator among the 3 studied zoned apple varieties in terms of area, as well as the level of leaf surface density per day, leaving fruiting branches with 3-4 cycles of rejuvenating and normalizing pruning 8 -12 pieces of fruitful branches.

In this variant, when 8-16 fruit-bearing buds remain on the growing branches, the branches develop well, and the level of illumination is 18-26% less than the illumination of the open area for the studied variety, mainly in the center of the crowns of fruit trees per day, which is sufficient for normal photosynthetic activity , which contribute to obtaining a high yield with good quality.

Conclusion. The correct formation of trees, pruning according to the method and degree of pruning has a positive effect on their growth and development, high quality and fast fruiting, including the efficient use of solar energy over long distances, low costs per unit of production. The productivity and quality of fruit trees will improve dramatically, their profitability will increase, and production costs will decrease.

The amount of direct light energy plays an important role in accelerating the process of photosynthesis in fruit trees and increasing its productivity. Here, the intensity of light performs not only the function of illumination, but also has a direct impact on the structure of the assimilation apparatus as an energy source, the intensity of growth and development processes, nutrients. It regulates the distribution of assimilation in various organs.

In general, in our studies and experiments carried out under industrial conditions, it was noticed that the net productivity of photosynthesis increases with an increase in the degree of

illumination and the degree of shortening of growing branches, which leads to an increase in illumination in the variants using the method and degree of rejuvenating and normalizing pruning.  
RustamYunusov, [28.03.2022 11:56]

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