

## INFLUENCE OF THE LIGHT FACTOR ON THE PRODUCTIVITY OF INTENSIVE APPLE ORCHARDS

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### **Annotation**

The article discusses the influence and significance of light on the yield of apple trees with intensive fruiting. Without touching upon the physiological nature of light in the metabolic processes of plant organisms, we should note the huge role of radiation energy in the phenomena of formation. Light is one of the factors in the formation of life forms of fruit plants.

### **Keywords**

intensive apple orchard, yield, light, energy, photosynthesis.

**Introduction.** Light is a major factor in photosynthesis. It promotes the growth and formation of plant organs. It affects leaf transpiration, orientation of growing organs, etc. The leaves of a thinned branch receive a lot of light compared to the leaves of a thick branch. When there is a lack of light, buds do not form, deciduous branches grow very quickly up, stretch out and thin out. And with a prolonged lack of light, the leaf plates become small and colorless. On such branches, buds bloom late, often do not fully develop, and inflorescences bloom imperfectly. Fruits decrease in size. The fruit inside the tree will not have a characteristic color (red or pink). The lower branches are devoid of growing branches and quickly dry up. As the tree grows, a large leaf cover is formed, light remains a limiting factor for further growth and development of the tree. The edge light will be 5-15 times stronger than the light inside the tree. Because of this, all

branches are pushed from the inside of the tree to the edge, and branches that are not exposed to light begin to dry [1,2,3,4].

**Materials and methods of research.** Productive leaf level and amount of light on an intensely undersized apple tree. With a radical improvement in the yield and quality of apple trees in dwarf intensive apple orchards, the surface area of leaves and their productivity, as well as high illumination, are considered dependent on the productivity of photosynthesis and its impact. For this reason, it is now considered that a more rapid increase in the level of leaves on fruit trees when creating modern gardens with dwarf-growing rootstocks depends on the level of illumination during full growth, development, and yield [5,6,7].

Based on the results of a study conducted by N.P.Kurenyy (1970), it was found that in densely planted orchards it causes an increase in the level of leaves by twice and the yield of young intensive apple trees by 2.5 times.

With an increase in the yield of apple bushes, according to A.A.Nichiporovich (1955), it is possible to achieve the level of leaves with an area of 40-50 thousand m<sup>2</sup> per hectare.

**Dependence of the main phytometric characteristics of the leaf level and light growth.** According to A.P.Kudryavts (1974), the area of foliage for the best fruit orchards should be such that the light intensity in the open ground is not less than 50%, provided that the illumination in this case is not less than 30% of the existing foliage surface. In most of the studies conducted, scientists consider (P. P.Ivanov, 1965; A.S.Ovsyannikov, 1969; V.V.Khromenko, 1972; R.P.Kudryavets, 1974; A.A.Aripov, A.U.Aripov, 2012; R.Yunusov, 2020,2021,2022,2023) it has been established that during the development of the trunk, depending on the penetration of light into its inner part, the most favorable distance for growth and growth is tree growth in optimal condition is 1.0-2.0 m [8,9].

**Research results.** One of the main factors for optimal tree growth on a permanent basis in intensive orchards is the light indicators. This indicator is a scientifically proven correct use of the light mode on fruit trees. (A.A.Nichiporovich, 1966; A.S.Ovsyannikov, 1969; G.V.Shishkanu, 1973; I.A.Shulgin, 1973; V.V.Grinenko, 1976; V.I.Babuk, R.Yunusov, 1985; R.Yunusov, 2011, 2020, 2021, 2022). So that low-intensity apple orchards have a high leaf illumination coefficient, so that dwarf intensive apple orchards have a consistently plentiful and high-quality harvest, first of all, the optimal planting scheme and the number of seedlings will not go unnoticed in the gardens. Therefore, the dwarf intensive apple orchards is closely related to the density of planting fruit trees, which are laid in apple orchards to improve light performance.

Table 1

**Light in the center of the tree trunk dependence on the variety and on the density of planting seedlings in 2021-2023 (%)**

Row and height	Planting order, M						
	4. 0x1.	4. 0x1.	4. 0x1.	4. 0x1.	4. 0x1.	4. 0x2.	4. x2. 2
Goldspur variety							
row one	45	47	50	52	55	57	57
1M	60	63	64	66	68	69	70
2M	70	82	83	85	88	90	91
3M							
addition l zone							
1M	50	52	54	55	57	59	60
2M	66	68	70	72	74	75	77
3M	82	63	65	66	67	78	72
Gala variety							
row one	46	49	50	53	54	55	56
1M	62	64	65	67	64	66	68
2M	82	82	84	86	86	86	87
3M							
addition l zone							
1M	52	53	54	56	57	58	59
2M	66	68	71	73	74	75	75
3M	63	64	70	60	71	72	72

The arrangement of trunks and branches on an apple tree indicates that their thicker arrangement causes lower light characteristics, and a higher arrangement of tree trunks leads to increased illumination. It is worth noting that the illumination in the central part of the branch and trunk of the apple tree is significantly reduced. Studies show that the central part of the tree trunk will not have the same percentage of light. In the studied varieties, the light indicators of tree trunk placement at height increase in all parts.

Sun light exposure to tree trunks and branches largely depends entirely on the biological characteristics of the variety. In the Goldspur variety, the intensity of sunlight exposure increases dramatically depending on whether the branch is optimal.

**Conclusion.** It is established that even in the conditions of the horticultural economy of Siyavush Agro LLC, the light of the trunk and branches of the tree and its location depend on the height and spreading of the tree trunk. Goldspur and

Gala varieties have a rootstock M-9, in which the light level increases from the lower part of the trees to a higher one. In this horticultural area, the rows are oriented from north-east to south and west. Therefore, this garden will have more light during the day from the tree trunks on the south-east side.

It is proved that when lighting a tree trunk in a horizontal direction, the tops should be located in the direction of a row of leaves. During the day, there will be more sunlight on the branch of the tree trunk than on the opposite side of the row. Thus, it was proved that the incidence of sunlight can be the same. When the seedling is placed in the order of densities 4,0x1,8 and 4,0x2,0m, light has a positive effect on the growth and development of the trunk and branch. For intensively stunted apple trees, a high level of illumination inside the trunk and branches of the tree is suitable during the day. In addition, a low-growing apple with better sunlight affects the full supply of trees, their optimal growth, development and high yield, and this was obtained when the trees were planted in the order of 4.0x1.8 m and 4.0x2.0 m. Also, the best conditions were the level of illumination in Goldspur and Gala varieties on low-growing rootstock M-9, propagated by a weakly-growing vegetative method, and its uniformity in the middle of the trunk, and the best level of illumination was when transplanting trees in the order of 4.0x1.8m and 4.0x2.0m.

#### REFERENCES:

1. Kudryavets R. P. Light regime and photosynthesis of apple trees depending on the crown shape. // Doklady TLCA. - Moscow, 1972-Issue 179. - p. 5-10
2. Gladyshev N. P. Productivity of apple tree photosynthesis on dwarf and strong-growing rootstocks. // Collection of reports of the All-Union Conference of Young Scientists on horticulture. Michurinsk, 1969, vol. 1, pp. 146-150.
3. Grinenko V. V., Light regime of apple tree plantings.//Gardening and viticulture. - 1972, - No. 1 - - p.
4. FA Ganieva, R Yunusov // Economical innovative basis for the care of intensive stunted apple varieties-//ajmr - Asian Journal of Multidimensional Research (AJMR)
5. GF Amrilloevna, Y Rustam - // Studying the different formations of apple trees in intensive orchards // European Journal of Agricultural and Rural Education, 2021
6. G.F. Amrilloevna, Y. Rustam, // The growth, development and yield of apple trees in intensive fruit orchards are hardwood cutting combinations and

their dependence on the thickness of seedlings//. NVEO-Natural volatiles & essential oils 08(5), 9591-9595 (2021)

7.F.A. Ganiyeva, // Apple tree productivity depending on planting density and rootstock variety combinations//. Web of E3S Web of Conferences 389, 03014 (2023) UESF-2023.

8.R.Yunusov, F.A. Ganiyeva, // Agrochemical properties of the soils of intensive apple orchards in Bukhara region//. Web of E3S Web of Conferences 116, 01005 (2023) EBWFF-2024.

9.R.Yunusov, F.A. Ganiyeva, //Dependence of varieties, plant thickness and resource saving technology small apples productivity//. Web of E3S Web of Conferences 116, 01023 (2023) EBWFF-2024.