

# Growth and fruiting of trees in intensive dwarf apple orchards depending on variety-rootstock combinations and planting density.

**Yunusov Rustam**, Candidate of Agricultural Sciences, Associate Professor of the Department of Biotechnology and Food Security, Bukhara State University, Uzbekistan, Bukhara.

Email: [f-ganieva@inbox.ru](mailto:f-ganieva@inbox.ru)

Uzbekistan, Bukhara

**Ganieva Feruza Amrullova**, Lecturer at the Department of Biotechnology and Food Security.

Email: [f-ganieva@inbox.ru](mailto:f-ganieva@inbox.ru)

Uzbekistan, Bukhara

**Artikova Manzura Israilovna**, Lecturer at the Department of Biotechnology and Food Security.

Email: [f-ganieva@inbox.ru](mailto:f-ganieva@inbox.ru)

Uzbekistan, Bukhara

**Annotation:** This article presents the results of a study in conditions of the horticultural economy of Siyovush Agro LLC, located on the territory of the Bogi Kalon MGS of the Bukhara region, Bukhara district, where the influence of variety-rootstock combinations and tree planting density on the growth, development and formation of yield elements was studied. Fruit trees in an intensive apple orchard have been scientifically studied during 2020-2022. A scientific experiment was carried out in young apple orchards, the Goldspur variety was planted on a weakly growing rootstock M-9, with a planting pattern of 4.0x1.0m, 4.0x1.2m, 4.0x1.4m, 4.0x1.6m, 4.0x1, 8m, and 4.0x2.0m, which are arranged in order, and as a result of the growth of the apple tree, the development and optimal formation of the elements of fruit formation, the phytometric indicators of illumination, the optimal arrangement of branches,

**Keywords:** Intensive orchard, fruit trees, dwarf apple trees, varietal rootstock combinations, crown of trees, phytometric indicators, illumination, flowering, fruit quality and productivity, profitability.

In recent years, intensive dwarf orchards have been rapidly created in Uzbekistan, in which combinations of cultivar-rootstock combinations, their biological indicators with scientifically based resource-saving technologies have not been studied [1,2].

Today, intensive orchards, including dwarf apple orchards, along with the cultivation of high-quality fruits, require the creation of orchards with rapid fruiting, that is, 2-3 years after planting them in the garden. Also, in intensive dwarf orchards, when selecting slow-growing, small-stemmed, high-yielding, high-quality varieties, as well as applying a set of high-quality resource-saving agrotechnical measures to them, it is possible to obtain 25-30 tons of high-quality dwarf fruits [6,7,8].

Carrying out these activities on a scientific basis is considered the most important agrotechnical factor in increasing productivity and improving the quality indicators of intensive orchards, and at the same time, research conducted in this area is recognized as relevant and active, is of great scientific and practical importance in increasing the productivity and quality of fruit trees in intensive gardens [3,4].

The purpose of scientific research is to study the growth and development of zoned intensive dwarf apple varieties in the soil and climatic conditions of the Bukhara region, on the formation of yield elements, the influence of variety-rootstock combinations and the optimal thickness of trees (stable) is to prepare scientific and practical recommendations for farms on technology cultivation where where it is obtained abundant and high-quality harvest of fruit crops.

The present research is being carried out in 2020-2022 in the Republic of Uzbekistan, Bukhara region, Bukhara district, in the horticultural farm of Siyovush Agro LLC MGS BogiKalon, on trees, weakly growing dwarf apple trees. Rootstocks M-9. The soils of the horticultural farm of Siyovush Agro LLC MGS BogiKalon consist of alluvial slightly saline soils, irrigated since ancient times, and with a surface water level (0.80-1.5 m), it differs sharply from other areas. The soil is of medium texture. It was found that in the processes of soil

formation in irrigated field conditions, parent rocks, topography and groundwater are directly related to agro-irrigation or research.

Soil analyzes of this site for the chemical composition were carried out in the Bukhara region, in the laboratory of the design department of the Uzdavroyikha Institute, taken from the aisles of apple orchards, the horticultural farm of Siyovush Agro LLC at the BogiKalon MGS, and it was noted that the change in the agrochemical properties of the soil with the depth of soil waters in 2020. According to the weather data received from the Bukhara City Observatory during 2020-2022, the weather conditions were favorable for the cultivation of intensive dwarf apple orchards. During the years of research, it was found that weather data does not greatly affect the growth and development of apple trees, dwarf varieties that are small in size. It is established that these indicators decrease with increasing depth of the soil layer.

Object of study. Dwarf apple trees of the Goldspur variety grafted onto weakly growing rootstocks M-9 and planted in apple orchards in March, according to the scheme 4.0x1.0m, 4.0x1.2m, 4.0x1.4m, 4.0x1.6m, 4.0x1.8m , 4.0x2.0m. On 1 hectare of land there are an average of 1250-2500 pieces. dwarf apple seedlings. The slow-growing rootstock M-9 was used as a rootstock in the experimental gardens. This rootstock was created at the Merlin Melton fruit station in England, and at the same time, due to the fact that the scientific and soil conditions of Uzbekistan are different, it has an optimal growth ability and low performance, and will begin to produce a crop in the second year. In the experimental garden, apple trees were formed in the form of semi-thinned tiered crowns. These dwarf intensive apple trees are irrigated with resource-saving drip irrigation. Dwarf apple trees are watered through rubber pipes by drip irrigation, which gives good results. As a result, water consumption in the apple orchard was saved by 2-3 times. Dwarf varieties of apple trees, grafted with a low-growing, slow-growing rootstock, effectively use assimilation to form fruit buds that form in the process of growth, and create conditions for obtaining high yields. During the growing season, weeds were removed between the rows of apple orchards, nitrogen fertilizers were applied - 250 kg/ha, phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the growth process, which ultimately leads to an increase in tree productivity. As a result, water consumption in the apple orchard was saved by 2-3 times. Dwarf varieties of apple trees, grafted with a low-growing, slow-growing rootstock, effectively use assimilation to form fruit buds that form in the process of growth, and create conditions for obtaining high yields. During the growing season, weeds were removed between the rows of apple orchards, nitrogen fertilizers were applied - 250 kg/ha, phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the growth process, which ultimately leads to an increase in tree productivity. As a result, water consumption in the apple orchard was saved by 2-3 times. Dwarf varieties of apple trees, grafted with a low-growing, slow-growing rootstock, effectively use assimilation to form fruit buds that form in the process of growth, and create conditions for obtaining high yields. During the growing season, weeds were removed between the rows of apple orchards, nitrogen fertilizers were applied - 250 kg/ha, phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the growth process, which ultimately leads to an increase in tree productivity. assimilation is effectively used for the formation of fruit buds formed in the process of growth, conditions are created for obtaining high yields. During the growing season, weeds were removed between the rows of apple orchards, nitrogen fertilizers were applied - 250 kg/ha, phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the growth process, which ultimately leads to an increase in tree productivity. assimilation is effectively used for the formation of fruit buds formed in the process of growth, conditions are created for obtaining high yields. During the growing season, weeds were removed between the rows of apple orchards, nitrogen fertilizers were applied - 250 kg/ha, phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the growth process, which ultimately leads to an increase in tree productivity. phosphate fertilizers -180 kg/ha, potash fertilizers -45-60 kg/ha, in pure form. In the dwarf apple variety, grafted on a low-growing slow-growing rootstock, assimilation is effectively used to form fruit buds that form during the

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**Research results.** In the young intensive garden of the horticultural economy of SievushAgro LLC, located on the territory of the MGS "Bogi Kalon" of the Bukhara region of the Bukhara district, during 2020-2022. the biological characteristics of dwarf apple trees, growth and development, productivity and its quality were studied. This study recorded the optimal growth and improvement of such indicators as illumination, the level of foliage of apple trees from small sizes. The conducted studies showed that the Goldspur apple variety in 2020 had a high light regime, these indicators were 70-85%, and in 2021, due to the optimal growth and development of apple trees and a rapid increase in surface area, the light indicators were reduced to 2-4 %, and in 2022 the indicator decreased by 4-6%. It should be noted, that this decrease in illumination did not have a significant effect on the formation of crop elements of apple varieties. Even in 2022, the growth, flowering and formation of fruit elements in the experimental apple orchards practically did not decrease, as a result of which good conditions were created for obtaining a high and high-quality crop on dwarf apple trees.

In the horticultural farm of SievushAgro LLC, the use of economical innovative agrotechnological methods in intensive orchards, the protection of apple trees from pests during 2022 were carried out directly in cooperation with the agronomists of this farm. The efficiency of growing dwarf apple trees increases dramatically, gives a high yield with a good fruit rate.

In 2022, this horticultural farm cared for dwarf apple trees based on optimal resource-saving innovative agricultural technologies, where biological characteristics were taken into account, high-yielding varieties and rootstocks were selected, as well as the optimal thickness of tree crowns. optimal location on the tree trunk, high light performance in all parts of the apple tree. On average, from one apple tree, 1.0-4.0 kg of a quality crop was obtained, and this figure means that the average yield per hectare is 25.0-110.0 c/ha. Every year, these orchards use high agrotechnical methods of caring for fruit trees. Efficiency in fruit growing is increasing dramatically, and the level of profitability in these orchards is also high.

Also, the results of scientific research and testing conducted during 2020-2022 indicate that the optimal size and height of the crowns of dwarf apple varieties will lead to good light indicators for intensive orchards of dwarf apple trees, taking into account the biological characteristics that, in the process of pruning and shaping, have of the studied trees leads to an improvement in phytometric indicators and indicators of growth, development and productivity of crowns, a sharp increase in the productivity of a dwarf apple tree creates the basis for improved growth and ultimately leads to an increase in yield.

The effect of pruning the branches located in the upper part of the trunk of intensive bonsai is directly related to the degree and method of pruning, the biological characteristics of the variety, habitat and levels of resource-saving agrotechnical care for them.

Thus, as a result of the research, it has been established that, taking into account the biological characteristics of the apple dwarf varieties, it is possible to increase the thickness of the tree crowns and maintain it at the required level, which has a positive effect on the formation of crop elements and their quality.

From the results of the research, it became clear that one of the most effective ways to obtain a high and high-quality yield in intensive dwarf apple orchards is the rational use of a combination of varieties and rootstock characteristics. Pruning tree trunk branches, variety-rootstock combinations by bringing the above measures and improves their active growth and branching of generative organs, thereby creating favorable conditions for its formation, this ensures a constant plentiful and high-quality harvest from year to year, the efficiency of growing fruits with good quality increases dramatically.

The factors that determine the quantity and quality of fruit tree crops include, along with the biological characteristics of cultivar-grafting combinations, the location and number of trees, age and agrotechnical measures, soil and climatic conditions, the method of pruning and shaping, as well as rootstocks.

In general, the most rational way to effectively manage the horticulture system is to form integrated tree care in it. At present, due to the development of the system of intensive fruit growing, the following achievements can be achieved: taking into account the high demand of our people for berry and fruit products, the formation of the best and environmentally friendly, diverse fruits that will be competitive in the world market; using advanced scientific and technological achievements, accelerate this industry, achieve the

production of cheap, high-quality products at low costs, apply the most advanced organizational forms of remuneration in production, and train mature specialists in the field of horticulture.

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