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# The Fertility of Fergana Province is Low, Stone-Suitable for Gravel Land Conditions, Climate Selecting Apple Grafts Resistant to Changes and Diseases, Adaptive

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**Annotation:** The Ferghana Research and Experimental Station conducted many years of experience in order to study the patterns of the growth and development of apple trees with different grafts in conditions of infertile, gravelly soils. According to the results of many years of scientific research, feces suitable for low-productivity, stone-gravel soil conditions and highly effective apple rootstocks are recommended.

**Keywords:** grafts, budding, flowering rate, flowering duration, seedling density, leaf level.

**Enter.** It is known that Western Europe has a temperate, humid climate, and small gardens are maintained by drip irrigation. Mineral fertilizers are added to the water in accordance with the demand of plant vegetation in each period, taking into account the amount of nutrients in the soil.

In order to keep the row space clean from weeds, special tillers are used and herbicides are sprayed. The soil between the rows of the garden is covered with special turf so that it does not become compacted during the passage of small-sized equipment, and is free from excessive pressure. Grass is cut using special equipment.

In the intensive gardens of our country, garden rows are cultivated with available techniques. The soil is compacted due to the cultivation of large tractors between the rows. Fruits grown in intensive orchards at high prices do not match the purchasing power of the local population. Also, climatic conditions, extremely hot summers, require the selection of appropriate microclimate conditions for intensive gardens. In particular, in small orchards, the surface layer of the soil has a strong root system, and the sudden warming of large branched orchards has a negative effect on the quantity and quality of the future harvest. It is observed that the root of the M-9 graft planted in small gardens is located in the surface (0-40 cm) layer of the earth, and if the soil cools down to -8°C in the winter months, the tree will be hit by cold. Therefore, it is an urgent task to carry out research aimed at determining suitable grafts for each soil-climatic condition.

Grafting plays a key role in controlling the height and size of a fruit tree. It is known that characteristics such as quick access to the harvest, productivity, adaptability are inextricably linked with grafts.

The wide range of grafts in terms of valuable economic and biological characteristics makes it possible to select them for a specific purpose, for a garden type and a specific soil-climate zone. The selected graft for a given soil-climate condition determines the degree of adaptability to environmental stress factors, quick ripening, dynamics of crop growth, stability of fruit production of the variety-graft combination, commodity and consumption quality.

That's why many years of experience were built in order to choose grafts suitable for local conditions, to evaluate them objectively, to cover the long-term cycle from the time of planting the seedlings to the aging of the garden and the harvest. In this case, the positive and negative aspects of each welder are analyzed based on long-term results, and a highly effective welder suitable for local conditions is recommended.

**Research methodology.**

The researches conducted on the study of four varieties, including M-9, MM106, intercalary and strong-growing seed grafts in the conditions of low-fertility stone-gravel soil of Fergana region, are conducted based on the methodology adopted in practice. [1].

**Research results and their analysis**

Fergana Scientific Experiment Station Fayzabad site, in the conditions of low productivity stone-gravel soil, four varieties, including M-9, MM106, intercalary and strong-growing seedlings of the Golden Delicious apple variety were planted in 2021. is the second year of research. Research shows that by the 3rd year, the reproductive phase begins completely in all types of grafts (Table 1).

In particular, the swelling of buds was recorded on March 13 in M-9 graft, March 14 in intercalary, March 15 in MM-106, and March 16 in strong growth.

Full swelling of buds was observed on M-9, MM-106 grafts on March 7-18, and on March 19-20 on intercalary and strong growth, respectively. The opening of the flower bags started on March 21 in M-9 and intercalary, in MM-106 and on March 22-23, and the full opening was detected on March 23-27.

The beginning of flowering was observed on March 28 in M-9, March 29 in MM-106, April 1 in intercalary, April 2 in strong grower.

It was found that the full flowering process started earlier in weakly growing grafts.

**Table 1. Dependence of grafting on growth and development process in apple tree (2023)**

| type | Name of the graft | bud protrusion, | | opening of the flower bag | | Flowering periods | | | Flowering dagree (point) | continuous flowering league |
|---|---|---|---|---|---|---|---|---|---|---|
| | | beginning | complete | beginning | complete | beginning | complete | finish | | |
| 1 | M-9 | 13.03 | 17.03 | 21.03 | 24.03 | 28.03 | 31.03 | 4.04 | 4,0 | 7 |
| 2 | MM-106 | 15.03 | 18.03 | 22.03 | 25.03 | 29.03 | 1.04 | 6.04 | 3,0 | 8 |
| 3 | intercalary | 14.03 | 19.03 | 21.03 | 23.03 | 1.04 | 4.04 | 8.04 | 3,0 | 7 |
| 4 | strong grower | 16.03 | 20.03 | 23.03 | 27.03 | 2.04 | 5.04 | 9.04 | 2,0 | 7 |

In particular, full flowering was recorded in M-9 and MM-106 grafts on March 31-April 1, and in intercalary and strong-growing grafts on April 4-5.

The end of the flowering process was observed on M-9 and MM-106 grafts on April 4-6, on April 8-9 in intercalary. So, flowering was earlier in the grafted apple with a pubic root system, and in the apple with a strong root system, the end of flowering occurred later.

The highest indicator of the level of flowering, 4 points, was recorded in M-9 graft, this indicator was 3 points in MM-106 and intercalary, and 2 points in a strong grower.

Flowering is almost the same in all grafts of apple, it lasted 7-8 days.

It is known that the leaf is considered the main organ of the plant, in which the synthesis of organic substances takes place, which ensures the processes of growth, development and entry into the harvest. According to the results of measuring the leaf level, the highest number of leaves per tree, 1950 pieces, was determined in the apple with a strong growing seed graft, while the lowest number, 1145 pieces, was found in the small ( M-9) was observed in grafted apples (Table 2). Also, it was

found that the number of leaves (1510 pieces) in the apple with a semi-ripe graft (MM-106) is more than that of the intercalary graft (1259 pieces).

**Table 2. Dependence of apple tree leaf area on grafts (2023)**

| т/р | Name of the graft | Seedling density, bushes /ha | number of leaves per bush, piece | 1 leaf area, cm2 | 1tree leaf area, cm2 | Leaf area per hectare, m2 |
|---|---|---|---|---|---|---|
| 1 | M-9 | 2000 | 1145 | 43,3 | 49578,5 | 9915,7 |
| 2 | MM-106 | 1000 | 1510 | 35,2 | 53152,0 | 5315,2 |
| 3 | Intercalary | 400 | 1950 | 32,8 | 63960,0 | 2558,4 |
| 4 | strong grower | 666 | 1259 | 34,4 | 43309,6 | 2884,4 |

The measurement results showed that the leaf surface is larger in grafted apples with a small number of leaves. In particular, the largest level (43.3 cm2) was determined in the small (M-9) graft, while the smallest level (32.8 cm2) was recorded in the apple with a strongly growing seed.

It was shown that the total number of leaves per tree is directly related to the number of leaves per tree. In particular, the highest indicator in one bush belonged to a strongly growing seed graft and made 63,960 cm2. The lowest leaf area (49,578.5 cm2) per tree was recorded in the M-9 graft. It was also revealed that M-106 graft (53,152.0 cm2) is superior to intercalary (43,309.6 cm2) according to the index of the leaf area of one bush.

Our experiment confirmed that seedling density per unit area is a decisive factor in terms of leaf area. In particular, the highest index of leaf area (9915.7 m2) was found in M-9 grafted apple with dense planting (2000 plants/ha), and the smallest leaf area (2558.4 m2 ) was recorded in the area unit of seed-grafted apple. So, it has been confirmed that the leaf level is one of the decisive factors in intensive orchards in which trees start to harvest quickly and have high internal potential.

Determining the yield per tree and unit of area gives the opportunity to draw clear conclusions about the internal potential of grafts in terms of yield.

The yield of one bush of apples was different according to the type of grafts. In particular, this indicator was 2.8 kg in the M-9 graft, 3.2 kg in the M-106, 2.1 kg in the intercalary, and 1.9 kg in the strong grower (Table 3).

This year's research also confirmed that the period of entry into the initial harvest of the Golden Delishes variety directly depends on grafts.

Therefore, the yield obtained per unit area was different according to the thickness of seedlings suitable for each graft and the yield obtained from one bush. For example, in four-year-old seedlings, the yield in M-9 graft reached 56 centners, in MM-106 it was 32 centners, in intercalary it was 13.9 centners, and in a strong grower it was 7.6 centners.

So, in our experiments, it was confirmed that the process of getting into the harvest in the first years of apples with small and semi-small grafts is accelerated compared to grafts with a strong root system.

**Table 3. Productivity of apples with different grafts**

| т/r | Name of the graft | Fruit yield on 1 bush, kg | productivity s/ hectare | |
|---|---|---|---|---|
| | | | on an area of 1 hectare | In addition to control |
| 1 | M-9 | 2,8 | 56 | 0 |
| 2 | MM-106 | 3,2 | 32 | 32 |
| 3 | intercalary | 2,1 | 13,9 | 13,9 |
| 4 | strong grower | 1,9 | 7,6 | 7,6 |

**Summary**

1. Growth and development processes in an apple tree are directly dependent on the type of grafts. In the fourth year after planting, M-9 and MM-106 grafts were superior to intercalary and seed grafts in terms of growth and development.
2. If the superiority of the seed graft was noted on the leaf level of an apple tree, the superiority of the M-9 and MM-106 grafts on the leaf level was determined due to the increase in seedling density per unit area.
3. In apples with small (M-9) and half-sized (MM-106) grafts, the process of entering the harvest in the first years is accelerated compared to grafts with a strong root system.

**List of used literature**

1. Программа и методика сортоизучения плодовых, ягодных и орехоплодных культур/под ред. Е.Н. Седова. Орел, 1999. 60 с.