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Ficus Plant Growing Technology

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Annotation: The scientific article contains brief information about technologies for growing ficuss. Scientifically based information about the phases of growth and development of underground and aboveground vegetative organs of the ficus plant, as well as obtaining a high yield from them due to the technology of growing ficuss.

Key words: seedlings, variety, ficus, plant, subtropical, branch, bud, leaf, root system, rhizome, flower, fruit, moisture, temperature, soil, environment.

Introduction In accordance with the Decree of the President of the Republic of Uzbekistan No. PF-5742 dated June 17, 2019, "On Measures for Efficient Use of Land and Water Resources in Agriculture," as well as to restore local varieties of agricultural crops with unique characteristics and prevent their extinction, and to establish original seed production of promising varieties, the Cabinet of Ministers signed Resolution No. 504 on August 24, 2020. To further develop the agricultural sector in the republic, reforms in the fruit-growing sector, including the cultivation of subtropical fruits such as ficuss, are being prioritized. This includes expanding the scope of research, implementing advanced, modern, resource-saving technologies, and creating extensive opportunities to produce high-quality, industrial-grade, and export-oriented ficuss.

The historical evolution of plant forms involves an adaptation to the gradual shifts in ecological conditions and soil formation processes, which, in turn, leads to an annual adjustment to external environmental changes. In temperate and neighboring regions, the life cycle of fruit-bearing plants distinctly includes two phases – the vegetative period and the relative dormancy period. The first phase, or vegetative period, occurs under favorable temperatures, promoting the intensive growth and yield of the plant's aboveground and underground parts. This period starts in spring and extends into autumn. The second period, marked by declining temperatures, begins in late autumn, continues throughout the winter season, and concludes in spring.

This study was conducted in Turkey in 2006 with the aim of investigating the possibility of producing ficus seedlings through the layering method. The Sarilop variety of ficuss was used as the material for this study. This variety is the best for drying and can also be consumed fresh. Mother plants were planted horizontally at a distance of 70 x 60 cm after leaf fall in November. In February, all buds on the aerial part of the plants were thoroughly covered, and the new shoots that reached 20 cm were covered with 10 cm of soil. The lower parts of these new branches were continuously covered with soil taken from the row spaces during the vegetative period. By the end of the growth phase, eighty seedlings of various sizes were obtained from twenty mother plants. The majority of these seedlings (77.5%) were of sufficient quality and quantity for sale. Smaller seedlings that were not suitable for sale could be used as stock or as mother plants after a year of care. The study determined that ficus seedlings can be propagated through stem layering, and layering with soil was proposed as an alternative method for ficus seedling production, due to its low production cost (2).

In ficus varieties, the intensity of regeneration in the aboveground pruned part of the plant differs among varieties. In the second year after pruning one plant, the average growth of each bush in the current year was as follows for the respective varieties: Kadota - 31.9 m, Crimea 43 - 30.6 m, Lardaro - 34.8 m, and Caucasus Black - 36.0 m. In other varieties, such as Uzbek Yellow - 11.6 m, Chapla - 13.4 m, and White Adriatic - 16.9 m. Rapid regeneration of the aboveground parts of bushes accelerates fruit-bearing and increases yields.

Up to 90-95% of ficus plant growth occurs in annual shoots. The buds on these shoots typically have one growth phase, with only a few larger buds experiencing two growth phases. Buds on perennial branches often emerge on the lower or middle parts of the branches and are characterized by intensive growth in the second or third phases.

Due to occasional adverse weather or sharp drops in temperature, ficus plants may suffer damage, and parts of the aboveground sections of the bushes affected by cold temperatures need to be partially or completely removed, which can then

Research Conditions. The experiments were analyzed at the "Horticulture and Viticulture" department. Field trials were conducted in the ficus nursery of the educational and scientific experimental farm at Tashkent State Agrarian University. Biometric measurements and calculations were carried out on 20 plants for each variant. The experiment was conducted with four replications.

Research Methodology. Phenological observations followed the recommendations and methods outlined in the following sources: "Methodology for Calculations and Phenological Observations in Experiments with Fruit and Berry Plants" by Kh.Ch. Buriev et al., V.F. Moiseychenko's "Methods of Accounting and Observations in Experiments with Fruit and Berry Crops," M.T. Tarasenko's "Propagation of Fruit Plants by Green Cutting of Shoots," and S.A. Ostroukhov's "Methodological Guidelines for Growing Seedlings of Fruit and Berry Crops." Biometric measurements and calculations were carried out on 20 plants in each variant, with four replications of each experiment.

Research Results. Based on the above, studies were conducted during 2022-2023 at the Agricultural Research and Training Station of Tashkent State Agrarian University to examine the

morpho-biological characteristics of growth and development of ficus plants propagated by different vegetative methods.

At the beginning of the bud-opening phase, the average daily temperature for ficuss was around 12-13°C, and during the late phases, when leaf yellowing occurred, it was around 13-14°C. Two groups of ficus varieties were identified based on the duration of various interphase periods and the accumulation of active effective temperatures. For the late-ripening varieties (Uzbek yellow, White Adriatic), the accumulated active temperature during the bud-development to fruit-appearance period ranged between 940-1001°C, with effective temperatures between 419-559°C. In the same period, the early-ripening varieties (Chapla, Crimean 43, etc.) had a lower accumulated active temperature: active temperature ranged between 805-846°C, and effective temperature between 346-366°C. For complete ripening of ficus fruits, an accumulated active temperature of 4000-4500°C is required.

Phenological observation data during the passing of vegetative phases showed specific differences within the plants' annual growth cycle. For instance, the budding of varieties such as Kadota, Crimean 29, and Uzbek Yellow started almost simultaneously, with a one- or two-day difference. The budding phase was found to start two to ten days later.

The end of the vegetative phase—primarily leaf fall—occurred between October 2-11, with the exception of Crimean 29, which was observed on October 15, four to six days later than other varieties. (Table 1).

Table 1. Vegetation phases of ficuss (2022-2023)

Varieties		Buds begin to write, date	Leaf shedding		Vegetation period duration, day
			the beginning	ending	
1	Kadota	14IV	14 IX	8 X	177
2	Krymsky 29	12 IV	9 IX	2 X	169
3	Uzbek jeltyy	15 IV	16 IX	11 X	179

The leaves are large, alternate, divided into 3-5-7 lobes, or occasionally entire and leathery. The shortened generative buds develop in the axils of the leaves, having two types – caprificuss and ficuss (syconia). These develop on separate trees and are characterized by spherical-oval formations with an opening at the top and hollow interiors, where small bisexual flowers are found.

Fresh ficuss contain up to 24% (in other sources, up to 75%) sugar (glucose, fructose), as well as organic acids, tannins, proteins, fats, and coumarins in the leaves. Fresh ficuss contain up to 1.3% protein, 11.2% sugar, and only 0.5% acids. Dried ficuss contain 3-6% protein and 40-50% sugar, providing a deep sweet taste and a sense of satiety (caloric content of dried fruit is 214 kcal per 100 g). They also contain vitamins (beta-carotene, B1, B3, PP, C) and minerals (sodium – 18 mg per 100 g, potassium – 268 mg, calcium – up to 34 mg, magnesium – up to 20 mg, phosphorus – up to 32 mg). Dried ficuss, like dates, contain almost as much potassium, though nuts surpass them in potassium content. Unripe fruits contain caustic milky juice, making them inedible.

In our research, two ficus varieties – Uzbek Yellow Ficus and Crimean Black Ficus (Ficus carica L.) – were selected. Cuttings of these varieties were rooted in a mist propagation setup. The number of leaves formed from these biological characteristics and their surface area were calculated. The number of leaves and their surface area were measured when the cuttings were 10, 30, 50, 70, and 90 days old. The number of leaves was counted visually, while leaf area was calculated using the formula by Ahmed F.F., Morsy M.H. (1999). The general form of the formula is $S=0.4\cdot(0.79\cdot D^2)+15.33$, where S is the leaf area in cm^2, and D is the largest diameter of the leaf in cm.

Table 2. Changes in the number of leaves and their surface area during rooting of ficus cuttings in a mist propagation set

Varieties name	Age of ficus cuttings, days									
	10		30		50		70		90	
	N	A	N	A	N	A	N	A	N	A
Uzbekistan yellow ficus	1	17,3	2	57,4	3	96,5	8	264,9	14	426,3
Crimean black ficus	1	20,1	3	92,4	5	153,1	12	357,4	21	519,7
Average	1	18,7	2,5	74,9	4	124,8	10	311,2	17,5	473,0

N = Number of leaves, and A = Area of leaves.

The conducted studies indicate that the number and area of ficus leaves vary depending on the variety. In the cuttings of the Uzbek Yellow Ficus variety, the number of leaves was as follows: 1 leaf at 10 days, 2 leaves at 30 days, 3 leaves at 50 days, 8 leaves at 70 days, and 14 leaves at 90 days. For the Crimean Black Ficus variety, the number of leaves at the same intervals was 1, 3, 5, 12, and 21, respectively (Table 2).

When comparing the number of leaves between varieties, no significant differences were observed in the early stages of planting and initial growth. However, from 30 days, the number of leaves began to diverge, with Crimean Black Ficus cuttings showing an average of two more leaves than Uzbek Yellow Ficus cuttings at 50 days, and this difference increased to four leaves by 70 days. By the mature growth stage at 90 days, Crimean Black Ficus cuttings had seven more leaves than Uzbek Yellow Ficus cuttings, which suggests a greater photosynthetic surface and potentially faster maturation and higher quality of seedlings.

Calculations of leaf area showed that at 10 days, the leaf area for Uzbek Yellow Ficus was 17.3 cm^2 and for Crimean Black Ficus was 20.1 cm^2. At 30 days, these ficusures were 57.4 cm^2 and 92.4 cm^2, respectively, at 50 days, 96.5 cm^2 and 153.1 cm^2, at 70 days, 264.9 cm^2 and 357.4 cm^2, and at 90 days, 426.3 cm^2 and 519.7 cm^2.

Comparing the two varieties, the leaf area began to significantly differ as the cuttings grew. In the initial period, the leaf area of Uzbek Yellow Ficus cuttings was 116.2% larger than that of Crimean Black Ficus cuttings; at 30 days, it reached 161.0%, and at 50 days, 158.7%. After this, the difference in leaf area stabilized. This can be attributed to the active growth and development of Uzbek Yellow Ficus cuttings. Thus, at 70 days, the leaf area difference was 134.9%, and at 90 days, it was 121.9%.

CONCLUSION

It can be concluded that intensive cultivation of ficuss in the Republic satisfies the demand of the population for subtropical fruits. Ficuss contain many microelements necessary for human health.

The establishment of ficus plantations and ficus groves is a key factor in increasing the assortment of subtropical fruits.

Ficuss can be eaten wet, dried and canned. It will be possible to export ficus products to domestic and international markets.

It is advisable to propagate Crimean black ficuss from cuttings in order to obtain standard seedlings when breeding ficus varieties in fog-forming facilities.

It can be noted that the Crimean black ficus variety is distinguished by the number of leaves and the level of the leaves, and it can be noted that it is of particular importance for the production of ficus seedlings in accordance with the quality and standard.

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