CONDUCTING PHENOLOGICAL OBSERVATIONS AND BIOMETRIC MEASUREMENTS ON LEMON TREES GROWN IN PLASTIC GREENHOUSES IN KARAKALPAKSTAN

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Abstract. *This article describes the characteristics of the Uzbekistan Tungichi lemon variety studied in the soil and climatic conditions of Karakalpakstan. It details the growth of branches, bud opening, pruning, duration of flowering and fruiting, width of the crown, height of the trees, and provides a description of the tree canopy.*

Keywords. *Lemon, variety, flowering, branch, crown, bud, fruit, height*.

Introduction. The Agency for the Development of Horticulture and Greenhouse Farming under the Ministry of Agriculture of the Republic of Uzbekistan, supporting farmers and dekhkans ready to engage in citrus fruit cultivation, has observed an increase in the volume of lemon exports and imports in Uzbekistan for selected varieties of lemons and other citrus crops. Specifically, while Uzbekistan exported 2,431 tons of lemons in 2016, this figure reached 5,097 tons by 2023. Growth is also observed in lemon imports: from 64.7 tons in 2016, the volume of lemon imports increased to 1,099 tons in 2023. Citrus plants originate from a tropical region spanning between 20 degrees north latitude and 30 degrees south latitude, covering a width of 5,200 kilometers. Citrus trees are short-day plants that can live for 100-200 years and are both light-loving and heat-loving. The total heat requirement is 4000 °C for mandarins, 4300 °C for lemons, and 4500 °C for oranges. Citrus fruits are distinguished by their high moisture demands. They have a high transpiration rate, and prolonged water deficiency leads to the loss of photosynthetic activity. Although 159 species of citrus plants have been identified worldwide, only about 10 species are considered to be of industrial importance. [1;4;5].

Research methods. Field experiments were conducted based on methodological guidelines such as “Programma i metodika sortoizucheniya plodovix, yagodnix i orexoplodnix kultur” (Orel 1999), “Mevali va rezavor mevali o‘simliklar bilan tajribalar o‘tkazishda hisoblar va fenologik kuzatuvlar metodikasi” (Buriyev X.Ch, va boshqa, 2014).

The objects of the research were trees, fruits, and yield of the Tungichi variety, which has been regionalized in Uzbekistan.

Research results. When studying the lemon tree in 2023, we observed that the first growth period of the branches occurred between 28/III - 29/V, the second growth period between 13/VII-17/IX, and the third growth period between 2/XI-11/I. The next stage was the opening of buds, which took place during 18/III-14/IV, 21/VII-19/VIII, and 12/XI-7/XII. Regarding budding, the first instance occurred between 15/IV-11/V, the second between 20/VIII-12/IX, and the third between 8/XII-2/I. The lemon tree's first flowering period was from 12/V-1/VI, the second flowering from 13/IX-15/X, and the final flowering from 3/I-4/II. The main fruiting periods were observed during 2/VI-16/X for the first, 16/X-20/II for the second, and 5/II-10/IV for the third. The first flowering of the lemon tree occurred between 12/V-1/VI, the second flowering between 13/IX-15/X, and the last flowering between 3/I-4/II.

In the second year (2024) of the study, the first growth period of buds was observed between March 10 and May 26, the second growth period between July 12 and August 14, and the third growth period between October 31 and January 10. The first bud opening occurred between March 15 and April 11, the second between July 19 and August 17, and the third between October 9 and December 6. Regarding budding, the first phase was observed from April 12 to May 12, the second from August 18 to September 11, and the third from December 7 to January 3. One of the most crucial phases, flowering, was recorded from May 13 to May 29, September 12 to October 12, and the third flowering in the observed year from January 4 to February 6. The final stage, fruiting, was observed during the following intervals: the first from May 30 to October 15, the second from October 13 to February 19, and the third from February 7 to April 13 (Table 1).

Table 1

Growth and development dynamics of the first Uzbekistan lemon tree variety

Growth period	Years in which the research was conducted	
	2023	2024
First growth stage of branches	28/III-29/V	10/III-26/V
Opening of buds	18/III-14/IV	15/III-11/IV
Budding	15/IV-11/V	12/IV-12/V
Flowering	12/V-1/VI	13/V-29/V
Fruiting	2/VI-16/X	30/V-15/X
First growth stage of branches	13/VII-17/IX	12/VII-14/VIII
Opening of buds	21/VII-19/VIII	19/VII-17/VIII
Budding	20/VIII-12/IX	18/VIII-11/IX
Flowering	13/IX-15/X	12/IX-12/X
Fruiting	16/X-20/II	13/X-19/II
First growth stage of branches	2/XI-11/I	31/X-10/I
Opening of buds	12/XI-7/XII	9/X-6/XII
Budding	8/XII-2/I	7/XII-3/I
Flowering	3/I-4/II	4/I-6/II
Fruiting	5/II-10/IV	7/II-13/IV

In our subsequent study, the crown width of the lemon tree was measured at 210.0±20.2 cm for the first tree and 203.0±18.1 cm for the second tree. The height of the first tree was found to be 210.0±13.0 cm, while the second tree measured 210.0±12.2 cm in height. Regarding the tree shape, it was determined that the crown volume is round and moderately dense, with the main branches forming acute angles (Table 2).

Table 2

Description of the fruit-bearing tree of Uzbekistan's first lemon variety

Daraxt soni	Shox-shabba kengligi, sm		Daraxt balandligi, sm	Daraxt shakliga tavsif
1	210,0±20,2	220,0±18,5	210,0±13,0	Shox-shabba hajmi yumaloq, o‘rtacha qalin, ona shoxlari o‘tkir burchakli
2	203,0±18,1	205,0±19,3	210,0±12,2	

Conclusion. Like other fruit trees, lemons do not have the same vegetation period. Because during the study, it was found that the phases of stem growth, bud opening, budding, flowering, and fruiting in lemons occur up to three times. In Karakalpakstan, it is recommended to cultivate the Uzbekistan Tungichi lemon variety in greenhouses.

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