



# STUDY OF PHENOLOGICAL PHASES OF QUINCE VARIETIES IN THE SOIL AND CLIMATIC CONDITIONS OF KARAKALPAKSTAN

Ruslan Baxitovich Seilbekov

Assistant of the Karakalpakstan Institute of Agriculture and Agrotechnologies (PhD)

Jasmina Kamalovna Kurbaniyazova

Student of the Fruit-Vegetable Growing and Viticulture  
of the Karakalpakstan Institute of Agriculture and Agrotechnologies

## Abstract

The phenological phases of the quince varieties "Samarkandskaya krupnoplodnaya" (st), "Aromatnaya", "Izobelnaya", "Mushk behi", "Savkhoznaya", "Krimskaya aromatnaya", "Otlichnitsa" the introduced varieties "Anjerskaya", "Grushavidnaya", "Zakatolskaya", "Konservnaya", "Micha urojaynaya", "Nagibrin", "Tursh Bukharskaya" and the folk selection varieties "Non behi", "Nordon" were studied. As a result of the study, it was found that the period from budding to the end of the growing season of trees lasted from 200 to 225 days.

**Keywords:** Quince, variety, soil, climate, salinity, growth, graft, development, branch, bud.

## Introduction

Quince (*Cydonia oblonga Mill*) is a very ancient and valuable seed fruit crop, widely distributed throughout the world. Quince has been known as a fruit crop for more than 4 thousand years. Currently, it is widely distributed in Europe, the Middle East and Asia Minor, in some states of the USA and Australia, in Central Asia and the Caucasus [4]; [6].

Common quince fruits contain 4,75-19,6% sugar (5,97-9,98 fructose, 2,77-3,31 sucrose, 5,97-9,28 glucose), 0,25-3,0% organic acids (0,25-1,68 malic, 2172,2%, 12,2 lemon), 0,27-2,25% pectin, and up to 1,72% tannins [7]. The seeds are rich in mucilage and are used for medicinal purposes. The fruits are also used in folk medicine, having a beneficial effect on the cardiovascular system, are effective against gastrointestinal diseases, and have astringent, diuretic, hemostatic, antiseptic, and antiemetic effects. An aqueous infusion of quince leaves lowers blood pressure and has the ability to stop attacks of bronchial asthma [5].

There has been insufficient scientific research into the selection of quince varieties in Uzbekistan over the past 30 years. In this regard, scientific research was considered relevant within the framework of the selection of suitable quince for the northern regions of Uzbekistan.

## Research Methodologies

Field experiments "Programma i metodika sortoizucheniya plodovix, yagodnix i orexoplodnix kultur" (Orel 1999), "Mevali va rezavor mevali o'simliklar bilan tajribalar o'tkazishda xisoblar va fenologik kuzatuvlar metodikasi" (Buriyev X.CH., va boshqa., 2014), was conducted based on





methodological guidelines such as. [1]; [2]; [3].

The object of research is zoned in Uzbekistan “Samarkandskaya krupnoplodnaya” (st), “Aromatnaya”, “Izobelnaya”, “Mushk behi”, “Savxochnaya”, “Krimskaya aromatnaya”, “Otlichnitsa”, introduced “Anjerskaya”, “Grushavidnaya”, “Zakatolskaya”, “Konservnaya”, “Micha urojajnaya”, “Nagibrin”, “Tursh Buxarskaya” and folk selection “Non behi” and “Nordon”.

In the Samarkandskaya Krupnoplodnaya variety, which was used as the standard variety for comparison, bud break occurred on 28/III. Compared to this, bud break was observed 1-3 days earlier in the Savxochnaya (25/III), Anjerskaya, Zakatolskaya, Mushk behi, Nagibrin, and Otlichnitsa (26/III) varieties, as well as in the Non behi and Nordon varieties (27/III). Conversely, bud break was noted 1-2 days later in the Grushavidnaya and Izobelnaya varieties (29/III), and in the Konservnaya, Micha urojajnaya, and Tursh Buxarskaya varieties (30/III).

Among quince varieties, branch growth in March began with Savxochnaya (29/III), Anjerskaya and Non behi (30/III), followed by Zakatolskaya, Krimskaya aromatnaya, Nordon, Mushk behi, Nagibrin and Otlichnitsa (31/III). In April, branch growth started in Samarkandskaya krupnoplodnaya (st) and Aromatnaya (01/IV), Grushavidnaya (02/IV), Izobelnaya, Konservnaya Micha urojajnaya and Tursh Buxarskaya (03/IV) varieties. The earliest end of branch growth was observed in the Zakatolskaya variety (30/V). In June, the end of branch growth was recorded for Mushk behi and Non behi (02/VI), Anjerskaya (05/VI), Aromatnaya, Grushavidnaya, Izobelnaya and Micha urojajnaya (06/VI), Nordon (09/VI), Nagibrin and Tursh Buxarskaya (10/VI), Savxochnaya (11/VI), Konservnaya, Krimskaya aromatnaya and Otlichnitsa (12/VI) varieties (refer to Table 1).

**Table 1 Phenological phases of quince varieties (2020), day/month**

Varieties			Shoot growth		Its flowering	The ripening of fruit		The shedding of leaves (autumn leaf fall)	The growing season
Samarkandskaya krupnoplodnaya (st)	29/III	28/III	26/III	28/III	01/IV	01/IV	The beginning		
Anjerskaya	02/IV	01/IV	01/IV	02/IV	03/IV	04/IV	ending		
Aromatnaya	06/VI	05/VI	05/VI	06/VI	05/VI	05/VI	The beginning		
Grushavidnaya	12/VIII	11/VIII	10/VIII	12/VIII	11/IX	12/IX	ending		
	15/IX	14/IX	13/IX	15/IX	14/IX	15/IX	ending		
	20/X	19/X	18/X	20/X	19/X	20/X	The beginning		
	28/X	27/X	26/X	28/X	27/X	28/X	ending		
	05/XI	04/XI	03/XI	05/XI	04/XI	05/XI	The beginning		
	222	223	210	222	210	210	duration, days		



The flowering process in quince varieties was observed during the first and second ten-day periods of April when the air temperature reached 17,2°C. The formation and completion of male and female flowers were observed in all varieties between April 2-16, with the cumulative air temperature during this period reaching 209,4°C.



In the compared quince varieties Nordon, Otlichnitsa, Nagibrin, and Tursk Bukharskaya, the sum of air temperatures from flowering (04/IV) to the beginning of fruit ripening (09/VIII) was +342,7°C. For the varieties Grushavidnaya, Zakatolskaya, Izobelnaya, Krimskaya aromatnaya, Micha urojaynaya, Nagibrin, Savxoznaya, Non behi, and Tursk Bukharskaya (10-20/VIII), it was +370,7°C. For the varieties Samarkandskaya krupnoplodnaya (st), Anjerskaya, Aromatnaya, Konservnaya, Mushk behi, and Krimskaya aromatnaya (21-29/VIII), fruit ripening began after the accumulation of +396,5°C of active beneficial temperature.

From the beginning to the end of fruit ripening, the Samarkandskaya krupnoplodnaya (standard) quince variety required an active beneficial temperature of +90,2°C over 27 days. In comparison, the Aromatnaya (+71,3°C, 28 days) and Tursk Buxarskaya (+78,4°C, 36 days) varieties were found to require lower active beneficial temperatures.

While the active effective temperature (+90,2°C) for the Anjerskaya, Konservnaya, and Mushk behi varieties was the same as the standard Samarkandskaya krupnoplodnaya variety, it was observed that for full ripening of fruits, compared to the standard variety, the Grushavidnaya, Zakatolskaya, Izobelnaya, Micha urojaynaya, Non behi and Nordon varieties required +9°C more (+99,2°C), the Otlichnitsa and Savxoznaya varieties needed +28°C more (+118,2°C), the Nagibrin variety required +37,7°C more (+127,9°C), and the Krimskaya aromatnaya variety needed the highest increase of +40,9°C, reaching an active effective temperature of +131,1°C.

In the compared quince varieties Aromatnaya, Izobelnaya, Konservnaya, and Otlichnitsa, leaf fall (leaf fall) began in the 2nd decade of September (10-18/IX), in the varieties Samarkandskaya krupnoplodnaya (st), Anjerskaya, Zakatolskaya, Micha urojaynaya, Nagibrin, Non behi, and Nordon - in the 3rd decade of September (20-29/IX), in the varieties Mushk behi and Tursk Buxarskaya - in the 1st decade of October (8-10/X), in the varieties Savxoznaya, Grushavidnaya, and Krimskaya aromatnaya - in the 2nd decade of October (15-20/X). In this case, the active effective temperature was +310,8°C, +331,7°C, +350,6°C, +363,6°C, and +376,3°C, respectively. The completion of leaf shedding in quince varieties was observed earliest in the 3rd decade of September for the Konservnaya variety (30/IX), followed by Anjerskaya, Zakatolskaya, Micha urojaynaya, Krimskaya aromatnaya, Nagibrin, Non behi, and Nordon varieties in the 1st decade of October (5-10/X). The standard Samarkandskaya krupnoplodnaya (st) variety completed leaf shedding in the 2nd decade of October (15/X), while Aromatnaya, Grushavidnaya, Izobelnaya, Mushk behi, Otlichnitsa, Savxoznaya, and Tursk Bukharskaya varieties finished in the 3rd decade of October (24-28/X). It was found that the sum of air temperatures at the end of leaf shedding in these varieties ranged from 350,6°C to 386,9°C.

The duration of the growing season for quince varieties, from bud break to the end of vegetation, varied. The standard Samarkandskaya Krupnoplodnaya variety had a growing season of 209 days. Compared to this, the Konservnaya variety (200 days) finished 10 days earlier, the Non behi variety (203 days) 6 days earlier, the Krimskaya Aromatnaya, Micha Urojaynaya, and Nordon varieties (206 days) 3 days earlier, and the Zakatolskaya variety (208 days) 1 day earlier.

It was observed that compared to the standard Samarkandskaya krupnoplodnaya variety (209 days), the vegetation period ended later for the following varieties: Anjerskaya (210 days) - 1 day later, Tursk Bukharskaya (221 days) - 12 days later, Grushavidnaya (222 days) - 13 days later, Aromatnaya (223 days) - 14 days later, Izobelnaya and Mushk behi (225 days) - 16 days later,





Otlichnitsa (228 days) - 19 days later, and Savkhoznaya (236 days) - 27 days later.

During the period from bud break to the end of the growing season, the accumulated active effective temperature for quince varieties was as follows: Zakatolskaya, Nagibrin, Non behi, and Nordon - 485.6°C; Samarkandskaya krupnoplodnaya (standard), Anjerskaya, Konservnaya, Krymskaya aromatnaya, and Micha urojajnaya - 504.6°C; Otlichnitsa and Tursh Bukharskaya - 513.8°C; Aromatnaya, Grushavidnaya, Izobelnaya, and Mushk behi - 517.5°C; and Sovkhoznaya - 519.9°C.

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