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EFFECT OF GRAFTING TIME ON THE GROWTH AND DEVELOPMENT OF KUMQUAT PLANTS

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Abstract. This study examined the effect of grafting time on graft take in the Nagami, Pestrolistniy, Meiwa, and Derevo kumquat cultivars. Grafting was carried out during the last ten days of March, the second ten days of June, and the first ten days of September. The highest graft take rate, 89.2%, was recorded in the Meiwa cultivar during the last ten days of March. Graft take rates declined in all cultivars in September. The results showed that the last ten days of March constitute a favorable period for kumquat grafting.

Keywords: kumquat, grafting time, graft, nursery plant, graft take rate, cultivar, Nagami, Pestrolistniy, Meiwa, Derevo.

Abstract. The study investigated the effect of grafting time on graft take in the Nagami, Pestrolistniy, Meiwa, and Derevo kumquat cultivars. Grafting was performed during the last ten days of March, the second ten days of June, and the first ten days of September. The highest graft take rate was recorded in the Meiwa cultivar during the last ten days of March, reaching 89.2%. Graft take decreased in all cultivars when grafting was performed in September. The results indicate that the last ten days of March constitute a favorable period for kumquat grafting under the conditions studied.

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Introduction. Kumquat (Fortunella spp.) stands out among citrus crops for the high nutritional and biological value of its fruit, its aroma, and its ornamental characteristics. Producing healthy, high-quality nursery plants is an important

cultivation practice for the successful cultivation of this crop. The growth, development, and subsequent productivity of nursery plants depend largely on the grafting method and the timing of grafting.

Graft take is influenced by temperature, humidity, the physiological condition of the plant, cultivar characteristics, and seasonal conditions. Therefore, identifying the most suitable grafting time for kumquat cultivars is important for improving the efficiency of nursery plant production.

In their discussion of citrus propagation techniques, Albrecht, Zekri, and Williamson emphasize the importance of compatibility between rootstock and scion in grafting and budding. The authors indicate that selecting the appropriate grafting method is essential for producing high-quality nursery plants. The manual prepared by Schmidt notes that grafting success depends on the physiological condition of the plant and seasonal conditions. The source identifies the period before the onset of active plant growth as favorable for grafting [1,2].

Albrecht, Dutt, and Grosser examined the importance of rootstock selection in citrus nursery production and noted that rootstock characteristics affect the subsequent growth and development of nursery plants [3.].

Ferrarezi described the interrelationships among irrigation, fertilization, and grafting stages in citrus nursery production. Appropriate management of these factors was shown to be important for producing high-quality grafted nursery plants [4].

The study used grafted nursery plants of the Nagami, Pestrolistniy, Meiwa, and Derevo kumquat cultivars as its research material.

The focus of the study was to examine the effects of grafting kumquat cultivars at different times on graft take and nursery plant development indicators.

Results. The study examined graft take rates in the Nagami, Pestrolistniy, Meiwa, and Derevo cultivars following grafting during the last ten days of March, the second ten days of June, and the first ten days of September. The results allow the

effect of grafting time on graft take to be assessed across cultivars and the most suitable period for kumquat nursery plant production to be identified.

In the study, the Nagami, Pestrolistniy, Meiwa, and Derevo kumquat cultivars were grafted onto lemon (Citrus limon) rootstocks in different seasons—in March (the last ten days), June (the second ten days), and September (the first ten days)—and their graft take rates were determined.

One-year-old lemon seedlings were selected as rootstocks, and scion cuttings from the kumquat cultivars were used. Grafting was performed using the cleft grafting (copulation) method.

According to the literature review, lemon species are recommended as the most suitable rootstocks for kumquat growth and development. Therefore, lemon seedlings were also selected as the principal rootstocks in this study.

Budding is a grafting method in which a single bud from a cultivar is grafted onto the stem of another plant to preserve the beneficial characteristics of that cultivar. The rootstock is the rooted plant (usually a local or resistant cultivar) that supports growth and provides nutrients. The scion in this method is a single bud taken from a productive cultivar with the desired characteristics.

In the Nagami cultivar, an average of 35.2 out of 40 grafts performed during the last ten days of March (the control treatment) took successfully, corresponding to 88%. During the second ten days of June, the number of successful grafts was 30.4, which was 4.8 fewer than in the control treatment, representing a 12% lower result. In September, the number of successful grafts was 21.6, reported as 14.6 fewer than in the control treatment, and the overall graft take rate was 54%. These results demonstrate the importance of grafting time.

Table

Effect of kumquat grafting time on graft take rate

Пайванд муддати	Пайванд қилинган	Тутган пайвандлар сони,	Тутган пайвандлар, %



	кўчатлар сони	дона	ҳисобида
Нагами нави			
Март III декада (назорат)	40	35,2	88%
Июн II декада	40	30,4	76%
Сентябр I декада	40	21,6	54%
Пестролистний нави			
Март III декада (назорат)	40	34,5	86,2
Июн II декада	40	27,8	69,5
Сентябр I декада	40	19,9	49,7
Мейва нави			
Март III декада (назорат)	40	35,7	89,2
Июн II декада	40	31,8	79,9
Сентябр I декада	40	22,3	55,7
Дерево нави			
Март III декада (назорат)	40	33,2	83,0
Июн II декада	40	28,4	71,0
Сентябр I декада	40	18,7	46,7

The same pattern was observed in the Pestrolistniy cultivar: graft take rates were 86.2% in March, 69.5% in June, and 49.7% in September.

The highest graft take rate in the Meiwa cultivar was recorded in March (89.2%). The rates were 79.9% in June and 55.7% in September.

In the Derevo cultivar, the graft take rate in the control treatment (March) was 83%, compared with 71% in June and the lowest rate, 46.7%, in September.

The results indicate that grafting time directly affects the graft take rate in kumquat. In spring, particularly during the last ten days of March, sap flow in plants reaches its most active phase. Water transport and metabolic processes in the tissues are active during this period. The cambial layer is active, and callus rapidly forms between the scion and the rootstock. The callus tissue subsequently develops a vascular connection through the phloem and xylem, establishing mechanical and physiological continuity. Consequently, grafts performed under conditions of active vegetative growth, as in spring, exhibit high graft take rates.

In summer (June), high temperatures and low atmospheric humidity lead to water deficits. These conditions slow callus formation at the union between scion and rootstock tissues.

In autumn (September), as the growing season approaches its end, physiological activity in the plant declines and cambial activity slows, reducing grafting success. Even technically well-executed grafts rarely take, and drying occurs in many cases.

Based on the study results, the optimal time for grafting kumquat onto lemon rootstocks was concluded to be the end of spring, specifically the last ten days of March.

During this period, graft take rates ranged from 83% to 89% across all cultivars, substantially exceeding those recorded in other seasons.

Grafting under conditions of active physiological activity, as in spring, not only promotes successful graft take but also positively affects subsequent growth, shoot formation, and active root system development.

Graft take rates declined sharply when grafting was carried out in summer and autumn. This decline is explained by changes in plant water balance and reductions in metabolic and cambial activity.

Therefore, the last ten days of March are recommended for grafting kumquat onto lemon rootstocks. Grafting during this period provides high graft take rates, good physiological adaptation, and sustained growth.

Conclusion. The study results showed that grafting time had a considerable effect on graft take rates in kumquat cultivars. The highest rates in all cultivars were recorded during the last ten days of March. During this period, graft take rates were 89.2% in Meiwa, 88.0% in Nagami, 86.2% in Pestrolistniy, and 83.0% in Derevo. The lowest rates were observed during the first ten days of September. Thus, under the conditions studied, the last ten days of March constitute the most suitable period for kumquat grafting.

Фойдаланилган адабиётлар

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