



A NEWLY DEVELOPED LEMON VARIETY PRODUCING FRUITS WEIGHING UP TO THREE KILOGRAMS

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Abstract

Under the climatic conditions of Uzbekistan, research was conducted in the lemon greenhouse of the Kibray District of Tashkent Region under experimental laboratory conditions. Based on the selection methods developed and applied by Z. Fakhruddinov, new locally adapted lemon varieties were developed. Improved breeding approaches were also employed to obtain high-yielding and stress-resistant citrus plants. Through hybridization with local varieties, grafting, and artificial cross-pollination, promising forms were selected and used as the basis for developing competitive new varieties that are disease-resistant and rich in sugars and vitamins.

Keywords: Citrus, plant varieties, climate, greenhouse laboratory, disease resistance, productivity, cultivated varieties, durability

INTRODUCTION

In the Republic of Uzbekistan, the process of developing new citrus varieties is distinguished by its long duration compared with the breeding of annual crops. In addition, the concept of a “variety” in citrus breeding has specific characteristics.



Modern American Journal of Biological and Environmental Sciences

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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The establishment of nurseries and mother orchards, selection, testing, and propagation of hybrid seedlings, acceleration of the period of entry into fruiting, evaluation of hybrids based on morphological characteristics, and related activities require breeders to possess in-depth knowledge of pomology, genetics, systematics, botany, and other disciplines.

A considerable number of introduced varieties are represented in the collection of citrus breeding plants in our country. Although these varieties generally have good commercial and organoleptic qualities, many of them are not sufficiently adapted to the local climatic conditions. Therefore, the development of new citrus breeding varieties is of considerable importance for the advancement of horticulture in the Republic. The development of agricultural production depends on specialists who are able to apply the achievements of crop genetics, breeding, and nursery production and who possess a thorough knowledge of breeding and variety science. The textbook on the genetics, breeding, and nursery production of greenhouse citrus crops presents important information related to these disciplines. Every citrus variety has a specific economic value. In agriculture, citrus fruit is cultivated for particular purposes. By developing new varieties, breeders can use citrus species more effectively and achieve the intended production objectives.

The intensification of agricultural production places important tasks before the fields of crop genetics, breeding, and nursery production. The time required for fruit orchards to enter the fruiting stage, their yield and fruit quality, their resistance to diseases, pests, and adverse environmental conditions, and the overall efficiency of orchards depend on the breeding variety; consequently, variety selection is of substantial importance. The development of crop genetics, breeding, and nursery production is increasing demand for Uzbek varieties. Therefore, the development in the country's greenhouses of new breeding varieties adapted to local conditions, high-yielding, and suitable for different economic purposes, as well as the improvement and enhancement of the existing collection of citrus varieties, constitutes one of the most pressing objectives of citrus breeding.



Research Methods and Materials

One of the principal activities in breeding research is the development of new varieties, artificial hybridization, bud grafting, and systematic recording of phenological observations. Phenology refers to the observation of physiological and developmental processes in plants, including sap flow, the formation of leaves and shoots, and their maturation. At present, the use of biotechnology and genetic engineering to develop and introduce into production new varieties and hybrids capable of meeting intensive production requirements, tolerating adverse environmental effects, and providing high yields is of particular relevance. In modern breeding, it is important to develop and cultivate varieties of subtropical plants that are capable of producing high yields and are adapted to natural conditions. Initial breeding material can be developed through artificial hybridization, and selected citrus plants should be studied and transferred to younger generations through appropriate educational and practical approaches. The analytical selection method has been, and remains, a fundamental principle of plant breeding.

Citrus fruit crop breeding is the science concerned with the development of new breeding varieties and is associated with the concepts of “selection” and “isolation.”

At the Experimental and Educational Laboratory of the Department of Crop Genetics, Breeding and Seed Production of Tashkent State Agrarian University in Kibray District, Tashkent Region, breeder-scientist Mukhammadaziz Fakhriddinov, following in the scientific tradition of his father, the renowned citrus breeder Zainiddin Fakhriddinov, has developed fifteen new citrus varieties adapted to the conditions of Uzbekistan. Together with his students, including Associate Professor Gulchekhra Abdikarimovna Narmatova, he has also developed the new Lazat lemon variety and is working on its introduction into production, propagation, and further cultivation. During repeated application of breeding methods in the development of the new lemon variety and subsequent phenological observations in the experimental educational lemonarium, an exceptional result was observed. The lemons were remarkably large, approximately bowl-shaped,



with nearly uniform color and form. Their size reached approximately three kilograms. The variety was named “LAZAT,” and documentation for obtaining a patent was submitted to the Intellectual Property Agency.3 килограмм

THE NEWLY DEVELOPED “LAZAT” LEMON VARIETY



The “LAZAT” variety is also a hybrid variety, obtained by crossing lemon F-2 Yubileyniy with another breeding form. As a result of many years of research, in 2026, at the Experimental Educational Laboratory of Tashkent State Agrarian University in Kibray District, Tashkent Region, breeder-scientist M. Z. Fakhrudinov, together with his student Associate Professor Gulchekhra Abdikarimovna Narmatova and other researchers, developed this variety. It differs from other lemon varieties by its short stature, thick branches, and firm, round, dark-green leaves, and by its abundant flowering in spring, summer, and autumn. In some cases, it begins flowering even while cuttings are rooting, which may inhibit vegetative development. Its large white flowers are usually clustered in inflorescences. During flowering, some buds should be removed to allow the development of new shoots. The lemon begins fruiting in the second year. The fruit is round or pear-shaped, with a thick peel of up to 1 cm. Despite its prolonged and abundant flowering, the variety is generally highly productive. Its fruit is considerably larger than that of other varieties, with an average weight ranging from 700 g to 1.5 kg and reaching up to 3 kg. The citric acid content is barely perceptible. The fruit is light green and contains numerous seeds; the pulp contains more than 36 mg of vitamin C per 100 g. The variety has a prolonged flowering



Modern American Journal of Biological and Environmental Sciences

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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period and requires relatively little formative pruning. It is readily propagated by cuttings. It is a dwarf-growing plant reaching a height of up to 2.75 m. The fruit hangs on the branches, distinguishing the variety from other cultivars, and the plant requires regular formative pruning.

At the Experimental Educational Laboratory of Tashkent State Agrarian University, a technology for obtaining high yields from citrus plants was developed. First, it was necessary to modify the planting scheme. Previously, seedlings were planted at a spacing of 3×2 m, resulting in approximately 1,400 seedlings per hectare. Experimental results showed that arranging lemon seedlings in a staggered 2×2 m pattern increased productivity several-fold. Under this scheme, the number of seedlings reached 2,000 per hectare. In particular, formative pruning requires the removal of vigorous water shoots in order to strengthen the development of productive lateral shoots.

The Experimental Educational Laboratory of Crop Genetics, Breeding and Seed Production at Tashkent State Agrarian University specializes in the propagation of citrus seedlings and the development of new varieties. Seedlings are produced at the laboratory's nursery for crop genetics, breeding, and nursery production. For farmers and gardeners who receive seedlings, we provide on-site scientific and breeding consultations, introduce advanced cultivation practices, and monitor the development of young plants. Beginning this year, we also plan to provide farmers and household garden owners with the necessary information on crop genetics, breeding, and nursery production.

Researchers in crop genetics, breeding, and nursery production have ambitious objectives and are conducting new experiments. Lemon and other plant species are being tested using different growth-promoting substances. The researchers, together with their students, are applying breeding methods and carrying out controlled pollination of lemon, orange, mandarin, and grapefruit flowers in order to develop new varieties.



CONCLUSIONS

1. The “LAZAT” lemon variety is a dwarf-growing, early-maturing, and high-yielding tree. Fruit maturation was observed within seven months, or approximately 210 days. The fruit is sweet, with an average weight ranging from 600 g to 3 kg. The thick peel and pulp are rich in essential vitamins. The seedlings demonstrate resistance to diseases and pests, while the fruit is characterized by abundant juice and favorable quality parameters.
2. The “LAZAT” lemon variety was studied and adapted to local climatic conditions, and improved cultivation and breeding methods were developed. These efforts resulted in the development of new, high-yielding varieties with enhanced tolerance to stress factors. Intraspecific and interspecific hybridization with cultivated varieties, grafting, and artificial cross-pollination enabled the selection of promising forms and the subsequent development of competitive, high-yielding, sweet, vitamin-rich, and disease-resistant varieties.
3. The principal genera and species of widely distributed citrus plants, their botanical characteristics, and biological features were studied. The conditions required for the growth and development of the “LAZAT” lemon variety were investigated, demonstrating the feasibility of developing new citrus varieties under the studied conditions.
4. The necessary documentation for obtaining a patent for the “LAZAT” lemon variety has been submitted to the Intellectual Property Agency of the Republic of Uzbekistan.

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***Modern American Journal of Biological and
Environmental Sciences***

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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