International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

Selection of Citrus Plants in Uzbekistan

Fakhriddinov M.Z.[1], Rakhmankulov M. S.[2]

[1]Institute of Polymer Chemistry and Physics, Uzbekistan Academy of Sciences, 100128, Tashkent, St. Abdulla Kadyri 7"b",
E-mail: *polymer[at]academy.uz*
fakhriddinov.m[at]mail.ru

[2]Tashkent State Agrarian University
murod1968[at]list.ru

Abstract: ***UZCHITAN is used for the treatment cuttings of citrus cultures. It is established that the process of rooting of cuttings in a closed ground is accelerated after treatment with preparation. For the purpose of obtaining a quality planting stock of lemon, mandarin and orange cuttings should be processed for 5 minutes.***

Keywords: citrus, culture, lemon, orange, mandarin, UZCHITAN, encapsulation.

The selection of citrus plant is also a unique science whose task is to create new varieties of citrus plants using all the methods used in citrus plant selection and to improve the quality and productivity of existing citrus plants by tending them on the basis of advanced agricultural techniques.The main task of the selection scientist, agronomist, a specialist in selection and seed production is to create new promising sorts of high-yielding, stress-resistant citrus crops[1].

It is known that productivity of lemons, oranges, mandarins and grapefruits are closely related with the creation and planting of new varieties of citrus plants adapted to the greenhouses in natural conditions [2].

The creation of the raw material by artificial hybridization, propagation of selected citrus plants in different ways and many other methods are used in modern selection. Nevertheless, the selection (analytical) method has been and will continue to be the basis of selection.Since the selection of citrus plants is a complex science, it is inextricably related with genetics and many other sciences. Biochemistry is of great importance in the selection of citrus plants [3].

Biochemical tests determine the nutrient layer, quality, more precisely, the amount of vitamins, protein, carbohydrates, fiber, minerals, enzymes and vitamins in the crop of citrus plants, including lemons, oranges, mandarins and grapefruits.Biochemistry reveals the processes that take place in the roots, body and fruit of citrus plants.The economic benefits of the new sort will be determined.

In addition, seed and seedlings of citrus plants selection is related to chemistry, cytology, botany, phytopathology, entomology and other sciences [4].

Productivity increases significantly with the introduction of new varieties into production. The quality of the product improves, the resistance of the variety to diseases and pests increases. There will be opportunities to plant, tend and harvest lemon, orange, mandarin and grapefruit seedlings. Selection of citrus was invented and developed at the same time as agriculture.

People have been involved in cultivating wild citrus plants since ancient times. They simply chose the best of the plants instead of creating a sort. Many fruitful varieties of citrus plants have also been created as a result of continuous selection since ancient times. According to written sources that have come down to us, the ancient Greeks and Chinese started the selection processes. It is true that they refered this as a concern to preserve the good properties of citrus plants or to improve their next generation [5]. Selection of citrus plants is well developed in many countries, including Uzbekistan.

In selection it is important to know the description of different forms of citrus plants in order to grow them in different soil conditions, in particular: to determine the difference between certain development stages of citrus plant forms during the growing season, structure, number and weight of crops during the growing season, etc.

Vegetative indicators determine the length of the body and branch, branching, the amount of yield, growth after disease and damage [6]. It includes the determination of resistance to different climatic conditions, the reaction to soil, air, spring, summer and low tdmperatures of winter plants, resistance to diseases, flowering biology, differences in the biochemical composition of twigs, changes in protein, sugar, vitamins and other substances, response to moisture and adverse conditions, and the determination of normal development as well.

The definition of similarity or difference in the forms of citrus plants is determined by their biological properties. I. V. Michurin was the first of the selectors to show that man could manage to create new varieties and forms of plants with the desired characteristics. He proved his theory by creating many new varieties of fruit trees. Currently, selection processes on various plants are carrying out by research institutes.

"Before we start the practical work on the selection," said N. I. Vavilov, - first of all, it is necessary to know the natural range well. If maletwig varieties bloom a hundred, then it will harvest two or three times. Many of the remaining flowers will be vain male flowers. It grows, develops and dries quickly. If the mother (fruitful) branches bloom a hundred, ninety of them will harvest. The remaining flowers may shed for certain reasons. The mother twig grows

slowly. The yield increases at the same time with an increase in the number of branches. Lives for many years. Selectioner can achieve his goal, only when he knows the nature of paternal and maternal citrus plants".

Citrus plants selected as paternal varieties must meet the following mandatory requirements: 1) paternal and maternal branches, flowers, which are involved in all selection work, must be absolutely healthy; 2) their phenology and characteristics of the crop, such as multivitaminity, disease and cold resistance should be studied.

Good knowledge of these traits allows the selectioner to obtain a hybrid on a specific target, rather than a random hybrid. In addition, the paternal and maternal plant should be grown under high agronomic conditions [7]. Proper pollination requires a good knowledge of the flowering biology of the citrus plant. Here: 1) the structure and characteristics of pollinator female flowers; 2) the period of flowering and fruiting; 3) the ability of female flowers to pollinate; 4) pollination path; 5) attention is paid to the shelf life and dust viability.

Flora is the most important part of the nature. The role of plants in nature, which appeared on the planet millions of years ago and which is a major factor in the formation of the environment in which we live is very diverse. The plant uses solar energy from green chlorophyll grains to produce organic matter that serves as a source of energy for humans and animals. Only green plants produce organic matter and release oxygen from the air by absorbing carbon dioxide. The assimilation of light and solar energy is called light assimilation or photosynthesis. During photosynthesis, citrus plants use large amounts of inorganic substances in addition to water, carbon dioxide, and light to form organic matter such as sugar, starch, protein and fat. These substances are accumulated in different amounts in the crops of plants. They are consumed by humans for their multivitamin feature. Citrus plants play an important role in the formation of the soil and its fertility as well. Stems formed from photosynthesis products, remnants of root, shed leaves are returned to the soil as manure. As these substances fall into the soil, they become food for a large number of microorganisms and a variety of animals.

Another important role of plants in nature is that they are the main source of energy not only for terrestrial animals, but also for microorganisms living in the soil. The more active the accumulation and decomposition of organic matter in the soil, the greater the soil fertility.

Man has been using citrus plants to meet his needs since ancient times.Citrus fruits are used in the production of medicinal substances, vitamins, syrups, essential oils and pectin. In addition, the green nature in the greenhouse and in naturegives people physical and mental peace. The role of citrus plants in nature is not limited with this. Ttoday, they are one of the most healing products for the humans' organism. Plants convert sunlight energy into a reserve substance using chlorophyll granules.However, this process is associated with complex photosynthesis. Solar energy is the main source of sugar for plants.The plant is involved in the process of metabolism.

Citrus plants are also a product of nature. It absorbs large amounts of water and nutrients forits growth and development. However, the plant should not be considered as an organism that absorbs only the substances necessary for its life from the external environment. Plants are also the source of energy for all living organisms. The more they are accumulated in nature the more they become the preyfor simple and highly developed animals. Therefore, biological processes are activated. Plants need certain conditions for their survival: light, heat, water and mineral nutrients.

Plants release oxygen, carbon dioxide, water, phytocides, essential oils, nectar into the environment and organic acids and vitamins into the soil.They also secrete substances that fight against bacteria and fungi and compete with similar plants. Plants absorb large amounts of minerals and water from the soil during the feeding process. For this purpose, they use water-soluble and sometimes insoluble substances. Bacteria and fungi help the plants during this time. The plant is made up of individual organs, each of which performs a specific functionand they are closely related to each other.

Each organ performs a specific function and its development depends on the growth and development of other organs. Plant organs are divided into two main groups: generative (adapted for gamogenesis) and vegetative (responsible for plant growth and development). Generative organs include flowers, seeds, and fruits. These organs serve to carry out nutrition, assimilation, metabolism and other vital processes. Plants are essential for humans, especially with roots, stems, leaves, flowers and fruits.

Plants grow and develop well only under the influence of external environmental conditions (heat, light, water, air, nutrients). These living conditions of plants are called factors. Plants produce organic matter under the influence of light. They form complex organic matters by absorbing carbon dioxide from the air through the solar energy.

Light is essential for the plant. However, they do not absorb light energy in the same way. This is because plants are divided into long and short day groups. Sun-loving plants ripen quickly in long light days. Many plants require light, to be more precisely, a large stream of light to grow and develop. They cannot grow in the dark. There are citrus plants that grow in diffused light. The sun is the only source of heat. Its rays return from the earth's surface and turn into heat. Heat is necessary for the synthesis and transpiration of organic matter for plants and for a bountiful harvest. Biochemical processes in the seed begin only at a certain temperatures which lead to the germination. Each stage of plant development requires a certain temperature. For example, citrus plants require a temperature of 20–25 ° C which is optimal for the normal growth of the plant. An average daily temperature below or above normal will accelerate or slow down and even stop the growth of the plant. Light and heat come from the sun. That is why they are called "space factors". Water makes up 80–90% of green plants.

It is present in all plant cells. Water determines the viability of cells. Water is very important in plant's life. The plant absorbs mineral salts and small amounts of carbon dioxide

through waterfrom the soil. Dissolved mineral salts are distributed to all organs of the plant. The water is cleanly connected through leaves and stems and protects plants from overheating. The water used for evaporation is called physical water. It meets all the requirements of the cells for water. Some of the water is used to make photosynthetic products. This is called as physiological water and is present in small amounts. A certain amount of water under certain conditions for the formation of plant organic masses is usually called the transpiration coefficient.Nutrients – make up the organism of plants from the products of photosynthesis and minerals. It is difficult to imagine the growth and development of a plant without minerals. They are included in the composition of proteins and other organic substances. There are various elements in the structure of plants. 45% of the weight of plants is carbohydrates, 42% is oxygen, 6.5% is hydrogen, 1.5% is nitrogenand the rest 5.5% is the other elements. Calcium, potassium, magnesium, silicon, sulfur, boron, manganese and others are included into this from ash elements.

However, ash elements play an important role in plants' life in spite of its low content in its structure. Air is one of the most important elements in plant's life. The plant absorbs the required amount of carbon dioxide in photosynthesis process. It absorbs oxygen and releases carbon dioxide during respiration. Thus, a key factor is necessary for the growth and development of the plant. All of these factors are equaland a plant can grow well only when they are in an optimal proportions.

One of the foundations of agriculture is the generative organs. They havestructures and functions and include parts of plants that serve for gamogenesis. These organs are located in the flowers of plants. Flowers are formed when citrus plants reach puberty. Dependingthe sort citrus plantsbloom once or several times a year during thevegetation period of its life.

The temperature in greenhouses during the flowering period of citrus plants should not be less than12^{o}C. A flower is a branch that changes its shape and shortens during evolution. It has deformed leaves. Pollinators or seeders are developed depending on whether the flower is paternal or maternal. Citrus plants have bisexual flowers. In some varietiesonly paternal flowers are observed in seedlings made from paternal branches. Differentorgansare separated during the generative and vegetative reproduction of citrus plants. They take root. Generative reproduction is the gamogenesis of the plant. Vegetative reproduction is observed in many citrus plants. Citrus plants can be propagated by twigs and buds. Modern science has developed methods for regenerating whole citrus plants from one or more groups of cell tissue. For example, both orange and mandarin can be transplanted into a bunch of lemons. In the gamogenesis of citrus plants a new organism is formed by the addition of two separate pollinating and seed germ cells formed at certain stages of plant development. This process occurs during pollination.

The fact that the pollen from the pollen falls on the beak of the seed is called pollination. Citrus plants are divided into self-pollinating and external pollinationdepending on which citrus pollinator falls on the seed pod.

In self-pollinating citrus plants the pollen from a single flower falls on the beak of the same flower seed. These include many citrus fruits such as lemons, oranges and mandarins. It is known that the fruits of lemons, oranges and mandarins are formed by pollinators in these plants. In xenogamy, the pollinator drops the flowers of one plant into the beak of another flower or the seed of another plant. Therefore, in such citrus plants the paternal and maternal flowers do not ripen at the same time. Externally pollinated plants have some advantages over self-pollinated plants. In this pollination, the plant is enriched with parental genetic characteristics. It will be able to adapt well to different living conditions. This condition is used to create new varieties in citrus plants. Wind-pollinated plants are called animaphilous plantsand the small and light pollens of such plants is spread by wind for several meters.

If the sort needs to be kept clean, conservation distances will need to be established. Citrus plants are protected from other pollinators by the wind when creating new varieties. Entomophilous plants are pollinated by their pollinatorssuch as bees, wasps, butterflies, beetlesand other insects. The flowers of entomophilous plants contain light-colored crowns and aphids that attract insects.Insects collect the dust and nectar they need to feed on, sticking sticky dust to their feet and beaks and spreading them from one flower to another.There is also a link between the flower structure of entomophilous plants and the presence of certain types of insects on them. This means that the flowers are pollinated only by certain types of insects.

In response to the question, "What is the photosynthesis of the fruits of citrus plants such as lemons, oranges, mandarins and grapefruits?" we can confidently say "The main feature of green plants is the formation of sugar using chlorophyll granules". Green chlorophyll absorbs solar energy and forms carbohydrates in the presence of carbon dioxide, water and the mineralsdissolved in it.The process of the formation of organic matter in plants is called photosynthesis or the assimilation of carbon. Photosynthesis occurs only when there is a sufficient light and temperature under certain conditions. The process of formation of organic matter is simply can be described in the following equation. $6CO2 + 6 H2O \rightarrow C6 H12 O6 + O2$.

During this reaction, one gram of molecule absorbs 686 kcal of energy to form sugar. The process of photosynthesis takes place in two stages. In the first stage, the sun's light energy is converted into chemical energy. In particular, water is decomposed and oxygen is released during the light reaction.Hydrogen is added to organic matter in combination with carbon dioxide during this reaction.

Russian scientist K. A. Timiryazev was the first to explain the absorption of carbon by green plants. The scientist proved through experiments that plants are the only source of energy for all living beings and that they are closely interrelated. His theory of the formation of organic matter is not only accepted by modern science as a theory, but also shows its connection with practice. Some soil scientists believe that soil fertility is formed as a result of the decomposition of plant organic matter. The teachings of

K.A. Timiryazev allow to master the resistance of plants to cold and disease in the desired direction.

If there is an organic matter during photosynthesis which is broken down during respiration, releasing water, carbon dioxide, and a certain amount of energy. During respiration the plant absorbs oxygen for dissimilation.

Only living cells in plants breathe andin which part of it there are many living cells, the respiration also takes place rapidly.

For example, the respiration rate in a flower of the plantis 3-4 times higher than in the leaves. The leaves breathe more actively than the stems and roots. The respiration of a plant mostly depends on its temperature. Breathingstops below zero temperature. Most plants breathe at 18–20°C. Respiration slows down when the temperature reaches 45°Cand the plant begins to die. Thus, two opposite photosynthesis and respiration processes take place during the plant's life.

Plants grow normally only when photosynthesis takes precedence over respiration. Along with photosynthesis transpiration process also takes place in plants. Transpiration is theabsorbtion of water through the roots, its rise and the evaporation through the mouths of plants.

The plant consists of water and other substances. There is85% of water in the cell protoplasm. It plays an important role in all organs. Water and its solutes are absorbed through the roots and rises through the stem to the leaves. Water moves through capillaries. It plays two roles in plants' life. Some of it is used for photosynthesis to produce organic matter and is called physiological water. The other part of the water binds and controls the temperature in the plant and is called physical water. Transpiration occurs in different processes at different stages of plant development.

This process is very fastin young plants. In particular, it uses more water than older plants to produce a certain amount of dry matter. The amount of water used to produce one gram of dry matter is called the transpiration coefficient. It depends on the type of plant, its biological properties, its supply of minerals and carbon dioxide as well as its temperature and other conditions.

Soil is a complex compound of mineral and organic components. Its mineral part is composed of small fralnic rocks in the soil. Soil is a porous layer on the surface of the earth's that is able to support the growth and development of plants that have changed and are changing as a result of natural factors and human activities.

Fertility is the ability of the soil to provide plants with nutrients, water and other necessary conditions. Due to this feature, soil is very different from natural rocks,stones, sand and others. Man constantly uses the fertile properties of the soil and influences its structural changes in order to obtain high yields from crops.

The development of all sectors of agriculture depends on soil fertility. Taking care of soil fertility should be a daily task of agricultural specialists. The level of soil fertility depends on natural characteristics and historical reasons. Plants determine the mineral content of the soil in which the plant is grown as well as its level of natural fertility. Natural fertility occurs without human's effect. It is mainly characteristic of natural crops and usually this level of fertility is low or high depending on the organic and mineral composition, chemical, biological and biochemical properties of the soil.

Man changes the level of natural fertility by cultivating the soil, irrigating, fertilizing, and planting seedlings and creates its artificial fertility. Artificial or effective fertility is created as a the result of human factor and depends on the increase of nutrients in the soil, the supply of water, and the improvement of the physical properties of the soil. Meaning this, soil fertility is directly related to the socio-economic situation, the development of science, technology and production. Natural fertility is constantly replenished by human factor. However, if a person does not take proper care of soil fertility or maintain it to a certain extent, effective fertility can decline to the level of natural fertility and even further.

The theoretical founder of soil science V.V. Dokuchaev was the first to prove that soil is not a dead body like mountain minerals. Soil is the product of centuries of interaction between living and dead nature. The scientist included water, airand soil minerals into the dead nature, and plants and various living organisms into the living nature. Bacteria, fungi, and algae begin to live in the soil when the temperature, water, and air in the mineral part of the soil begin to rise to a favorable ratio.They die and decompose to form organo-mineral and mineral reserves. Other types of plants begin to live actively in thissoil. Time is one of the most important conditions for the accumulation of organo-mineral and mineral compounds, including nitrogen. For millions of yearsthis process has led to the exchange of organisms, the accumulation of nitrogen, phosphorus, carbon, potassium and other elements in the soil that plants can assimilate, the increase soil fertilityand efficient use of every inch of land in greenhouses. The main task of agronomists specializing in selection and seed production is to create new promising sorts of high-yielding, stress-resistant citrus crops.

Uzbek selectioner-scientist, agronomist, People's Academician Z. Fakhriddinov has established more than 10 new local sorts of lemons. In order to continue the work that our teacher could not finishnew local varieties of citrus plants were developed. These arepomelo Zayniddin sort of grapefruit, Uzbek sort oforange and Tashkent sorts of mandarin which were created in 2020 by the agronomist Fakhrutdinov Muhammadaziz Zaynuddinovich. Based on the results of research on the introduction of new citrus varieties suitable for different climatic conditions, created using the characteristics of citrus plant species in the creation of new varieties:

patents for selection achievements of the Intellectual Property Agency of the Republic of Uzbekistan for “Grapefruit Zaynuddin”, “Orange Uzbekistan” and “Mandarin Tashkent” varieties of low-growing, precocious,

high-yielding, diseaseanddrought-resistant, high-quality citrus fruits with valuable economic characteristicsobtained (NAR 00274, NAR 00275, NAR 00276). As a result, these citrus varieties are recommended for planting in large citrus greenhouses on lemon farms of the republic;

the “grapefruit Zaynutdin” sort of citrus was planted in Samarkand region as a “promising variety”.In the farm of “Пахтачи томорқа хизмати” LLC of Samarkand region 100 saplings of this citrus sort were planted in a 10-hectare greenhouse, the average yield of 5-6-year-old trees from a single sapling was 40-45 kg. where the yield was 4200 (four thousand two hundred) kg and the average income was 63 000 000 (sixty three million) sums;

“Grapefruit Zaynutdin”, “Orange Uzbekistan” and “Mandarin Tashkent”sorts of citrus are grown and reproduced at the experimental station in accordance with the “Methods of conducting experiments indoors” adopted by Z. Fakhruddinov at a private firm in Kibray district, Tashkent region. In 1980-2019, the lemon farm of Kibray district of Tashkent region adapted these citrus varieties as a collection variety to our climatic conditions by grafting the local lemon F-2 Jubilee and mixing the flowers. In 2019-2020, patents for selection achievements of the Intellectual Property Agency of the Republic of Uzbekistan (NAR 00274, NAR 00275, NAR 00276) were obtained for the varieties of citrus fruits with high quality and yield "grapefruit Zaynuddin", "orange Uzbekistan" and "mandarin Tashkent".

In the lemon farm laboratory in Tashkent region were planted and reproducedin a three hundredhectare greenhouse. (Reference No. 02 / 029-2551 of the Ministry of Agriculture in August 18, 2020). As a result, the Resolution of the President of the Republic of Uzbekistan in February 19, 2020 No PP-4610-10 "On additional measures for further development of the lemon industry" was acceptedin order to achieve the further development of these citrus fruit varieties in the country, expand the scope of scientific research, increase the production of high quality industrial citrus fruits on the basis of advanced and modern resource-saving technologiesandwidely introduce mechanisms of state support.

Today, the necessary number of seedlings for planting in farm greenhouses has been multiplied.

Conclusions

1) New local plant varieties of oranges, mandarins and grapefruits were preparedon the basis of greenhouse laboratory conditions and methods of Z. Fakhriddinov in selection work, adapted to climatic conditions, improved methods were developed and new high-yielding and stress-resistant varieties were created. By interspecific hybridization, grafting and artificial crossbreedingit was possible to select shapes and use them to create new high-yielding, sweet, vitamin-rich, disease-resistant and competitive varieties.
2) The main seeds and species of widespread citrus plants, botanicaland specific biological characteristics, conditions of growth and development of citrus crops on the basis of orange, mandarin and grapefruit were studiedand the possibility of creating varieties was shown.
3) The results of the study revealed the economic efficiency of new export-oriented varieties and it was observed that they werehigh-yielding but low-growing trees that grow in greenhouse soil conditions.
4) Grapefruit pomelo Zayniddin citrus plant is determined by the method of re-selection of high-yield disease resistance and early ripening, and the selection is based on the study and analysis of seed processes.
5) Uzbek citrus plant varieties were obtained as a result of cross-breeding and multiple selection of oranges on the basis of hybrids of selection and the difference from controlled varieties was confirmed by study and analysis of fertility, prematureness and disease resistance.
6) The sort of Mandarin Tashkent citrus plant was created by hybridization method of selection and its difference from controlled varieties is based on the study and analysis of its origin, fertility, disease resistancece, especially to cold weather in greenhouse conditions, genetic and selection processes.
7) On the basis of the analysis of grapefruit Zayniddin citrus and mandarin Tashkent citrus plant varieties in different greenhouse climates it was found that grapefruit pomelo Zayniddin citrus plant sort is resistant to drought, frost and disease compared to the optimum regimen.
8) The Uzbek sort of orange was created by the hybridization method of selection and its origin, productivity, sweetness of fruits and high quality of multivitamin was scientifically and practically based.
9) The work started by my teacher Z. Fakhruddinov is being continued.Normative documents were obtained for the Uzbek sort of orange, Tashkent sort of mandarin and grapefruit Zaynutdin and the necessary information was developed.
10) High-yielding, stress-resistant, export-oriented new promising local sorts of citrus plants like oranges, mandarins and grapefruits were created and carried out on the basis of technology developed under optimal conditions.
11) Local sorts of grapefruit pomelo Zayniddin, promising Uzbekistan orange and Tashkent mandarin sortswere patentedby the Intellectual Property Agency of the Republic of Uzbekistanin 2020.

References

[1] S.Sh Rashidova., Milusheva R.Y. Chitin and Chitosan Bombyxmori Synthesis, Properties and Applications. // Tashkent: “Fan”, Academy of Sciences of the Republic of Uzbekistan. −2009. −P. 246.
[2] S. Sh Rashidova., I.N. Ruban Biologically active polymer compositions in seed science. –Tashkent, “Fan”, -1987. − P. 22-30.
[3] Fakhriddinov M.Z. Features of growingcitrus in Uzbekistan. − Tashkent. –2016. − P.70-83.
[4] M. A. Arslanov Influence of indolylacetic acid on the rooting and growth of lemon cuttings. J. Chemistry in agriculture. − 1972. − No. 3. −C. 35-46.
[5] N. Z. Fakhriddinov The appearance of roots at certain times in green cuttings of citrus plants. Collection of

scientific works of Tashkent State Agrarian University. Propagation methods of fruit plants and grapes. − Tashkent, 1993.− P. 25-36.

[6] S. Sh Rashidova, R. Y. Milusheva and others. Patent RUz No. 1702. Compositions for presowing treatment of seeds of agricultural crops.

[7] M.Z Fakhriddinov., M.A Khaidarov., S.M Pirmanova., S.I Dustmuradova., S.Sh. Rashidova Presowing preparation of tomato seeds encapsulated "UZCHITAN" // Actual problems of chemistry, physics and polymer technology. Republican Scientific and Practical Conference, Abstracts. – Tashkent, 2009.−P. 6-15.