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L. N. Grigortsevich[1], M. A. Surma[1], A. I. Alekhna[2], A. D. Telesh[1]
[1]Belarusian State Technological University
[2]Central Botanical Garden of the National Academy of Sciences of Belarus

AGROTECHNICAL FEATURES OF CULTIVATION OF CITRUS CROPS IN THE GREENHOUSE CONDITIONS

The article presents data on the selection of varieties of lemon and mandarin, suitable for growing in the greenhouse conditions in the country, and also to agrotechnical features of their cultivation. The most preferred varieties of lemons are: Meyer, Panderoza, Eureka; of mandarin varieties are best suited Sochi No. 23 and Pioneer No. 80. As for the agronomic characteristics of their culture, the optimal light conditions created when light of 5,000 lux; soil mixture made from sheet metal or wood-term land, sod of soil and fine river sand with an equal ratio (1:1:1); watered plants in several stages, taking a break to soil layer evenly moistened, and make organic and mineral fertilizers "Kemira"; for good fruiting pruning is carried out. On saplings of citrus plants in greenhouses often settle sucking pests: Jose scale, Coccidae, mites, aphids, and sublevels, mealybug, whitefly, so developed and described in detail protective measures. Expediency of cultivation of the citrus crops possessing medical properties, in greenhouse conditions is noted at establishments of sanatorium type, the large enterprises, at creation of winter gardens in cottages.

Key words: agrotechnical features, citrus crops, greenhouse conditions.

Introduction. In the Republic the cultivation of citrus plants is very limited. However, as the experience of lemon, mandarin, grapefruit and figs growing shows, it is possible to grow citrus in winter gardens at sanatoriums, large enterprises, cottages. Citrus plants are a storehouse of vitamins, have a tonic effect, contribute to the improvement of human body.

Some amateur gardeners also can grow lemon fruit in indoor conditions.

Main part. On the basis of research materials of CBG of NAS of Belarus, the most preferred species of lemon as glasshouse culture are: Meyer, Panderoza, Eureka. They are highly decorative, having good fruit giving ability, do not require large areas for growth.

Meyer Lemon (*Citrus* × *meyeri*). A tree of 1.5–2.0 m high, with rounded-oval, round, thick, strongly leafy crown, as a glasshouse culture require annual pruning and shaping. Sprigs are ribbed, rarely rounded, green. There are few small spines on generative sprigs are few, and those of nourishing ones having big spines.

The leaves are dark green, glossy, dense, thick, widely-lanceolate, 10–11 cm long and 4.5–5.0 cm wide, petioles without wings, not very often with small wings, fringed. The flowers are fragrant, single or 2–5 in bloom, medium size. Buds and outer part of the petals of anthocyan colour inner part is white. Stamens are fused in groups.

The fruit is medium in size, being long or short elliptic. The rind has thin, soft, smooth surface, the color varies from yellow-green to orange. Segments numbers 10 pieces. Flesh color is light orange, yellow. The flesh is tender, juicy, tart with lemon flavor having small amount of seeds. Fruiting period mainly occurs in autumn-winter period (November – February). Ripening lasts 8–9 months. Productive variety. Fruit weight is from 70 to 150 g, the fruit blossoms usually in March – April. The buds are formed only on the current year shoots. The culture requires good lighting. Easily undergoes cutting grafting. Cuttings grown from plant seeds start blooming in the fifth year.

Panderoza lemon (*Citrus limon* (L.) Burrn. Fil.). The sprawling tree is of average height (2.5–3.5 m high) with short thick shoots and a few thick spines. In indoor conditions it doesn't exceed 2 m in height.

The leaves are very large, wide oval, petioles having small wings. Flowers are single or gathered in small blooms, flowers are large (4.5–6.5 cm diameter) having thick petals, fleshy.

Fruits are medium and large (the average weight of about 500 g), oboval. Color of fruit is lemon yellow. The rind is thick, fleshy. Oilbags are located under the rind surface, large and oval in form. The surface is smooth, but slightly uneven and slightly ribbed. Flesh color is pale green. The flesh is juicy, sour flavor with bitterness. There are many seeds, from 30–40 pieces up to 60. The fruit ripens throughout the year.

Eureka lemon (*Citrus limon* (L.) Burrn. fil. cv. Eureca). The tree is 3.5 m high with strong branching crown. In Belarus it requires annual pruning and shaping of the crown when cultivated in greenhouses. The shoots are green, the upper growing part and growing leaves have anthocyan coloration. There is a small number of spinules.

The toothed leaves are oval with a pointed apex and wide V-typed base. Petiole has no wings. Leaves and petiole are without pubescence. Flowers are single or 2–3 in small blooms, medium sized (3.5–4.0 cm in diameter).

Fruits are medium-small (about 95 g), elliptical or oblong, sometimes obovate. The number of seeds in the fruits is variable, but usually have little number of seeds or without ones. Mature fruits are yellow. The peel is medium thick, with oil vesicles. Segments are about 10. The color is greenly yellow. The flesh is fine-grained, soft, and juicy. Taste is strongly acidic. Fruiting occurs throughout the year, but the major amount of the fruit matures in late winter.

The best tangerine species are Sochi No. 23 and Pioneer No. 80, tall trees having a spreading crown, high-yield species with fruit of medium and large sizes.

Mandarin Sochi No. 23 (*Citrus unshiu* Marc.). They are tall trees (in outdoor conditions can reach 4.5–5.0 m in height) with a strongly leafy pyramidal crown.

In the glasshouse conditions this species requires annual pruning and shaping of the crown. The shoots are light green, round, ridged at the top. The spines are small and few.

Leaves are large, oblong-shaped, oval with corrugated plate slightly concaved along the midrib (boatlike). Petiole is edged. Flowers are pentapetalous of medium size (3.0 cm diameter), single or 2–3 in one bloom. Petals have a cream shade and lanceolate shape unlike other species and varieties of mandarins.

Fruits are of medium and large sizes, weight is 65–80 g, rounded, flattened or slightly pear-shaped; apex is rounded or rounded-flattened; base is rounded and rather flat. Peel is 0.2–0.5 cm thick, orange, lightly rough with good separability from the flesh. The flesh is juicy, soft, sweet and sour, orange in colour. Fruit has 9–12 lobes being different in sizes. Films are thin, raw and dense. Corn is irregularly shaped, hollow filled. There no seeds. Indoors harvest ripens throughout the year.

Mandarin Pioneer No. 80 (*Citrus unshiu* Marc.). Trees are tall (up to 4.5 m in height) with medium, pyramidal, wide crown. In greenhouse conditions species requires systematic pruning and shaping of the crown. Stems are ribbed, light green. The spines are small and few.

Leaves are large, dark green and broad with pointed apex cunoform base and crenate edges. Petioles are fringed having no wings. Flowers are pentapetalous), single or in small (2–3) tassels of medium size (4.0 cm in diameter). Petals are broadly lanceolate.

The fruits size is 5.8×4.3 cm, weight 60–80 g, rounded-flat shape. The top is flat with a saucer-shaped depression. Round, rather flat. Peel is 0.2–0.4 cm thick, weakly rough surface, the gap from the flesh is good. The flesh is orange, juicy, sweet-sour. Lobes are 9–12, not of the same size, thick, rough film. The core is hollow or partially executed. There are no seeds. Indoors fruit ripens throughout the year.

Cultivation of these varieties is optimal with good lightning, during the autumn-winter period is necessary an extra lighting with lamps of 100–150 watts. The optimum growth temperature of citrus in summer is about 16–25°C, in winter – 10–12°C. In summer, the sun and hot weather it is necessary to ventilate the greenhouse and additionally humidify the air. Optimum air humidity is 60–70%, soil moisture is 50–70% of the total capacity.

When growing citrus it is desirable to prepare soil mixture of leaf or forest land, sod of soil and fine river sand with an equal ratio (1:1:1). In spring it is necessary to add some fertilizers like “Kemira Suite”, at the rate of 20 g per 10 l of water.

The same thing should be done in summer – fertilizer “Kemira-wagon”; in autumn – “Kemira-autumn” as often as once a month.

You can use liquid complex fertilizer “Vito” trace elements (20 ml per 10 l of water) or a mixture of citrus, which contain micronutrient fertilizers. Fertilizing should be done 2–3 times a year (spring and autumn) in the form of solutions, in moist soil.

For the normal growth of the citrus organic fertilizers are also imporant. Cow manure or chicken manure infused for 10 days, and diluted 1:10 and 1:20 respectively. Use this solution once a month. The ideal fertilizer for citrus is a moose droppings (diluted 1:10).

Water the plant in stages, taking a break so that the soil layer evenly moistened. Irrigation continues until the first drops of water to the pan pot. Watering is carried out in moderation, as drying of the soil in the pot, 2–3 times a week during daylight hours.

During the growing season lemon trees remove dry, growing inside the crown shoots, fruit free twigs. Pruning shears is carried out, after each cut it is disinfected with 10% formalin. Place slices obscure garden pitch.

For a good fruiting lemon should undergo pruning. Vertical shoots of young plants are pruned to a height of 15–20 cm, while the germination of lateral buds – 3–4 leaves the upper escape (first-order branch). With a length of 15–20 cm pinch them and form a 2–3 branches of the second order, which also pinch out the tops. They appear on the two branches of the third and fourth order. Subsequently, there is a need to maintain the shape of the plant and remove the damaged, thin and small branches.

The older the tree the smaller the increase in yields. In this case, it is performed partial short pruning of weakened branches. This contributes to the emergence of new fruit-bearing shoots.

On saplings of citrus plants in greenhouses often settle sucking pests: Jose scale, Coccidae, mites, aphids, and sublevels, mealy bug, whitefly.

To carry out protective measures against scale insects, whiteflies, and gray citrus scales, rubbing leaves should be clean with a soft pad or cotton wool soaked in soap or a tobacco extract or 3% soap emulsion.

To prevent the occurrence of mass mites 2–3 times a day, the leaves were sprayed with clean water. If this fails, the plant is treated with the drug Decis Profi (EDC, 0.5–1.0 g per 100 m^2), or insecticidal soap.

Against aphids the protection can be done by spraying with soapy water or a tobacco extract with the addition of soap. You can also carefully clean the leaves with a soft sponge or brush dipped in a weak solution of vinegar (the concentration of not more than 3.5%).

Mealy bug can be disposed of by mechanical treatment plants. There sublevels, which are an indicator of excessive, soil moisture. Plants sublevels do not interfere, but excess moisture is harmful. It is necessary to limit watering of plants.

Conclusion. Based on the research results obtained in a greenhouse of the Central Botanical Garden of NAS of Belarus, we believe its appropriate cultivation of medicinal fruits of lemon, mandarin in the country in terms Orange yards at sanatoria and health resorts, large enterprises, while creating conservatories in the cottages.

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Information about the authors

Grigortsevich Lubov Nikolaevna − D. Sc. Agricultural, professor, Department of Landscape Design and Architecture. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: kafedralpsps@gmail.com

Surma Margarita Alexandrovna − student. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: kafedralpsps@gmail.com

Alekhna Anton Ivanovich − Laboratory hothouse plants State Scientific Institution. Central Botanical Garden of the National Academy of Sciences of Belarus (2b, Surganova str., 220012, Minsk, Republic of Belarus). E-mail: office@cbg.org.by

Telesh Anna Dmitrievna − Ph. D. Agricultural, senior lecturer, Department of Landscape Design and Architecture. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: rebko@belstu.by @tut.by

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