

"Efficiency of feeding standards on the growth, development and yield of okra (*Hibiscus esculentus* L.) vegetable crops" (in the conditions of typical irrigated gray soils of Kibray district)

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Abstract. The assortment of vegetable plants for gardeners and market gardeners has been constantly increasing in recent years. New types of plants are appearing, the seeds of which are offered by various agricultural companies. There are many books on agricultural technology for vegetable and fruit crops, but they often lack information about techniques for growing rare plants. Such exotics from our summer cottages include amaranth, chufa, peanuts, momordica, pepino, lufant and others. In this work we want to share our experience in growing okra.

Keywords: Okra, open ground conditions, seed germination, temperature, growth.

Okra, or edible abelmosh (*Abelmoshus esculentus*), and according to another classification, *Hibiscus exculentus* belongs to the Malvaceae family (Hibisceae). Tropical Africa is considered the homeland of okra; it is preserved in its wild form in the Antilles, Ethiopia, and in the upper reaches of the Nile. Okra is cultivated under various names: okra, gombo, bhindi, abelmoshus [3]. Finding out whether it is possible to obtain okra fruits in the open ground conditions of Kibray district.



Picture 1. The appearance of okra plant

To achieve the goal, the following tasks were set:

1. Familiarize yourself with literary sources on the research topic;
2. Grow okra from seeds;
3. Get a fruit harvest;

4. Find out what agricultural practices must be followed when growing okra in open ground conditions in Kibray district.

Okra (*Hibiscus esculentus*) is an annual herbaceous plant of the hibiscus genus of the Malvaceae family, a vegetable crop. Tropical Africa is considered the homeland of okra; it is preserved in a wild state in the Antilles. Distributed in a number of countries in Southern Europe, America, Africa and Asia. In the Moscow region at the beginning of this century, okra was successfully grown.

The culture is warm and light-loving, which is why it is grown more often in the southern regions of Uzbekistan. Prefers soils that are light and rich in organic matter. The plant is drought-resistant, but to obtain a bountiful harvest, it requires sufficient watering, but does not tolerate waterlogging. For seed germination, the temperature must be at least 15°C, and for normal growth, at least 20°C. Okra does not tolerate frost.

The okra plant reaches 200 centimeters (tall forms); dwarf forms have a stem 30-40 cm high. The stem is thick, branched, pubescent with stiff hairs. The leaves are also pubescent, large, 5-7 lobed (less often whole), light and dark green on long petioles. The flowers are large, solitary, bisexual, self-pollinating, with a 5-lobed corolla. The petals are yellow, cream or orange, with a large red or purple center.

The okra fruit is a multifaceted, finger-shaped seed pod, 6-30 cm long. The seeds are round, glabrous or with brown pubescence, dark green or gray. Unripe (three to six days old) fruit ovaries are eaten as soon as they reach 4-6 cm in length. They are cut with scissors every 2-3 days, avoiding overripeness; overripe fruits are not tasty and lose their dietary properties. It is not recommended to store the collected fruits for a long time (more than two days), in the refrigerator for no more than 3-4 days.



Picture 2. Fruits of Okra plant

Okra fruits contain a lot of protein substances, carotene, ascorbic acid (up to 45 mg%), mucous substances (valuable in the treatment of peptic ulcers and gastritis). The fruits are eaten fresh, boiled, stewed and canned, for preparing salads, soups and other dishes. Before use, remove the stem from the fruit and wash thoroughly. Unripe seeds are used as green peas, and surrogate coffee is prepared from ripe ones.

Known varieties: White Cylindrical 127, White Velvet, Green Velvet, Dwarf Greens, Lady's Fingers - they differ in early maturity, shape, color and size of the fruit, and plant height.

Okra is a warm and light-loving crop; it prefers soils that are light and rich in organic matter. Okra does not tolerate frost. The plant is drought-resistant, but to obtain a bountiful harvest, it requires sufficient watering, but does not tolerate waterlogging. In the southern regions of Uzbekistan, okra is grown in open ground, in the Non-Black Earth Region, usually by seedlings.

The most famous varieties in Russia are "White Velvet", "Green Velvet", "Dwarf Greens".

SEEDING BEDS AND SEEDLINGS

Okra seeds germinate slowly (2-3 weeks), so to speed up the emergence of seedlings, they are soaked in warm water for 24 hours before sowing. Sowing is carried out in the spring in well-warmed soil, after the threat of spring frosts has passed. The seeding rate is 2.5 grams of seeds per 1 m². Sow to a depth of 1-3 centimeters, in a row, with a row spacing of 70 cm, in a row after thinning of 30 cm.

When growing seedlings, they maintain a temperature of 18-21°C and optimal air and soil humidity, which is regulated by watering. Okra does not tolerate transplantation well, and therefore it is advisable to grow it in peat pots (cups). 3-4 seeds are sown in each pot, and after the seedlings grow a little, one plant (the strongest) is left. Seedlings are planted in open ground at the age of 30-45 days.

SOIL AND FERTILIZER

Place okra in areas with a southern slope or make ridges sloping to the south. The soil should be well heated, fertile, and light. For seed germination, the soil temperature must be at least 15°C, and for normal plant growth a temperature above 20°C is required.

In autumn, the soil is dug up deeply, adding organic and phosphorus-potassium fertilizers: 3-4 kg of manure per 1 m², 40-60 g of superphosphate and 25-30 g of potassium sulfate. In the spring, before sowing, 2-3 times loosening with harrowing is carried out and ammonium nitrate is applied at a dose of 13-15 g/m².

CARE

During care it is necessary: timely loosening of rows, weeding, hilling, watering, as well as one-time fertilizing with mineral fertilizers before flowering. Plants bloom two months after germination. To give the plant the appearance of a bush, you can pinch the growing point (with a stem height of 25-30 cm), this also speeds up fruiting.

HARVEST

The first harvest in the south of Uzbekistan begins to be harvested in late July - early August, in the middle zone August-September. Okra fruits are cut with scissors every 2-3 days, as soon as they reach a length of 4-6 cm, avoiding overripening, as they quickly lose their commercial quality (become fibrous, rough and tasteless). The fruit harvest lasts one and a half to two months. Productivity 1.2-1.4 kg per 1m². Collected fruits cannot be stored for a long time; in the refrigerator at a temperature of 2-4°C - only a few days.

PROCESS OF GROWING OKRA

The okra seeds were soaked in warm water for a day. This technique serves two purposes. The first is a test for germination: mature and healthy seeds sink in water, and empty ones float. The

seeds turned out to be suitable for sowing. But we carried out further soaking in a small amount of water, which stimulates the seeds to germinate [2]. When soaking the seeds, we used potassium permanganate; it disinfects the seeds, since fungi and bacteria can damage the seedlings. Water penetrates through the seed coat and activates the vital activity of cells, converting enzymes that control seed germination into an active state. But there should not be a lot of water, since the seed breathes and oxygen must reach the embryo.

After soaking in water, the seeds increased in size, which indicates the onset of the swelling phase. The swelling phase is followed by the activation phase, and then the pecking phase - the growth of the primary roots of the seed. The okra seeds swelled and increased in size after a day of soaking, and after two days they developed roots (pecking phase). We left the hatched seeds for another day in a damp cloth, since some of them were not yet ready for sowing. Considering the fact that okra is a heat-loving plant, we decided to grow it using seedlings. In Kibray district, return frosts occur until the beginning of June, so young seedlings may die in open ground.

We sowed the hatched okra seeds in seedling boxes, and after 4 days, seedlings appeared. During germination, the cotyledons of the okra seed do not remain in the soil, but are carried outside - this is called above-ground seed germination. Typically, with this type of germination, the seed coat remains in the soil. But in some seedlings it remained on the cotyledon leaves. We carefully removed the peel with tweezers so that chlorophyll would form in the cotyledon leaves in the light. In the cotyledon leaves, the process of photosynthesis begins and substances necessary for growth are formed. After a week, all the young plants had true leaves. The first leaves of okra are simple, almost whole, then lobed-separated appear. The leaves are 5–7 cm in size and have pubescence.

Before transplanting into open ground, we watered the seedlings with Organic Mix fertilizer. Young okra plants were planted in the country house. The place for the plant was chosen to be sunny with fertile, loose soil. For better survival of young plants, we treated them with an epin solution. Epin increases resistance to diseases and adverse conditions. Okra is very demanding of heat, light and watering. The bed where the okra was grown was equipped with drip irrigation.

We regularly watered the plants, removed weeds, and loosened the soil. To our regret, the plants vegetated, looked quite healthy, but did not form flowers or fruits. At the end of September, due to the drop in temperature at night, the plants died. A sandstorm and heavy rain contributed to the death of plants. We concluded for ourselves that the best conditions for growing kiwano in our area are greenhouse conditions. But in a greenhouse it must be artificially pollinated, since bees and wasps do not fly there.

As it turned out later, we made another mistake, which did not allow the plant to flower and bear fruit. The plant simply did not have enough sunny days; flowers appear on the 75th day of cultivation. Therefore, it is better to plant kiwano seedlings earlier than we did in our experiment.

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