GULISTAN STATE UNIVERSITY



BIOLOGY AND CULTIVATION TECHNOLOGY OF ROOT VEGETABLE CROPS

Ildizmevali sabzavot ekinlar biologiyasi va yetishtirish texnologiyasi

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Ushbu ma’ruza matni Meva-sabzavotchilik fanidan o‘tiladigan “Ildizmevali sabzavot ekinlar biologiyasi va yetishtirish texnologiyasi” mavzusiga bag‘ishlangan bo‘lib, unda ildizmevali sabzavot ekinlarining ahamiyati, ularning turlari, biologiyasi, navlari, yetishtirish agrotexnikasi to‘g‘risidagi ma’lumotlar ingliz va o‘zbek tillarida bayon etilgan hamda asosiy atamalar izohi–glossariy keltrilgan. Ma’ruza 2-bosqich Agronomiya ta’lim yo‘nalishi talabalariga mo‘ljallangan.

Taqrizchilar: **Ingliz tili va adabiyoti kafedrasi dotsenti v.b., p.f.f.d (PhD) Dushayeva S.**

Agrotuproqshunoslik va melioratsiya kafedrasi dotsenti v.b., q.x.f.f.d. (PhD) D.Kim.

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BIOLOGY AND CULTIVATION TECHNOLOGY OF ROOT VEGETABLE CROPS (Ildizmevali sabzavot ekinlar biologiyasi va yetishtirish texnologiyasi).

Root vegetable crops grown in Uzbekistan include carrots, beetroot, radishes, turnips, and radishes (small radish varieties). In other regions of the country, parsnips, parsley, celery, lingonberries, chicory, and scorzonera are also cultivated.

Carrots are consumed fresh or cooked, and they are also preserved and dried. Carrot juice is used as a nutritious food for children. Carrots are also used for medicinal purposes in cases of anaemia and high blood pressure. Carrot seeds are used to produce essential oils and liqueurs, as well as in the perfume and cosmetics industries.

Non-standard and damaged carrots are used as animal feed. Carrot roots are rich in sugars, which can reach up to 12% in some varieties. They also contain starch, dietary fibre, pectin, and nitrogenous compounds. The ash of carrot roots contains potassium, sodium, calcium, and various micronutrients. Carrots contain enzymes and vitamins, particularly carotene, at relatively high levels (5–10 mg %).



Picture 1. Beet roots vegetables

(O‘zbekistonda ildizmevali sabzavotlardan sabzi, lavlagi, turp, sholg‘om va rediska yetishtiriladi, mamlakatning boshqa mintaqalarida bulardan tashqari pasternak, petrushka, selderey, oryukva, tsikoriy, skrotsiner ham o‘stiriladi.

Sabzini yangiligida va pishirib iste'mol qilinadi, konservalanadi va quritiladi. Sabzi sharbati bolalarga oziq sifatida beriladi. Kamqonlikda, qonbosimi kasalliklarida dorivor sifatida foydalaniladi. Sabzi urug‘idan efir moyi, liker tayyorlashda va atir-upa – kosmetika sanoatida ishlatiladi.

Nostandart va ezilgan sabzilar chorva mollarga oziqa sifatida beriladi. Sabzi ildizmevasi qandga boy, ayrim navlarda u 12% ga yetadi. Unda kraxmal, kletchatka, pektin va azotli moddalar bor. Ildizmevasi kulida kaliy, natriy, kaltsiy va barcha mikroelementlar mavjud. Sabzida ferment va darmondorilar, ayniqsa, karatin (5-10 mg%) ko‘p).

Beetroot is consumed as a food throughout the year. In spring, its young leaves and roots are used in cooking, while in summer and autumn, its roots are consumed. In terms of nutritional value, beetroot is superior to a number of other vegetables. Its roots contain 18–20% dry matter, including 8–12% sugar, 1.3–1.4% protein, 0.1% lipids, and 0.7–0.9% dietary fibre. Beetroot also contains up to 30 mg% of vitamin C, as well as B-group vitamins, including B_1, and vitamin PP (niacin). Among vegetables rich in organic acids, beetroot ranks among the leading crops in terms of phosphorus and potassium content. It also contains substantial amounts of other minerals.

Turnip roots are consumed raw, fried, stewed, or minced, and they are also used as livestock feed. Turnips are particularly rich in carbohydrates, proteins, vitamins, and mineral salts.

Carrots were consumed by the ancient Greeks and Romans as early as 2,000 years before the Common Era. In Russia, carrots became widespread during the 14th–15th centuries. Beetroot has been known for more than 3,000 years. Root vegetable crops are cultivated throughout the world, with carrots being the most widely grown among them. In the Commonwealth of Independent States (CIS), root vegetables are cultivated across all soil and climatic zones. In Uzbekistan,

carrots are grown on an area of 18,000–19,000 hectares, with an average yield of 13–15 tonnes per hectare.



Picture 2. Beet roots vegetable

(Lavlagi oziq-ovqat sifatida-yil davomida ishlatiladi, bahorda ovqatga yosh barglari va ildizlari, yozda va kuzdamevasi foydalaniladi. To‘yimliligi jihatdan lavlagi bir qator sabzavotlardan ustun turadi. Uning ildizmevalarida 18-20% quruq moddalar, shu jumladan 8-12% qand, 1,3-1,4% oqsil, 0,1% lipid, 0,7-0,9% kletchatka bor. Shuningdek, 30 mg% gacha C, PP guruhidagi B_1 va PP darmondorilarga ega. Organik kislotaga boy sabzavotlar orasida lavlagi fosfor va kaliy saqlash bo‘yicha birinchi o‘rinlarda turadi. U shuningdek, juda ko‘p boshqa minerallarni o‘zida saqlaydi.

Sholg‘om ildizmevasi xomligicha, qovurilgan, dimlangan va qiymalangan holda iste'mol etiladi, shuningdek chorvaga beriladi. U uglevodlar, oqsillar, vita'minlar va mineral tuzlarga nihoyatda boy.

Sabzini qadimgi greklar va rimliklar eramizdan 2 ming-yil oldin iste'mol etganlar. Rossiyada u XIV-XV asrlarda keng tarqaldi. Lavlagi 3 ming-yildan ortiq vaqtdan beri ma'lum. Ildizmevali sabzavotlar yer sharining hamma yerida yetishtiriladi. Ulardan eng ko‘p tarqalgani sabzi. MDH da ildizmevali sabzavotlar

barcha tuproq iqlim zonalarida yetishtiriladi. Bizning mamlakatimizda sabzi 18-19 ming ga yerda yetishtiriladi. Uning o‘rtacha mahsulotdorligi gektaridan 13-15 t).

Botanical Characteristics and Biological Features. Root vegetables belong to various botanical families: carrots belong to the Apiaceae (umbel) family, table beets to the Amaranthaceae (goosefoot) family, and radishes, turnips, and small radishes (*rediska*) to the Brassicaceae (cruciferous) family. Most of these originated from the Mediterranean region. At the same time, there are also local Central Asian species of carrots, radishes, and turnips. Near East gave rise to certain forms of carrots and beets, while Japan and China gave rise to specific forms of radishes, small radishes, and turnips. Except for the small radish (*rediska*), all root vegetables are biennials: in their first year, they produce leaves and the root, and in their second year, they produce seeds.

The shape of the root vegetable is determined by the extent to which its distinct growing parts participate in its formation.

Carrot. The leaves are three- to five-times pinnately dissected. Their color ranges from light green to dark green, sometimes displaying a grayish or violet tinge. The shape and size of the leaves vary significantly depending on the variety and growing conditions. The shape of the root vegetable ranges from round to elongated. Its weight varies from 30 to 200 g or more, depending on the size and growing conditions. The shape, surface, color, and variety of the root vegetable differ based on cultivation conditions.

The flower stalk grows up to 1 meter or higher. The bush can be low-branched or extensively multi-stemmed. Each stem terminates in a compound umbel inflorescence. The fruit contains two seeds. The weight of 1,000 seeds is 1.0–2.8 g. Carrot seeds germinate 10–15 days after planting, or 25–30 days at lower temperatures. The first true leaf appears 10–15 days after emergence. The root vegetable forms 50–70 days after seed emergence, reaching full development in 80–140 days.

For carrots to flower and produce seeds, exposure to temperatures of 0 to +2°C for 60–100 days is required. After planting seed-roots, the flower stalk

appears in 30–35 days, flowering occurs in 50–80 days, and seed ripening takes place after 100–120 days.



Picture 3. Beet root vegetables

(Botanik xarakteristikasi va biologik xususiyati. *Ildizmevali sabzavotlar turli xil botanik oilalarga: sabzi soyabongullilar, xo‘raki lavlagi – sho‘ragullilar, turp sholg‘om va rediska – butsimongullilar oilasiga mansub. Bularning ko‘pchiligi O‘rta dengiz atroflaridan kelib chiqqan. Shu bilan birga sabzi, turp va sholg‘omning mahalliy O‘rta Osiyo turlari ham bor. Old Osiyo sabzi va lavlagining, Yaponiya va Xitoy turp, rediska va sholg‘omning ayrim shakllarini bergan. Rediskadan boshqa barcha ildizmevali sabzavotlar ikki-yillik bo‘lib, 1-yili bargi va ildizmevasi, 2-yili urug‘i tarkib topadi.*

Ildizmeva shaklini tashkil topishida uning alohida o‘suv qismlarining hay darajada qatnashishi bilan belgilanadi.

Sabzi. *Barglari uch besh karra patsimon qirilgan. Rangi och yashildan to‘q yashilgacha, ba'zida kulrang yoki gunafsha tusgacha bo‘ladi. Bargining shakli va kattaligi navi hamda yetishtirish sharoitiga harab kuchli o‘zgarib turadi. Ildizmevasining shakli – dumaloqdan uzunchoqqacha. Ildizmevasi hajmi va yetishtirish sharoitiga qarab 30 dan 200 g gacha va undan yuqori o‘zgarib turadi.*

Ildizmevasi shakli, yuzasi, rangi, navi, yetishtirish sharoitiga ko‘ra turlicha bo‘ladi.

Gulpoyasi 1 m va undan yuqori bo‘ladi. Tupi kam va yon tomonga tarvaqaylagan ko‘p poyali. Har bir poyasi zontiksimon murakkab gulto‘pi bilan tugallanadi. Mevasi ikki urug‘li. 1000 dona urug‘ining og‘irligi 1,0-2,8 g. Sabzi urug‘i ekilganidan 10-15 kun o‘tgandan so‘ng, past haroratda esa 25-30 kundan so‘ng o‘sib chiqadi. Unib chiqqanidan 10-15 kundan so‘ng birinchi haqiqiy barg paydo bo‘ladi. Ildizmevasi urug‘ unib chiqqandan so‘ng 50-70 kunda paydo bo‘ladi, to‘liq rivojga esa 80-140 kundan so‘ng erishiladi.

Sabzi gullashi va mahsulot berishi uchun 60-100 kun davomida 0+2°C harorat ta'sir etishi zarur. Urug‘lik ekilgandan so‘ng gulpoyasi 30-35 kundan so‘ng paydo bo‘ladi, gullashi 50-80 kundan va urug‘lik pishishi 100-120 kundan so‘ng bo‘ladi).

Beet flowers are small, greenish, and sometimes red or yellow, with 5 stamens. The stamens open 2–3 days before the pistil. Two to three beet flowers grow fused together, forming a multiple fruit (seed ball). Each multiple fruit contains 2–3 seeds. The weight of 1,000 seeds is 10–22 g.

Under favorable conditions, beet seeds begin to germinate 8–10 days after sowing. After another 6–10 days, the first true leaf appears. Root development begins 20–25 days after emergence, reaching full maturity in 80–100 days.

Radish (turp) and small radish (rediska) seeds emerge 4–6 days after sowing. The root begins to enlarge after producing 1–2 leaves. Rapid root development starts 55–120 days after emergence in radishes and 30–60 days in small radishes. Seed-radishes flower 35–40 days after planting, and their seeds mature in 100–110 days. In small radishes, flowering occurs 70–100 days after seed planting, and seed maturation takes place after 140–170 days.

Under optimal conditions, ***turnips*** emerge 4–5 days after sowing. Root formation is completed 60–80 days after seed emergence. Flowering of the seed-producing turnip plant begins 15–20 days after planting and continues for 25–30 days.



Picture 4. Beet root vegetables

(Lavlagining *guli mayda, ko‘kish, ba'zan qizil yoki sariq, otaliqlari 5 dona. Otaliklari onalikdan ikki-uch kun oldin ochiladi. Lavlagining 2-3 dona gullari qo‘shilib o‘sib, qo‘shaloq meva mahsulot qiladi. Har bir qo‘shaloq mevada 2-3 dona urug‘ bo‘ladi. 1000 dona urug‘ og‘irligi 10-22 g.*

Lavlagi urug‘i sharoit yetarli bo‘lganda ekiladiganidan so‘ng 8-, 10- kuni ko‘karib chiqa boshlaydi. Oradan 6-10 kun o‘tgach esa birinchi haqiqiy barg chiqaradi. O‘sib chiqqanidan so‘ng ildizmevasi bog‘lab yetilishi 20-25 kundan so‘ng, to‘liq rivojlanishi – 80-100 kundan keyin ro‘y beradi.

Turp va rediska *urug‘i ekilgach 4-6 kundan keyin chiqadi. 1-2 barg chiqargandan keyin ildizmevasi kattalasha boshlaydi. Ildizmevasining jadal rivojlanishi o‘sib chiqqanidan keyin turpda 55-120 va rediskada 30-60 kundan so‘ng boshlanadi. Urug‘lik turp ekilgach 35-40 kundan so‘ng gullaydi. Urug‘i 100-110 kundan keyin yetiladi. Rediskada gullash urug‘lik ekilgach 70-100 va urug‘ining yetilishi 140-170 kun o‘tib bo‘ladi.*

Sholg‘om *maqbul sharoitda sepilganidan so‘ng 4-5 kun o‘tgach chiqadi. Ildizmevasining shakllanishi urug‘i unib chiqqanidan 60-80 kun o‘tgach tugaydi. Urug‘lik o‘simlikning gullashi ekilganidan 15-20 kun o‘tgach boshlanadi va 25-30 kun davom etiladi).*

Temperature, Light, Moisture, and Soil Requirements. Root vegetables are cold-resistant plants. Carrot seeds begin to germinate at 3–5°C, beet seeds at 5–6°C, and radish (*turp*) and small radish (*rediska*) seeds at 1–2°C. The optimal germination temperature for radish, beet, and small radish seeds is 20–25°C, while for carrots it is 25–27°C.

Root formation and growth require temperatures of 20–22°C for carrots, 18–20°C for radishes, small radishes, and turnips, and 15–25°C for beets. Young emerged seedlings can tolerate temperatures down to -2 to -3°C, while mature plants can endure -5 to -6°C.

Root vegetables are long-day plants. The root systems of radishes, turnips, and especially small radishes are weakly developed, which increases their requirement for soil moisture. In conditions of insufficient moisture, they yield misshapen and poorly palatable root vegetables. Carrots and beets are relatively drought-resistant plants. However, they yield high productivity only when supplied with adequate moisture throughout their entire growing season. The ideal soil moisture capacity for them is 70%. Their water demand peaks during seed germination and root formation.

Radishes, small radishes, and turnips are demanding in terms of soil fertility and mechanical composition. Carrots and beets are distinguished by their well-developed root systems and relatively long growing seasons, making them less demanding regarding soil type. Nevertheless, they respond very well to mineral fertilizers and produce high yields in light-textured soils. Fresh organic manures cause branching in root vegetables, which subsequently shortens their storage life.

(Ildizmevali sabzavotlar sovuqqa chidamli o‘simliklardir. Sabzi urug‘i 3-5°C da, lavlagi 5-6°C, turp va rediska 1-2°C una boshlaydi. Turp, lavlagi va rediska urug‘i unishi uchun maqbul harorat 20-25°C, sabzi uchun 25-27°C.

Sabzining ildizmevasi shakllanishi va o‘sishi uchun 20-22°C, turp, rediska va sholg‘om uchun 18-20°C, lavlagi uchun 15-25°C harorat zarur. Unib chiqqan ko‘chatlar – 2-3°C, katta yoshdagi o‘simliklar – 5-6°C ga chidaydi.

Ildizmevali sabzavotlar – uzun kun o‘simliklari. Turp, sholg‘om va ayniqsa, rediskada ildiz tizimi kuchsiz rivojlangan bo‘ladi. Bu ularning tuproq namligiga talabchanligini oshiradi. Namlik yetarli bo‘lmaganda ular shakli buzuq va iste'molga unchalik yaramaydigan ildizmeva beradilar. Sabzi va lavlagi nisbatan qurg‘oqchilikka chidamli o‘simliklar. Biroq ular yuqori mahsulotni butun o‘suv davrida namlik bilan yetarli ta'minlanib turganlaridagina beradilar. Ular uchun tuproq nam sig‘imi 70% bo‘lishi zarur. Tuproq namligiga talabchanlikni urug‘ unib chiqayotganda va ildizmeva shakllanayotganda oshiradilar.



Picture 5. Beet root vegetables

Turp, rediska va sholg‘om tuproqning unumdorligi va uning mexanik tarkibiga talabchan. Sabzi va lavlagi ildiz sistemalari yaxshi rivojlanganligi va o‘suv davri nisbatan uzoq davr davom etishi bilan ajralib turadi. Shu tufayli tuproqqa nisbatan kam talabchandirlar. Biroq ular mineral o‘g‘itlarni yaxshi qabul qiladilar, mexanik tarkibi yengil tuproqlarda ko‘p mahsulot beradilar. Yangi organik o‘g‘itlar ildizmevalarining shoxlanishiga sabab bo‘ladilar. Shu sababli saqlanish muddati qisqaradi).

Varieties. In Uzbekistan, 13 varieties of carrots, 6 of table beets, 4 of radishes (*turp*), 7 of small radishes (*rediska*), and 3 of turnips are recommended for planting.

Three local carrot varieties are regionalized in Uzbekistan: early-ripening "Mushak-195", mid-early "Sariq Mirzoyi-304", and mid-ripening "Qizil Mirzoyi-228", along with two European mid-ripening varieties — "Chantenay-2461" and

"Nantes-4". Across all regions of the republic, one variety of beet, "Bordeaux-237" (100–110 days), and two varieties of radish (*turp*) — the early-ripening "Kuz Khadyasi" (50–60 days) and "Margilan" (70–80 days) — are regionalized.

For turnips, the early-ripening "Namangan Local", "Samarkand Local", and "Muyassar" varieties are regionalized. For small radishes (*rediska*), the mid-early "Saxa" and "Ertapishar", as well as the mid-ripening "Red White-Tipped", "Krasny Velikan" (Red Giant), "Local May", and the local "Tashkent White" varieties are regionalized.



Picture 6. Beet root vegetables

(Navlar. *O‘zbekistonda sabzini – 13, lavlagini – 6, turpni – 4, rediskani – 7, sholg‘omni – 3 navlari ekishga tavsiya etilgan.*

O‘zbekistonda sabzining uch xil mahalliy navlari tumanlashtirilgan – ertapishar «Mushak-195», o‘rta ertapishar, «Sariq Mirzoyi-304», o‘rtapishar «Qizil Mirzoyi-228» va ikkita yevropa o‘rtapishar navlari – «Shantane-2461», va «Nantskaya-4». Respublikaning barcha viloyatlarida lavlagining bitta «Bordo-237» (100-110 kun) va turpning ertapishar “Kuz xadyasi” (50-60 kun) «Marg‘ilon» (80-70 kun) navi tumanlashtirilgan.

Sholg‘omning ertapishar «Namangan mahalliysi» va «Samarqand mahalliysi» va “Muyassar” navlari tumanlashtirilgan. Rediskaning o‘rtagi ertapishar «Saksa» va «Ertapishar», o‘rtapishar «Qizil-oq uchli», «Krasnny

velikan», «Mahalliy mayskiy», «Tashkentskiy beliy» mahalliy navlari tumanlashtirilgan).

Cultivation Technology. Root vegetables grow best in organic-rich meadow, fertilized sandy loam, or loam soils. Beets are more tolerant of heavy loam soils than other root vegetables and can also be successfully cultivated on slightly saline soils. Root vegetables grow very slowly in their early stages; therefore, they can easily be choked out in weed-infested fields. For this reason, they should be planted in weed-free areas following appropriate predecessor crops. It is advisable to plant root vegetables in fields previously cropped with potatoes, cabbage, tomatoes, and cucumbers. In summer, root vegetables are planted as a second crop after harvesting early potatoes and vegetables.

Primary tillage is carried out in the same manner as for other vegetable crops. Since the seeds of most root vegetables are very small, they must not be buried too deep during planting. Therefore, pre-planting soil preparation requires creating a level, finely granulated seedbed. This is achieved by harrowing and loosening the soil immediately prior to sowing.



Picture 7. Beet root vegetables

(Yetishtirish texnologiyasi. *Ildizmevali sabzavotlar organik moddalarga boy o‘tloq, o‘g‘itlangan qumoq yoki soz tuproqlarda yaxshi o‘sadi. Lavlagi boshqa ildizmevalarga qaraganda og‘ir soztuproqlarga chidamli va kamsho‘rlangan yerlarda ham muvaffaqiyatli yetishtirilishi mumkin. Ildizmevali sabzavotlar juda*

sekin o‘sadi, shu sababli begona o‘t bosgan dalalarda osonlikcha yovvoyi o‘tlar orasida qolib ketishi mumkin. Shu tufayli ularni begona o‘tlardan tozalangan maydonlarga o‘tmishdoshlariga qarab joylashtirish zarur. Ildizmevalilarni kartoshka, karam, pomidor va bodring ekilgan yerlarga ekish maqsadga muvofiqdir. Ildizmevalilarni yozda ikkinchi ekin sifatida ertagi kartoshka va sabzavotlar yig‘ishtirib olingach ekiladi.

Tuproqni asosiy ishlash boshqa sabzavot ekinlarida qanday bo‘lsa, shunday o‘tkaziladi. Ko‘pgina ildizmevalilarning urug‘i juda mayda, ular ekish paytida tuproqqa chuqur kirmasligi kerak. Shu sababli ekish oldidan yerga ishlov berganda tuproq yuzasi tekis, mayda, donador qilib yumshatilgan bo‘lishi zarur. Bunga tuproqni bevosita ekish oldidan boronalash va yumshatish bilan erishiladi).

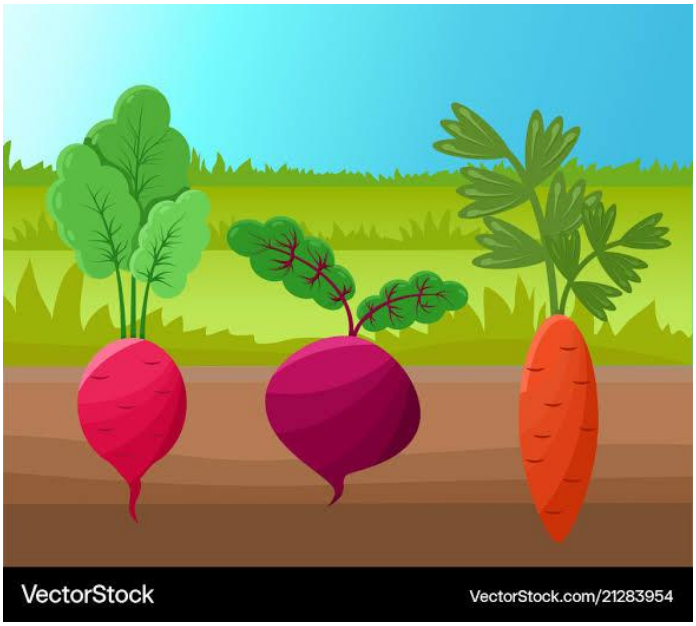
Fertilization. Compared to other vegetable crops, root vegetables are relatively less demanding in terms of nutrient supply. However, they maintain a consistent requirement for nutrients throughout their growing season.

Under the conditions of Uzbekistan, a carrot crop producing 100 centners per hectare removes 25–29 kg of nitrogen and 11–14 kg of phosphorus from the soil.

To achieve a yield of 150–200 centners per hectare the following fertilizer application rates are recommended (in kg/ha): on sierozem (gray soil) lands, 120–150 kg of nitrogen, 80–100 kg of phosphorus, and 40–50 kg of potassium. The bulk of the phosphorus fertilizer (70–75% of the annual norm) and the entire dose of potassium are applied after the primary plowing, while the remaining phosphorus is applied before planting. Nitrogen fertilizers are applied in two split applications during the growing season: first after thinning, when 2–3 true leaves have appeared, and second when the root vegetables begin to form.

***(O‘g‘itlash.** Boshqa sabzavotlarga solishtirganda ildizmevalilar oziqvgv u darajada nisbatan talabchan emas. Biroq o‘suv davri davomida oziqqa nisbatan talabchan bo‘ladilar.*

O‘zbekiston sharoitida gektaridan 100 ts dan mahsulot beradigan sabzi tuproqdan 25-29 kg azot va 11-14 kg fosfor oladi.



Picture 8. Beet root vegetables

Gektaridan 150-200 st mahsulot olish uchun o‘g‘itlarni quyidagi miqdorda solish tavsiya etiladi: (kg/ga): bo‘z tuproqli yerga 120-150 azot, 80-100 fosforli, 40-50 kaliyli. Fosforli o‘g‘itlar (yillik miqdorining 70-75% i) va kaliyning hammasi asosiy haydashdan so‘ng, fosforli o‘g‘itlarning qolgan qismi – ekish oldidan solinadi. Azotli o‘g‘itlar o‘suv davrida ikki bo‘lib beriladi: yaganadan so‘ng, 2-3 ta haqiqiy bargi chiqqanida va ildizmevalari shakllana boshlaganda).

Planting Methods and Dates. In Uzbekistan, root vegetables are cultivated during the following seasons:

1. **Early Spring:** In the southern and central regions of the republic, planting takes place at the earliest possible field access — late February to early March; in the northern region, it occurs in the second half of March. Carrots and beets are grown during this period, with beet variety "Bordeaux-237" and carrot variety "Mushak-195" being planted.

2. **Late Autumn/Winter (Dormant Sowing):** Conducted from November 15 to December 10, just before the onset of persistent frosts. Only cold-tolerant European varieties are sown: carrot varieties "Nantes-4" and "Chantenay-2461", and beet variety "Bordeaux-237". The harvest is gathered in late May and June.

3. **Summer:** Carrots, beets, radishes (*turp*), and turnips are cultivated during this season. Beets and carrots are sown from June 15 to July 10, while

radishes and turnips are sown between the second half of July and the first ten days of August. The crop is harvested in late October to early November, prior to the arrival of frost. High yields are achieved during this period by planting carrot varieties "Sariq Mirzoyi-204" and "Qizil Mirzoyi-228", though other regionalized varieties can also be used.

(Ekish usullari va muddati. *O‘zbekistonda ildizmevali sabzavotlarni quyidagi muddatlarda yetishtiriladi:*

1.Ertabahorgi – respublikatning janubiy va markaziy mintaqalarida dalaga chiqish mumkin bo‘lgan birinchi damlarda – fevral oxiri mart boshida, shimoliy mintaqada martning ikkinchi yarmida. Bunda sabzi va lavlagi yetishtiriladi. «Bordo-237» va sabzining «Mushak-195» navlari ekiladi.

2.Kuzgiqishki – 15 noyabrdan 10 dekabrgacha, ya'ni muntazam sovuqlar boshlanishi oldidan o‘tkaziladi. Bunda faqat chidamli yevropa navlari: sabzining «Nantskaya-4», «Shantane-2461» va lavlagining «Bordo-237» navlari ekiladi. Mahsuloti may oxiri va iyunda yig‘ishtirib olinadi.

3.Yozgi – bunda sabzi, lavlagi, turp va sholg‘om yetishtiriladi. Lavlagi va sabzi 15 iyundan 10 iyulgacha, turp va sholg‘om esa iyulning ikkinchi yarmidan avgustning birinchi o‘n kunligi orasida ekiladi. Mahsulot oktabrning oxiri noyabrning boshida, sovuq kunlar tushishi oldidan yig‘ishtirib olinadi. Bu davrda sabzining «Sariq Mirzoyi-204», «Qizil Mirzoyi-228» navlari ekilsa, yaxshi natijaga erishiladi. Shuningdek, boshqa rayonlashtirilgan navlarini ham ekish mumkin).

Small radishes (*rediska*) are usually planted in spring with intervals of several days, as well as in autumn during September.

Root vegetable seeds are generally sown dry (without soaking). In some cases, when planting is delayed, carrot seeds are soaked for 48 hours, while seeds of other root vegetables are soaked for 18–24 hours. Soaked seeds are then surface-dried for easier sowing. To ensure rapid germination of early spring-sown carrot seeds, it is recommended to wet them for 1–2 days prior to sowing and keep them moist at room temperature for 2–3 days, then store them at 0–3°C.

Root vegetables are planted using row, band (strip), or wide-row methods. During sowing, seeds are placed evenly along the rows. Because beets and radishes (*turp*) produce larger root crops, they can be planted with 60 cm row spacing or in two-row bands using a $50 + 20\text{ cm}$ scheme. The required distance between individual plants is established after seedling emergence through thinning.

Root vegetables are sown using mounted SKOB-4.2 vegetable seeders or modified equipment equipped with furrow-openers, wide-row coulters, and other attachments. During summer and autumn plantings, irrigation furrows are made simultaneously, and fields are irrigated immediately after sowing to promote germination.

In Uzbekistan, seeding rates per hectare are 15–16 kg for beets, 5–6 kg for radishes (*turp*) and carrots, 15–20 kg for small radishes (*rediska*), and 2 kg for turnips. Seeds are sown to a depth of 2–4 cm for beets, 1–2 cm for carrots and other root crops, and up to 3 cm on light sandy loam soils.

(Rediskani odatda, bahorda bir necha kun oralatib, shuningdek kuzdasentabr oyida ekiladi.

Ildizmevalilar urug‘i odatda, ivitmasdan ekiladi. Ayrim hollarda, ekish kech qolganda, sabzi urug‘i ikki sutka mobaynida, boshqa ildizmevalilar urug‘i 18-24 soat namlab qo‘yiladi. Namlangan urug‘ sepilishi oson bo‘lishi uchun quritiladi. Erta bahorda sepilgan sabzi urug‘i tez unib chiqishi uchun uni sepmasdan oldin 1-2 kechakunduz davomida xo‘llash va nam holida uy haroratida (2-3 kun) 0-3°C da saqlash tavsiya etiladi.

Ildizmevali sabzavotlar qatorlab, lentasimon, kengqatorlab ekiladi. Ekilayotganda urug‘ to‘liq qatorlab joylashtiriladi. Lavlagi va turp ildizmevasi katta bo‘lgani uchun 60 sm qator oralab, qatorlab va ikki qator lentasimon qilib 50+20 sm sxemsi bo‘yicha ekilishi mumkin. O‘simliklar oralig‘idagi kerakli masofa unib chiqqandan so‘ng belgilanadi.

Ildizmevali sabzavotlar osma SKOB-4,2 sabzavot seyalkasida yoki sug‘orish arig‘i ochadigan, keng qatorli soshnik va boshqa moslamalar

ulanganlari bilan ekiladi. Yozda va kuzda ekin ekilayotgan vaqtda sug‘orish egatlari ochib ketiladi va ekib bo‘lingach, oziqlantirish uchun sug‘oriladi.

O‘zbekistonda bir gektar yerga 15-16 kg lavlagi, 5-6 kg turp va sabzi, 15-20 kg, rediska va sholg‘om urug‘lari – 2 kg ekiladi. Lavlagini 2-4, sabzi va qolgan ildizmevalilar 1-2 sm, yengil qumoq tuproqlarda esa 3 sm chuqurlikka ekiladi).

Crop Care and Maintenance. During early spring and late autumn/winter plantings, soil crusting is prevented immediately after sowing by mulching the field with a 1.5–2 cm layer of well-rotted manure. Crusting can also be broken mechanically using light spike-tooth harrows or managed through prolonged light irrigations to soften the soil surface.

Weed control between rows is carried out through inter-row cultivation. Cultivation is performed 4–5 times (or every other day) after complete seedling emergence and following each irrigation. Weeds within rows are removed manually by hand-pulling, starting shortly after crop emergence and repeated 2–3 times.

Herbicides are applied to control weeds in carrot fields. Under Uzbekistan conditions, Treflan is recommended as a pre-emergence application at a rate of 0.5–0.75 kg/ha incorporated to a depth of 8–10 cm into the soil. Prometryn is applied as a liquid solution at a rate of 3 kg/ha after sowing but before carrot emergence.

Pre-emergence applications of Linuron and Propazine at rates of 2.5–3 kg/ha can also be used after sowing. At the 1–2 true leaf stage, carrot fields are treated with Prometryn at 3 kg/ha. Beet fields are treated with Acetochlor (9.3–13.9 kg/ha) after sowing prior to emergence, and with Betanal (6–8 kg/ha) after the appearance of 1–2 true leaves. The harvesting and marketing of products are permitted 4 months after treatment with Dizanex or Linuron.

*(**Ekinlar parvarishi.** Erta bahorgi va kuzgiqishki ekishda qatqaloqqa qarshi ekib bo‘lish bilan 1,5-2 sm chirigan go‘ng solib maydon mulchalanadi, shuningdek mexanik usulda yoki yengil to‘rsimon borona bilan qatqaloq*

yumshatiladi, shuningdek tuproqni yumshatish uchun uzoq muddatli sug‘orish amalga oshiriladi.

Qator orasidagi begona o‘tlarga qarshi kurash kultivatsiya o‘tqazish orqali amalga oshiriladi. Uni o‘simlik to‘liq unib chiqqandan va har bir sug‘orishdan so‘ng 4-5 marotaba yoki kun oralatib o‘tkaziladi. Begona o‘tlar qo‘l kuchi yordamida ham yo‘qotiladi. Ularni yulish o‘simlik unib chiqqandan so‘ng amalga oshiriladi va 2-3 marta takrorlanadi.

Sabzi ekilgan maydonidagi begona o‘tlarni yo‘qotishda gerbitsidlar bilan ishlov beriladi. O‘zbekiston sharoitida sabzi unib chiqishga qadar treflandan gektariga 0,5-0,75 kg miqdorida sepish tavsiya etiladi (8-10 sm qilib tuproq ostiga solinadi). Prometrinni gektariga 3 kg miqdorida eritma holda (ekilgandan so‘ng, sabzi unib chiqquncha) solinadi.

Urug‘lik ekilgandan so‘ng unib chiqquncha gektariga 2,5-3 kg linuron va propazin preparatlarini ham qo‘llash mumkin. Sabziga 1-2 bargi chiqqanidan keyin gektariga 3 kg prometrin bilan ishlov beriladi. Lavlagiga ekilgandan unib chiqquncha atsetlurom (9,3-13,9 kg/ga) va 1-2 haqiqy barg chiqargach betonolom (6-8 kg/ga) bilan ishlov beriladi. Mahsulotlarni realizatsiya qilish dozanek, linuron bilan ishlov berilgandan so‘ng oradan 4 oy o‘tgach ruxsat etiladi).

Experiments show that growing carrots under paper mulch in the republic yields great results; it completely eliminates annual weeds, improves soil water and nutrient regimes, and increases productivity. Applying this method requires specialized machinery that performs sowing while simultaneously laying the paper and covering its edges with soil.

Thinning is a mandatory management practice in caring for root crops and is usually carried out simultaneously with hand-weeding.

If plant density is not overly high, thinning can be limited to a single pass after 3–4 true leaves have appeared. The first thinning of beets is performed 8–10 days after emergence, while for other root vegetables, it takes place 12–15 days after emergence. A second thinning is conducted for all root crops 2–4 weeks after the first. In the first thinning, a spacing of 2–3 cm is left between plants; in the

second and final thinning, a spacing of 5–7 cm is left for carrots, 8–12 cm for beets and turnips, and 10–15 cm for radishes (*turp*). Young plants removed during the second thinning of beets and carrots can be utilized as fresh greens. The first thinning of beets, radishes, and turnips can be partially mechanized using cultivator sweep blades or specialized beet-thinning attachments.

Under Uzbekistan conditions, irrigation of root crops is compulsory. Insufficient watering reduces yield and deteriorates nutritional quality. During cultivation, effective soil moisture should be maintained at 70–80% of field capacity. When carrots and beets are sown in early spring, irrigation generally begins in April after full crop emergence. Initially, fields are irrigated every 10–12 days. From early May, as rapid root development begins, the irrigation interval is shortened to 7–10 days; in late May and June, crops are irrigated every 5–6 days. The total number of irrigations reaches 8–9. On soils with high groundwater tables, the frequency is reduced, with total irrigations numbering 5–6. A similar regimen is applied to late-autumn and summer plantings. Early spring-grown small radishes (*rediska*) are either not irrigated or given 1–2 light irrigations.

(Tajribalar ko‘rsatadiki, jumhuriyatda sabzini maxsusqog‘oz ostida yetishtirilsa katta samara beradi, u bir-yillik o‘tlarni butunlay bartaraf etadi, tuproqning suv va oziqlanish rejimini yaxshilaydi, mahsulotdorlikni oshiradi. Bu usulni qo‘llash maxsus texnikani talab etadi. U bir vaqtda ekishni amalga oshiradi va shu bilan birga qog‘ozni yoyadi hamda uni ustiga tuproq to‘kadi.

Ildizmevalilarni parvarishida yaganalash majburiy jarayon hisoblanadi, uni odatda, begona o‘tlarni tozalash bilan birgalikda o‘tkazadilar.

O‘simlik juda zich bo‘lmasa, 3-4 chin barg chiqargandan keyin bir marta yagana qilish bilan cheklaniladi. Lavlagining birinchi yaganasi unib chiqqanidan so‘ng 8-10 kun o‘tgach amalga oshiriladi. Boshqa ildizmevalilarni yaganalash esa unib chiqandan so‘ng 12-15 kun o‘tgach amalga oshiriladi. Hamma ildizmevalilarda ikkinchi yagana birinchisidan 2-4 hafta o‘tgach o‘tkaziladi. Birinchi yaganada o‘simliklar orasida masofa 2-3 sm, ikkinchi yakunlovchi yaganada – sabzida 5-7 sm, lavlagi va sholg‘omda 8-12 sm va turpda 10-15 sm

qoldiriladi. Lavlagi va sabzini ikkinchi marta yagana qilganda undan ko‘kat sabzavot sifatida foydalanish mumkin. Lavlagi, turp, sholg‘omning birinchi yaganasini qisman mexanizatsiyalashtirish mumkin. Bunda kultivator g‘ozpanjasidan yoki lavlagini yagana qiluvchi moslamadan foydalaniladi.

O‘zbekiston sharoitida ildizmevalilarni sug‘orish majburiy hasoblaniladi. Qoniqtirib sug‘orilmaganda mahsulotdorlik pasayadi va oziqlik qimmati yomonlashadi. Ildizmevalilarni yetishtirishda tuproqning samarali namligi dala nam sig‘imiga nisbatan 70-80% bo‘lishi kerak. Sabzi va lavlagini erta bahorda ekilganda sug‘orishni odatda, apreldan, barcha o‘simliklar o‘sib chiqandan so‘ng boshlanadi. Avvaliga 10-12 kun o‘tkazib sug‘orib turiladi. May oyi boshidan o‘simlik ildizmevasi jadal shakllana boshlangaanda sug‘orish oralig‘ini 7-10 kunga qisqartiriladi, may oyining oxiri va iyunda har 5-6 kunda sug‘oriladi. Sug‘orishning umumiy soni 8-9 taga yetadi. Sizot suvlari yaqin joylashgan tuproqlarda sug‘orish bir muncha kamaytiriladi va uning umumiy soni 5-6 tani tashkil etadi. Xuddi shunday rejim kuzgikechki mavsumda ekilgan o‘simliklarga nisbatan qo‘llanadi. Erta bahorda yetishtiriladigan rediska sug‘orilmaydi yoki 1-2 sug‘orish amalga oshiriladi).

For summer-planted root crops, irrigations are applied every 3–4 days to maintain adequate soil moisture until emergence. After emergence, fields are irrigated every 8–10 days, and during the ripening phase, every 12–15 days. Irrigation is stopped 2–3 weeks prior to harvesting late-season root crops. In areas with high groundwater tables, the interval between irrigations is extended, bringing the total number of irrigations to 6–8.

Pest and Disease Control. Root vegetables are heavily affected by powdery mildew and aphids. Control measures against them are similar to those used for other vegetable crops. Table beets are susceptible to the beet weevil, beet webworm, and beet flea beetle. Spraying with a 0.4–0.5% Trichlorfon (Chlorophos) solution or a 0.7% sodium fluorosilicate solution yields effective control against these pests.

Harvesting. Carrots and beets planted during autumn, late autumn/winter, and early spring seasons are harvested in two stages. Initially, early spring production is hand-harvested and utilized as fresh greens.

Summer-planted root vegetables are harvested in a single pass in late October to early November. Harvesting must be completed before the onset of prolonged rains and severe frosts. Beets should be harvested earlier than other root crops because they have higher warmth requirements; their roots protrude further above the soil surface, making them less protected from cold temperatures.

Root crops are excavated using SNU-30, SNSH-4, SNS-2M, and OSHKSH-1.4 diggers, as well as potato diggers and potato harvesters.

When trimming root vegetable tops, the petiole length left behind should not exceed 2 cm. Trimming tops too close to the crown or leaving them overly long can lead to rotting during storage. Tops must be trimmed on the same day the crops are excavated, especially in summer, as untrimmed roots lose significant moisture, wilt rapidly, and store poorly.

(Yozda ekilgan ildizmevali ekinlar unib chiqquncha tuproq namligini saqlab turish uchun har 3-4 kunda sug‘orish o‘tkaziladi. Unib chiqqanidan so‘ng ham 8-10 kunda, pishib yetilayotganda esa har 12-15 kunda sug‘oriladi. Kechki ildizmevalilarni yig‘ib olishdan 2-3 hafta oldin sug‘orish to‘xtatiladi. Sizot suvlari yaqin joylashgan yerlarda sug‘orish oralig‘i uzayadi va sug‘orishning umumy soni 6-8 tani tashkil qiladi.

Zararkunandalar va kasalliklarga qarshi kurash. *Ildizmevali sabzavotlar unshudring, o‘simlik biti bilan kuchli zararlanadi. Ularga qarshi kurash boshqa sabzavot ekinlarinikiga o‘xshashdir. Lavlagi uzun oyog‘i, lavlagi kapalagi, lavlagi burgasi bilan zararlanadi. Bu zararkunandalarga qarshi 0,4-0,5% li xlorofos eritmasi yoki 0,7% li kremneftorli natriy eritmasi purkalganda yaxshi natija beradi.*

Mahsulotni terib olish. *Kuzgi, kuzgiqishqi, erta baqorgi qilib ekilgan sabzi va lavlagini ikki marta terib olinadi. Avvaliga erta bahorgi mahsulotni ko‘kat o‘simlik sifatida qo‘lda terib olinadi.*

Yozgi muddatlarda ekilgan ildizmevalilarni bir marta oktabr oxirinoyabr boshida yig‘ishtirib olinadi. Terim surunkali yomgir va kuchli sovuq tushguncha tugatiladi. Lavlagini boshqa ildizmevalilarga nisbatan ertaroq yig‘ishtirib olish kerak, chunki issiqqa ko‘proq talabchan, uning ildizmevasi tuproq ustiga ko‘proq chiqib turadi va sovuqdan kamroq himoyalangan bo‘ladi.

Ildizmevalilarni kovlab olish SNU-30, SNSH-4, SNS-2M va OSHKSH-1,4 kavlagichi, shuningdek kartoshka kavlagich va kartoshkani yig‘ib oluvchi kombayn yordamida amalga oshiriladi.

Ildizmeva poyasi kesilayotganda, barg bandi uzunligi 2 sm dan ortiq qoldirilmasligi kerak. Poyasi tagidan taqab yoki uzun qoldirib kesilsa saqlash davomida chirib ketishi mumkin. Ildizmevalilarni kesish qazib olingan kunda o‘tkazilishi kerak, ayniqsa, yozda. Chunki poyasi kesilmagan ildizmevalar o‘zidan ko‘p namlikni yo‘qotadi, tez so‘lib qoladi va yomon saqlanadi).

Seed Production. Except for small radishes (*rediska*), seed production for root vegetables requires a two-year cycle. The cultivation method for growing stecklings (mother roots) in the first year does not differ from growing root crops for fresh consumption.

After the stecklings are harvested, their tops are trimmed, leaving 1–2 cm of the petioles intact. Then, selection for seed production is conducted, choosing large to above-average sized roots. Stecklings are planted before winter in the south, and in early spring (late February to early March) in other regions of the republic. If stecklings are to be planted in spring, they are stored during winter in trenches, clamps, or vegetable storehouses covered with moist sand. Prior to storage, stecklings are treated with 50% TMTD (Thiram) at a rate of 8 kg per ton.

Seed stecklings are planted in February–March with a row spacing of 70 cm and plant-to-plant spacing of 25–30 cm for carrots and 50–60 cm for other root crops. Stecklings planted in autumn are covered with a 12–15 cm layer of soil, while those planted in spring are covered with 5–6 cm. Seed crops are irrigated 4–6 times, cultivated 3–4 times, and hand-hoed between rows. They are top-dressed twice after sprouting: once at the onset of flowering with 1–1.5 centners/ha (100–

150 kg/ha) of ammonium nitrate, along with superphosphate applied during each feeding.

Depending on growing conditions, seed yields range from 3–5 centners/ha (300–500 kg/ha) for carrots, 8–10 centners/ha (800–1000 kg/ha) for beets, 5–6 centners/ha (500–600 kg/ha) for radishes (*turp*), and 3–4 centners/ha (300–400 kg/ha) for turnips.

*(**Urug‘lik.** Ildizmevalilar urug‘i, rediskadan tashqari, ikki-yil davomida yetishtiriladi. Urug‘lik ildizmevalilarni yetishtirish usuli birinchi-yili oziq-ovqat uchun mo‘ljallab yetishtirilayotgan bo‘lak ildizmevalilardan farq qilmaydi.*

Ildizmevalar yetishtirib olinganidan so‘ng poyalari qirqiladi, barg tubidan 1-2 sm qoldiriladi, so‘ngra urug‘lik maqsadlar uchun tanlanadi, bunda ildizmevalilar yirik, o‘rtadan katta bo‘lishi kerak. Ildizmevalar janubda qish arafasida, respublikaning boshqa mintaqalarida esa erta bahorda fevral oxiri – mart boshida o‘tkaziladi. Ildizmevalar bahorda ekiladigan bo‘lsa, qish oyida transheya yoki burtlarda, sabzavot omborxonalarida ustiga nam qum sepib saqlanadi. Saqlashga qo‘yishdan oldin ildizmevalilarga 50% li TMDT (8 kg/t) bilan ishlov beriladi.

Urug‘lik ildizmevalar fevral-mart oylarida qator oralarini 70 sm va qator orasida sabzida 25-30 sm va bo‘lak ildizmevalilarda 50-60 sm qilib ekiladi: Kuzda ekilgan tuganaklarning usti 12-15 sm, bahorda ekilganlarining usti esa 5-6 sm tuproq bilan bekitiladi. Urug‘lik ekinlar 4-6 marta sug‘oriladi. 3-4 kultivatsiya qilinadi, qator oralari qo‘lda yumshatiladi. Ular tuganak o‘sib chiqqanidan so‘ng ikki marta oziqlantiriladi, gullay boshlangaanda gektariga 1-1,5 ts ammiakli selitra va har bir oziqlantirishda superfosfat beriladi.

Yetishtirish sharoitiga qarab sabzi urug‘ining mahsulotdorligi 3-5 ga/ts, lavlaginiki 8-10 ga/ts, turpniki 5-6 ga/ts va sholg‘omniki 3-4 ga/ts ni tashkil etadi).

GLOSSARY

Atamaning nomlanishi			Atamaning ma’nosi
O‘zbekcha	**Ruscha**	**Inglizcha**	**Izoh**
Ildizmevali sabzavotlar	Корнеплодные овощи	Root vegetables	Oziq moddalar asosan yo‘g‘onlashgan ildizida to‘planadigan sabzavot ekinlari.
Sabzi	Морковь	Carrot	Karotin va boshqa foydali moddalarga boy, oziq-ovqatda keng ishlatiladigan ildizmeva.
Qizil lavlagi	Свёкла столовая	Beetroot	Ildizmevasida qand, mineral moddalar va rang beruvchi pigmentlar to‘planadigan ekin.
Sholg‘om	Репа	Turnip	Salqin sharoitda yaxshi o‘sadigan, yumaloq yoki yassi ildizmeva hosil qiluvchi ekin.
Turp	Редька	Radish / Daikon	Ildizmevasi oziq-ovqatga ishlatiladigan, turiga qarab achchiq yoki yumshoq ta’mli ekin.
Rediska	Редис	Radish	Tezpishar, qisqa muddatda iste’molga yaroqli ildizmeva hosil qiladigan ekin.
Petrushka ildizi	Корневая петрушка	Root parsley	Ildizi va barglari ziravor hamda oziq-ovqat sifatida ishlatiladigan ekin.
Selderey ildizi	Корневой сельдерей	Celeriac	Yo‘g‘onlashgan poyasimon ildizmevasi oziq-ovqatda foydalaniladigan ekin.
Ildizmeva	Корнеплод	Storage root	Oziqa moddalar to‘planishi natijasida yo‘g‘onlashgan, hosil uchun yetishtiriladigan yerosti organi.
Ildiz tizimi	Корневая система	Root system	O‘simlikni tuproqqa biriktiradigan va suv hamda oziq moddalarni o‘zlashtiradigan organlar majmui.
Asosiy ildiz	Главный корень	Primary root	Murtak ildizidan rivojlanib, ko‘pincha asosiy ildiz o‘qini hosil qiladigan ildiz.
Yon ildizlar	Боковые корни	Lateral roots	Asosiy ildizdan tarqalib, suv va oziq moddalarni o‘zlashtirish maydonini kengaytiradigan ildizlar.

Atamaning nomlanishi			Atamaning ma’nosi
O‘zbekcha	**Ruscha**	**Inglizcha**	**Izoh**
Vegetatsiya davri	Вегетационный период	Growing season	Unib chiqishdan hosilning yetilishigacha bo‘lgan o‘sish-rivojlanish davri.
Urug‘	Семя	Seed	Yangi o‘simlikni hosil qiluvchi va murtak hamda zaxira oziq moddalarni saqlovchi tuzilma.
Urug‘ning unuvchanligi	Всхожесть семян	Seed germination rate	Muayyan sharoitda unib chiqqan urug‘lar ulushini foizda ifodalovchi ko‘rsatkich.
Unib chiqish	Прорастание	Germination	Urug‘ning suv, harorat va kislorod ta’sirida murtak o‘sishini boshlashi.
Harorat rejimi	Температурный режим	Temperature regime	Urug‘ unishi va o‘simlik o‘sishi uchun zarur bo‘lgan harorat sharoitlari.
Yorug‘lik	Освещённость	Light intensity	Fotosintez va o‘simlikning me’yoriy rivojlanishiga ta’sir qiluvchi yorug‘lik sharoiti.
Fotosintez	Фотосинтез	Photosynthesis	Yorug‘lik energiyasi yordamida organik moddalar hosil bo‘lish jarayoni.
Tuproq unumdorligi	Плодородие почвы	Soil fertility	Tuproqning o‘simlikni suv, havo va oziq moddalar bilan ta’minlash qobiliyati.
Tuproq strukturasi	Структура почвы	Soil structure	Tuproq zarrachalarining agregatlar hosil qilib joylashishi; ildizmevaning shakllanishiga ta’sir qiladi.
Tuproq namligi	Влажность почвы	Soil moisture	Tuproq tarkibidagi suv miqdori; ildizmeva o‘sishi va hosildorlik uchun muhim omil.
Almashlab ekish	Севооборот	Crop rotation	Ekinlarni dalalarda yillar bo‘yicha belgilangan tartibda navbatlab ekish tizimi.
Ekish muddati	Срок посева	Sowing time	Ekin urug‘ini tuproq va ob-havo sharoitiga mos ravishda ekish vaqti.
Ekish me’yori	Норма высева	Seeding rate	Bir gektar maydonga ekiladigan urug‘ miqdori.

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