

MANUAL ON GROWING POTATOES



**MINISTRY OF AGRICULTURE AND ENVIRONMENTAL
PROTECTION OF TURKMENISTAN**

TURKMEN AGRICULTURAL INSTITUTE

AGRICULTURAL RESEARCH AND PRODUCTION CENTER

MANUAL ON GROWING POTATOES

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The manual, based on the results of research and advanced production experiments carried out at the Agricultural Research and Production Center of the Turkmen Agricultural Institute, discusses the rules of agricultural technology in the soil and climatic conditions of the country where potatoes are grown and recommends the rules for measures taken to protect them from pests.

The manual is intended for agricultural specialists, private landlords, tenants, teachers and students of higher and secondary vocational schools.

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INTRODUCTION

Under the leadership of President Gurbanguly Berdimuhamedov, a lot of work is being done in all spheres of the country's economy, and great progress is being observed. Our state creates all the conditions for our farmers to grow a rich harvest of agricultural crops.

In order to strengthen the country's food independence, to fully meet the growing needs of the population for food products grown on Turkmen soil, the President said that he would increase the cultivated areas in the country, enrich and increase diversity in spring and autumn. Soil and climatic conditions of Turkmenistan are favorable for soil cultivation and increasing yields. Its potatoes (tubers) are considered a high-quality food product for humans. Its tuber contains 75-80% water and 25% dry matter, the main part of which is starch. In addition, sugar, protein, fat, C (ascorbic acid), B (pyridoxine), B1 (aneurin), B2 (riboflavin), PP (nicotinic acid), vitamins A (carotene), lemons, apples and organic acids also contain mineral salts of iron, calcium and iodine. Potatoes are used not only as an important food product for humans, but also in the manufacturing industry for the production of starch, glucose, alcohol, etc.

Taking into account the above features of potatoes, it contains recommendations for producers and agricultural specialists on agricultural technology, pests and measures to combat its cultivation in various soil and climatic conditions of the country.

Biological features of potatoes

Potatoes (of *Solanum tuberosum*) belong to the family Solanaceae (Solanaceae). Mainly propagated by fruits (tubers), it can also be propagated by seeds. The seed propagation method is used in the selection process and to obtain clean, virus-free seeds.

It is a widespread potato root that is found in the upper soil layer and sometimes even in the lower soil layers. The stems of a plant grown from its tops can reach 50-80 cm in height and form 3-6 stems, depending on the variety and soil. The stem first grows vertically, and then, during harvest, its branches tilt downward. Stems can be triangular in most cases and polygonal in some varieties. Its first leaves are simple in appearance. In the process of development, the last leaves become more complex. It has a complex flower, the fruits of which are two-celled, polyspermous, blue, white, yellowish. Depending on the variety, tubers are of various shapes, namely round, roundish, elongated. Its outer color is white, yellow, magenta, or purplish red. The fruit is yellow, brown. With prolonged storage in winter in warehouses, the amount of starch and sugar in it decreases.

The temperature begins to rise to + 17-18 ° C. The optimum temperature for normal growth is + 20-21 ° C. At air temperatures up to +25, fruit growth slows down, and at +30 and above it stops.

It is suitable for growing potatoes in small light clay soils. That is, the growth period of cultivated varieties is 60–70 days, and in the spring they are consumed mainly in the form of food. Early maturing varieties ripen in 70–80 days and are used in the harvested summer seasons. Intermediate varieties mature in 80–100 days and are used during the summer and autumn months. In addition, there are intermediate and late varieties of potatoes. These varieties mature in 100–150 days. The varieties grown in our country are mainly used in the early and middle periods.

Characteristics of potato varieties grown in our country

To obtain high yields, it is important to choose the right variety. For planting, it should be select healthy varieties with high seed characteristics (germination). In our country, mainly early, medium varieties of potatoes are cultivated.

Gala variety. It is a spring-ripening variety that is sown in spring. Ripens in 70-80 days after germination. The average fruit weight is 70-90 g , tubers are round, yellow. Starch content 10.5%, dry matter 14.8%. The taste is good, the average yield is 180-200 c / ha. It is suitable for storage and shipment.

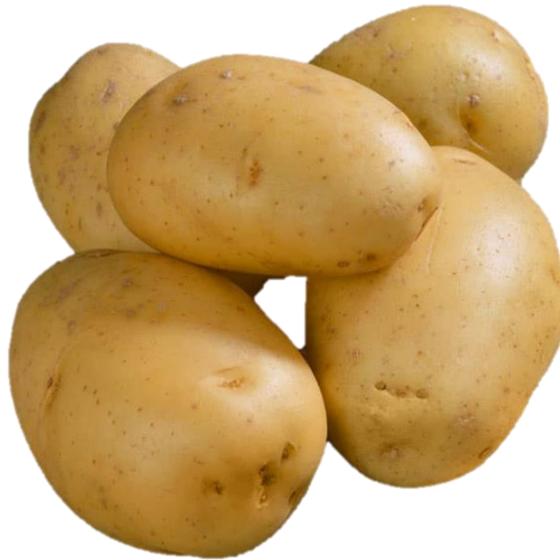


Figure1 . Gala potato variety

Dovreban variety. Sowed in spring - the variety ripens 60-80 days after germination. The flowers are yellow, short, 6-8 days old; the average fruit weight is 50-80 g. The taste is good, the yield per root is 7-10, the average yield is 130-136 c / ha. It is suitable for storage and transportation.



Figure2. Potato variety Dovrebap

Shanly Variety. It ripens in 80-90 days after germination. The average fruit weight is 70-80 g , the tubers are thin, smooth, round, yellow. Starch content 10-14%. The taste is good, the yield per root is from 9 to 12, with an average yield of 150-250 c / ha. It is high resistance to disease, suitable for storage and transportation.



Figure3. Potato variety Shanly

Sahra variety. It is a variety sown in spring. It ripens 65-80 days after germination. Average fruit weight 70-80 g , elongated contour, yellow color. It contains 17.5% starch and 23.7% dry matter. The taste is good, the number of yields per plant varies from 9 to 11. The average yield is 220-250 kg/ha. It is suitable for storage and transportation.



Figure4. Sahra potato variety

Bereketli variety. A high-yielding early-ripening variety is sown in spring. It ripens in 70-75 days after germination. The fruit is large, weighing an average of 90-100 g , elongated, light yellow in color. The amount of starch in it is 13-14%. The taste is good, the average yield is 200-220 *kg / ha*. It is resistant to viral diseases and dehydration. It is suitable for storage and transportation.

Agro techniques of potato cultivation

Preparing the soil for sowing. For cultivation of potatoes, you need to choose areas with light clay soils. In a crop rotation, it produces high yields when placed after crops such as cereals, legumes, cabbage, cucumbers and melons. Crop residues should be removed from the cultivated area. Moisture is retained by irrigation at the rate of 600 *m³/ha* before plowing. Herbicides recommended against perennial weeds in the field are sprayed according to the rules and certain measures are taken.

Before plowing, 30-40 *tons of* rotten manure per hectare, 500 *kg of* superphosphate and 60 *kg of* potassium chloride are introduced and plowed to a depth of 30-32 *cm* with mechanisms. At the same time, the soil is enriched with organic and mineral substances, the norms of plant nutrition with water and air are improved, and favorable conditions are created for a bountiful harvest. Basic agrotechnical requirements for sowing:

- plowing should be done on time and under the soil;
- the plowing depth should be even at 30-32 *cm*;
- the soil layer must be in a state of complete loosening and crushing.

The optimal time for plowing the field, for which it is planned to plant potatoes, is November 10-30. Leveling his land is one of the important stages in preparing the soil for sowing.

Alignment is done crosswise. The reclamation state is maintained at a normal level, water is saved, and crops grow normally and give high yields.

To prepare the soil for sowing, a dental rake is carried out in areas where washing and presowing water is carried out. Then it is loosened with softening tools to a depth of 12-14 *cm* in light soils and 16-18 *cm* in moderately clayey soils. The above work is carried out before sowing.

Growing of potatoes in spring

Potatoes are sown with special seeders to a depth of 8-10 *cm* at a distance of 25-30 *cm* from each mace on a 70-*cm* ridge drawn in advance. Before planting, germinate seeds; seed tubers weighing 50-60 *g* are suitable for sowing. 2.5-3.5 tons of seeds are consumed per hectare.



Figure6. Sowing of potatoes

The most favorable time for spring sowing is considered to be the southern region of the country from February 15 to March 1, and in the north from March 1-15.

With early maturing sowing, the plants are covered with a polyethylene shelter for 25-30 days, while the yield reaches 15-18 days earlier than in the open field, with an increase of 6.5-9.0 *c / ha* . The height of the polyethylene cover should allow the plants to grow sufficiently. At the same time, if the air temperature rises above 25 ° C during the day, you should open one side of the polyethylene cover every 3-4 meters and close it at night.

During the growing season, the soil is fed with mineral fertilizers at least 2 times, the first time after mass germination, intermittent processing and the second time during mass flowering. For the first time, 150 *kg of* carbamide, 150 *kg of* superphosphate, 40 *kg of* chloride-potassium fertilizers (in natural weight) and 500-600 *kg of* rotten manure are applied per hectare of mineral fertilizers, depending

on soil fertility. The second time, 100 kg of ammonium nitrate per hectare, 150 kg of superphosphate and 500-600 kg of rotten manure per hectare are applied.



Figure 7. Watering of potatoes during the growing season

At the beginning of vegetation water give every 7-8 days, and the period of mass blossoming every 5-6 days (only 6-7 times on light soils 8-9 times) at a rate of $600 m^3 / ha$, widespread use of rainwater methods significantly save water.



Figure 8. Potato flowering period

Interrow treatment during the growing season is an important measure to ensure high yields. As a result, the weeds are destroyed mechanically, the roots of the plant soften, the ventilation of the roots is improved and the evaporation of moisture from the soil is reduced. This procedure is repeated 3-4 times with the help of mechanisms. In this case, the inner part of the garden bed softens to a depth of 10-12 *cm*. When flowering begins, treatment is stopped.

Growing of potatoes in autumn

Seed tubers are selected from early, intermediate varieties that produce two harvests per year for spring sowing, or use pre-planted tubers. Seed tubers are germinated before sowing, so they are laid in lighted warehouses with a thickness of 20-30 *cm* and placed for 27-30 days. They are periodically moistened with water until healthy processes on the eyes have fully grown. The heat of their warehouse should be + 20-22 ° C. When it begins to swell, they should be observed every 3-4 days, choosing those that have rotted and removing the thin ones from the growing eyes. Sprouted tubers 5-6 days before sowing are stored in a dark place.

To get a high yield from irrigation in the fall, 30-40 tons of rotten manure, 500 *kg of* superphosphate and 60 *kg of* potassium chloride are applied per hectare of sown area . Sowing plays a special role in growing high yields. Plowing is carried out in a timely manner with complete rolling of the soil layer to a depth of 30-32 *cm* with mechanisms.

Leveling the planted area is one of the important steps in preparing for sowing. Alignment is done crosswise. When preparing the soil for sowing, the areas of leaching (if necessary) and the catchment area of groundwater, if detected, are treated with a disc rake, then a cultivator with illumination, a cultivator on light soil 12-14 *cm* , on medium soil 16-18 *cm* . processed and disinfected.

If planting is carried out over a large area at the same time using the spreaders in the seedbed every 25-30 *cm* throw the ranks in the 70-30 *cm* , poured wet sand thickness of 8-10 *cm* . In small areas, sowing and irrigation water is stored at the rate of 700-800 m^3 / ha . When the soil is plowed, sowing is done by hand.

For planting, only seed pods are used.

The most favorable conditions for sowing in summer (when sowing varieties grown in the intermediate period) in the southern regions of the country in the third decade of July (20.07-05.08), when sowing early varieties in late July, early August, June 15-15, northern region (30 July, 7 December). The planting line for seed germination should be $70 \times 25-30 \text{ cm}$, $8-10 \text{ cm}$ deep . Seed tubers weighing 50-60 g are suitable for planting. Then 2.5-3.5 tons of seeds are consumed per hectare. At this time, you need to water every 5-6 days until the plants germinate.

After the plants sprout, inter-row cultivation should be started, 3-4 rows of cultivation should be carried out during the development of the soil, and the roots should be sown twice. During the growing season, potatoes are supplemented with mineral fertilizers at least 2 times, the first time after mass germination, inter-row cultivation and the second time when the mass begins to bloom. Urea, 150 kg of superphosphate, 40 kg of chlorine, potash fertilizers (by physical weight) and 500-600 kg of rotten manure were added . The second time, 100 kg of ammonium nitrate per hectare, 150 kg of superphosphate and 500-600 kg of rotten manure per hectare are applied.



Figure9. Harvesting of potatoes

At the beginning of the growing season, water is given every 7-8 days, during the period of mass flowering and every 5-6 days (only 6-

7 times, on light soils 8-9 times) at a rate of $600 \text{ m}^3 / \text{ha}$, the widespread use of rainfall methods allows significantly save water. Intermediate treatment during the growing season is an important measure to ensure high yields. As a result, the weeds are destroyed mechanically, the roots of the plant soften, the ventilation of the roots is improved and the evaporation of moisture from the soil is reduced. This procedure is repeated 3-4 times with the help of mechanisms. In it, the inner part of the garden is softened to a depth of 10-12 *cm*.

In the last stage of potato growth, the harvest begins when the leaves begin to turn yellow. Watering will be stopped 10-12 days before harvest.

Potatoes planted in the summer ripen in late October - early November. 5-6 days before the ripe soil is excavated, its pest should be removed from the ground by 6-8 *cm of the* surface using mechanisms. Then it is harvested using special combines. Where there are none, harvesting is done with earth-moving machines. At the beginning of the harvesting period, they are divided into varieties, i.e. small potatoes are divided into 30-40 g, medium 50-60 g in 70-80 and 100 g large. The collected potatoes are transported to specialized warehouses, unloaded from bags and scattered to a thickness of 20-30 *cm*. The internal temperature of the warehouse should not be higher than + 2-5 °C, and the humidity should not be 85-95%.

Growing of potatoes from botanical seeds

One way to grow quality healthy seedlings is to grow them from plant seeds. The seeds are used not as grounding tubers, but as botanical seeds as the main sowing medium. These seeds form very similar tubers in shape and color. Also, when breeding with seeds, many soil diseases are not transmitted from generation to generation. Therefore, botanical potato seeds serve as a remedy for disease.

The botanical seed of a potato is very small in size, weighing 0.5 grams per 1000, and it is yellow in color.

There are two main methods of plant propagation from plant seeds:

1. Direct sowing method. Thus, the botanical seeds are sown very strongly in the breeding zone, and therefore the weight of the resulting clubs is small.

When propagated by this method, 80 g of apple seeds is enough to grow 2.0 tons of seed tubers (15-35 mm in size).

2. The method of germination by sprout. In this way, seedlings from botanical seeds are first grown in a special area, and then the rooted seedlings are transplanted into an open field after 5-6 weeks, i.e. when they have 4-5 leaves.

When propagated by this method, seedlings grown from 100 g of seeds are sufficient for planting per hectare, and from this year it is possible to grow seeds or nutritious fertilizers from it.

Seed growing of potato

The best and finest potato seeds should be grown under the supervision of scientists. Primary seeds must meet the following requirements:

- the purity of the variety must be 100%,
- you should not get infected with fungal and bacterial diseases.

Seed germination is prepared by sowing. For its germination, it must be light inside the premises, the air temperature must be + 12-16 ° C. When the seeds germinate in a bright place, then their sprouts become thick and dark blue in color. Fertilized seeds are evenly distributed indoors for 30-35 days or stored in wooden buckets no more than 10-12 cm high.

Agrotechnology of sowing and cultivation of seeds is no different from food. However, during the period of plant growth in seed fields, it is necessary to distinguish between those belonging to other varieties that have lost their identity, their diseases. After harvest, tubers should be sorted appropriately and selected from among medium sized tubers without damage from disease. Their appearance and color must be the same.

Potatoes planted in summer are more suitable for sowing. This is due to the fact that during this period the tubers of the cultivated soil pass without diseases.

Storing of potato

Potato tubers for food should be stored in warehouses in mesh, synthetic or dense non-woven bags on shelves, wrapped to a height of 2.0-2.2 m and chilled for 3-5 days at a temperature of 5-10 ° C. They

are placed in a room with a temperature of + 2-5 ° C 0.8-1.0 m from the wall for storage. The interior of the warehouse must be ventilated 1-2 times a day. They should also be placed at a height of 1.6-1.8 m and stored at a temperature of + 2-5 ° C. The humidity inside the warehouses, where the premises for storing food and seeds are stored, should be 85-95%. Fodder tubers grown in spring are stored for 4-5 months, autumn tubers - 6-7 months; it is not recommended to store them in uncooled warehouses.

Insect pests and diseases of potato

The Colorado potato beetle (*Leptinotarsa decemlineata*) belongs to the leaf beetle family and is considered a quarantine potato pest. An adult beetle (imago) has a black and yellow stripe with a black triangular spot. The egg is orange-yellow, 0.8-1.5 mm long. The larvae are fleshy, vesicular, first orange-red, then orange-yellow, 15 mm long (Fig. 12).

In winter, the Imagoes hibernate in the soil at a depth of 20-70 cm. In the spring, when the soil warms up to 14-15°C, some winter beetles begin to rise to the ground, and most of them do not operate in the ground for 20-22 months. Therefore, the offspring of the Colorado potato beetle does not disappear even in unfavorable natural conditions.

In winter, the beetles that come out to the surface regularly drink water, so they can be found in humid places. Beetles begin to feed only when they are filled with water. If the bush is green, they eat its leaves, and if it is not green, they gather on wild plants or grow for 30 days without eating anything. The Colorado potato beetle in search of food can fly up to 500 meters per day. Mating of feeder beetles begins in the summer and fall months. The paired mother beetle often lays 20-30 eggs under the top leaves of the plant. One beetle is capable of laying an average of 400-800 eggs, sometimes up to 2000 eggs. The larvae hatch from the egg in 5-20 days and renew 4 times in 19-22 days. The larvae eat the leaves like large thorns. When the sun rises, the larvae and thorns are on the leaves, and in cool air (in cloudy weather) they move under the leaves. After 4 years, the larvae go into the soil to a depth of 6-8 cm and become a pupa. Beetles emerge from pupae in 6-15 days. Young caterpillars feed quickly, mate and begin to lay eggs. The Colorado potato beetle gives 1-3 generations per year.

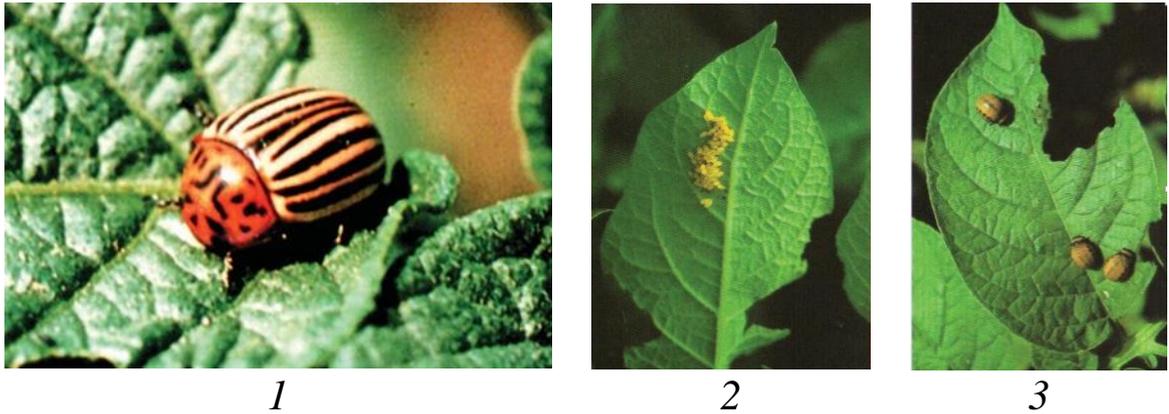


Figure 10. Colorado potato beetle (1), its egg (2) and its well-rejuvenating larva (3)

Control measures. Due to a particularly dangerous pest of the Colorado potato beetle, it is necessary to carry out massive work (quarantine). Entry and exit vehicles should be regularly checked for incoming and outgoing freight traffic. The potato tops are harvested and burned. Sift the soil to a depth of 25 cm and remove beetles, larvae and eggs. If the Colorado potato beetle is found in large areas, before flowering or after flowering, one hectare of the recommended insecticides (for example, best alpha, break, fascord) should be treated.

The stem nematode (*Ditylenchus destructor*) belongs to roundworms and has a length of 0.8-1.4 cm. The pests are spread mainly through seed clubs and soil. The female lays up to 250 eggs in the nematode, lays the larvae in 2-6 weeks and damages the club cells. In the affected clubs, white spots first form, and then they turn gray. The inner part of the tubers turns into a cellular form, gives off an unpleasant odor and rots.

The nematodes *Trichodorus* and *Paratrichodorus* are located at the ends of the stem roots, are 0.6-1.2 mm long and move freely within the cells. For their reproduction, high humidity is required, and the affected roots and plant remain dormant. In nematodes, it is necessary to carry out crop rotation without planting soil in the affected area for 3-4 years. Use chemicals to spray XL nematode at a rate of 30 l/ha .

Late blight disease (*Phitophthora infestans*) is a fungal disease that mainly affects potatoes and tomatoes. The first signs of late blight appear when the rash begins to germinate. The spread of the disease is exacerbated when the bees grow and begin to close the rows. When a disease occurs, brown spots first form on the leaves, and then they

begin to grow. In humid air, seeds of a white, moist matter appear between the spots and healthy leaf cells. They are spread by rain and wind water to the healthy roots of the plant. In dry years, the seeds of diseased foliage turn brown and dry, and in rainy years they turn black and rot. Leaf sprouts break easily. Dark brown spots appear on the affected tubules, and the inner side is pale brown.

The main source of the disease is tuberculosis, which is stored in a warehouse, but the disease remains on the ground. High temperature and humidity are important for the growth of late blight. That is, at a temperature of 15-20 ° C and humidity above 75%, heavy rains, high humidity and regular foggy weather are favorable conditions for the formation and intensification of late blight.



Figure11. Potato tops sick with Fhitophtora

Tubers resistant to late blight are cultivated with *celest Top* fungicide (0.3-0.4 l / t). The contaminated beeswax must be collected and burned in a special place. Spraying chemicals (fungicides) before

symptoms appear can prevent the spread of the disease. In particular, in areas where late blight occurred in previous years, fungicides should be applied until the rows are completely sealed. One of the agents, Ridomil Gold MS (2.5 kg / ha) or Fulpas 100 KE against late blight should be sprayed twice a season (10-14 days) before flowering. After flowering, the second group of chemicals is used bravo (3.0 kg / ha), folpan (3.0 kg / ha) and poliram DF (2.0 kg / ha).

On most acreage, 10-14 days before harvest, the leaves in the hive should be sprayed with Reglon Super (2.0 L / ha), Harvey 25F (3.0 L / ha), or manually removed , so that the bark can grow well so that the bark can grow well .

Ripe fruits must be harvested no later than 2 weeks after drying. Disease-causing fungi are stored in damp rooms for several weeks and are transferred to healthy tubers during harvest, transport and storage. Therefore, the crop should be ventilated at a temperature of 10-20°C for 5-10 days. Any painful tubers that develop should be removed. The temperature in the warehouse should be 10-30 ° C, and the humidity should be 85-90%.

Black root rotting Disease of potato is occurring by fungal of *Erwinia phytophthora*. They pass through traumatized, damaged areas. The source of the disease is diseased seeds and soil. In addition to the spread of the disease, tomatoes, cucumbers, and legumes are also affected. The tops of the affected stem wither; the leaves turn yellow and curl. The roots of the bush are rotten and black when viewed. Potatoes do not cause this disease if they touch young plants, and if they touch them after flowering, the yield is reduced. Diseased tubers are small black spots on the outside that become juicy when cut. The seed against this disease is treated with an aqueous solution of formalin (in a ratio of 1: 200) (sprinkled or soaked in the solution for 3-5 minutes) 3 times between bud germination - during germination, flowering and harvesting, diseased seedlings must be completely removed, and the harvested crop must be dried well.

Corynebacterium sepedonicum is caused by tuber and crop rot. Bacteria overwinter in soil, plant debris and diseased tubers. To prevent this disease, healthy seeds should be sown, potash fertilizers should be applied with sufficient regularity, and the crop should be dried in the light.

Spongospora subterranea is a fungal disease that severely damages crop yields. There are no signs of disease in the tops.

Symptoms of the disease begin to appear in the newly formed tubules with the appearance of brown-brown needles with a diameter of 3-4 *mm* . Over time, they reunite. When warts are found, dark powdery substances (mushroom seeds) come out of them. The disease spreads through soil and seed tubers.

The soil-borne fungus *Rhizoctinia solani* is caused by the silver coating of the tubers. The disease spreads to tubers from the site of injury and from tissues that have fallen from it. There are silver shiny spots on the tubers. Cold and humid weather contributes to the onset of illness.

It is necessary to carry out high-level agronomic measures against potatoes and apply potash fertilizers to the land. Sow disease resistant and healthy varieties. The seed seed must be treated with a maximum of 25 (0.2 *l/t*).

Potato leaf roll virus is caused by Potato leafroll disease. The leaves of a diseased potato are rearranged, curled and the disease spreads through the seed tubers, aphids.

Potato M virus is caused by mosaic leaf rot. The disease spreads through diseased plants through aphids. Symptoms vary depending on the type of virus. Often the upper leaves (shoots) curl up and the crop does not grow. Sow healthy seeds to prevent viral diseases. We need to fight against weeds and pests.

Rules and terms for carrying out agrotechnical measures during spring cultivation

No	Agrotechnical measures	Norm	Deadlines	
			Southern etraps of Akhal Mary Lebab Balkan velayats	Northern etraps of Dashoguz and Lebab velayats
1	2	3	4	5
1	Watering before plowing	600 m ³ /ha	01.11-10.11	-
2	Weed control measures	generally recommended herbicides,	If necessary	
3	Fertilization before plowing	Superphosphate 500 kg / ha , potassium chloride 60 kg / ha , rot 30-40 t / ha	10-30.11	20.10-30.11
4	Plowing	30-32 cm deep	10-30.11	20.10-30.11
5	Trimming	Transverse section	10-20.12	20.10-30.11
6	Land preparation with irrigation and presowing water	Digging temporary trenches, dividing them into ditches, stretching	20-30.12	01-30.12
7	Preparation of presowing water	700-800 m ³ /ha	25.12-15.01	01-30.02
8	Presowing soil treatment (chisel + rake + sowing kit)	12-14 cm on light soils and 16-18 cm on medium to heavy soils	25.01-10.02	15-30.02
9	Furrow formation	70 or 90 cm from row spacing	15.02-01.03	02.30-01.03
10	Weed control	generally recommended herbicides,	If necessary	If necessary
11	Sowing	Seeders or by hand, depth 8-10 cm , 2.5-3.5 t / ha	15.02-01.03	01-15.03

Continuable of table 2

1	2	3	4	5
12	Irrigation for prosperity	600-700 m^3/ha , slow flow	After sowing	
13	Softening and grinding plant roots	3-4 times with mechanisms 10-12 cm deep	15.03-20.04	05.04-10.05
14	Intermediate processing and mass feeding for the first time after mass germination	Urea - 150 kg/ha , superphosphate -150 kg/ha , potassium chloride 40 kg/ha + 500-600 kg mix with rotten manure	15-25.03	05-15.04
15	Carrying out measures to combat insects and diseases	generally recommended chemicals,	If necessary	If necessary
16	Re-feeding with the beginning of mass flowering.	Ammonium nitrate - 100 kg/ha , superphosphate - 150 kg/ha + 500-600 kg combine with rotten manure	10-25.04	04.25-10.05
17	Irrigation for growth	At a mass rate of 600 m^3/ha with mass flowering every 5-6 days, only 6-7 times	15.03-20.05	10.04-15.06
18	Weed weeding (if necessary)	Two times manually	25.03-25.05	15.04-20.06
19	Removing the tops	With the help of specialized mechanisms	05.25-05.06	20.06-01.07
20	Harvesting	Using potato harvesters	05.25-05.06	20.06-01.07

Note: Recommended rules and agrotechnical terms may vary depending on the weather.

Rules and terms for carrying out agrotechnical measures for growing potatoes in autumn

T / b	Agrotechnical measures	Norm	Deadlines	
			Southern etraps of Akhal Mary Lebap Balkan velayats	Southern etraps of Akhal Mary Lebap Balkan velayats
1	2	3	4	5
1	Preliminary drip irrigation (if necessary)	600 m ³ /ha	-	-
2	Weed control measures	As a rule, the recommended herbicides,	If necessary	
3	Fertilization before plowing	Superphosphate 500 kg / ha , potassium chloride 60 kg / ha , rot 30-40 t / ha	01-20.06	10-15.06
4	Plowing	30-32 cm deep	01-20.06	10-15.06
5	Trimming	Transverse section	15-30.06	15-20.06
6	Land preparation with irrigation and presowing water	Digging temporary trenches, dividing them into ditches, furrows	01-15.07	15-20.06
7	Presowing water	700-800 m ³ /ha	10-20.07	15-20.06
8	Presowing treatment: chisel + rake + harrow in combination	12-14 cm on light soils and 16-18 cm on medium to heavy soils	20-30.07	20-25.06
9	Furrow formation	70 or 90 cm from row spacing	20-30.07	20-25.06
10	Application of herbicides before sowing or germination (if necessary)	As a rule, the recommended herbicides	If necessary	

Continuable of table 2

1	2	3	4	5
11	Sowing carried out	Seeders or by hand, to a depth of 8-10 cm, 2.5-3.5 t / ha	20.07-05.08	06/30/15/07
12	Irrigation for flowering	600-700 m ³ / ha , slow flow	After sowing	
13	Softening and grinding plant roots	With the mechanism 3-4 times 10-12 cm deep	01.09-30.10	05.08-20.09
14	Intermediate processing and mass feeding for the first time after mass germination	Urea - 150 kg / ha , superphosphate -150 kg / ha , potassium chloride 40 kg / ha + 500-600 kg should be diluted	05-15.09	01-10.08
15	Carrying out measures to combat insects and diseases	As a rule, the recommended chemicals,	If necessary	
16	Re-feeding with the beginning of mass flowering.	Ammonium nitrate - 100 kg / ha , superphosphate - 150 kg / ha + 500-600 kg combine with rotten manure	30.09-10.10	25.08-05.09
17	Irrigation water for growth	At a mass rate of 600 m ³ / ha with mass flowering every 5-6 days, only 6-7 times.	05.09-15.10	05.08-15.09
18	Weed cleaning	Two times manually	If necessary	
19	Removing the tops	With the help of specialized mechanisms	30.10-10.11	25.09-05.10
20	Harvesting	Using potato harvesters	30.10-10.11	25.09-05.10

Note: Recommended rules and agrotechnical terms may vary depending on the weather.

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