MANUAL FOR GROWING LEGUMINOUS CROPS

MINISTRY OF AGRICULTURE AND ENVIRONMENT PROTECTION OF TURKMENISTAN

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MANUAL FOR GROWING LEGUMINOUS CROPS

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The manual provides advice on the rules, methods and terms of agro technical measures for the cultivation of leguminous crops in Turkmenistan. It also describes the biological characteristics of leguminous crops, i.e. their requirements to heat, light, soil, water, nutrients, and their effects on plant growth, yield, and product quality. The guide is intended for agricultural professionals, students, tenants, and the general public readers.

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INTRODUCTION

In the era of prosperity of our sovereign state under the wise leadership of our President, in the agriculture of our country achievements in science and technology, new technologies, advanced production practices are widely introduced into production. Great work is being done to improve the culture of the fields. In our country, soybeans, peas, peas and beans, which are legumes, are of great importance in crop rotation in order to obtain high yields from agricultural crops and improve the composition of the soil reclamation.

In agricultural cultivation, legumes help to successfully solve the main three problems, namely, the increase in the production of grain and plant protein in our country, as well as soil erosion, which is a major contributor to legumes, cereals. The amount of protein stored in the grains, leaves, and stalks of leguminous grains is 2-3 times higher than that of whole grains (wheat, rye, barley, and oats). In particular, protein is more common in soybeans, reaching 35-45%. Its fodder value is also important because legumes and legumes contain 8-15% protein.

Unlike whole-grain crops, legumes contain essential amounts of the essential amino acids needed for humans and pets; tryptophan, lysine, valine, arginine, leucine, isoleucine, sis tin, and tyrosine. Cereal crops collect nitrogen from the air through the harvesting bacteria in their roots to help the soil become rich in nitrogen.

On every hectare of land free from soybeans, oats, and peas 60 to 150 kilograms of nitrogen are accumulated. For this reason, leguminous cereals are considered to be the best crops to be planted before other crops in crop rotation. In Turkmenistan such legumes as peas, beans and others are grown. These crops the nature of rapid ripening is to use them as intermediate crops as well allows. Given the above, our country, this manual has been prepared in order to provide scientific advice on the rules, methods and timing of agro-technical

measures to be taken in their cultivation in order to get a good harvest of these crops in soil and climatic conditions.

When preparing this manual, the advices, speeches, and articles of scientists and experts who have gained a lot of experience in growing crops have been used.

I. BIOLOGICAL FEATURES OF LEGUMINOUS GRAIN

Leguminous crops belong to the cereal family; some of them are planted as cultural crops. According to the structure and growth characteristics of the leaves, leguminous grains are divided into three groups:

- Feather-shaped, partly leaves are partly on the surface when sprouting. They include pea pearls, china.

- The leaves are three-toothed, and when they grow, the leaves are partly on the surface of the soil. These include soybeans, beans and vinegar.

- The leaves are finger-shaped; partly leaves are on the surface when sprouting. They include lupines. Because leguminous crops are bullet-rooted, they are able to penetrate into depth of soil (2 meters or more). A large number of side roots return from the main root and they are in the soil occupies a considerable area.

The mechanical strength of the legumes is not equal. For example, chickpeas, vertebrate species, lupine, the soybean stalks remain upright until the end of the development, the chin, and the branches of the pearl and the bean fall.

The fast-growing period of leguminous cereals is their growing and coincides with the time of flowering. In most leguminous crops, the flowers are located on the upper and lateral branches of the main stem.

The formation and flowering of flowers is the main branch and lasts from the beginning to the end of the lateral branches. Beaded leguminous grains (soybeans, peas, beans) bloom and form shoots the period of arrival is continuous.

Soybean (Glycine hispid) is a one-year-old plant that belongs to the legumes family, consists of soybeans and contains human’s substances necessary things for the survival of living. The 100-gram product contains 19.94 grams of fats, 36.49 grams of protein; It contains 30.16 grams of carbohydrates, 8.54 grams of water and 4.87

grams of ash. It is widely used as a fodder in livestock and poultry for livestock and poultry, which remains after its oil, is extracted.

Soybean oil contains 36.4% protein, 6.4% fats and a number of useful compounds are stored. Soybean meal contains 59.2% protein, which the birds better absorb it.

In the cultivation of soybeans in the soil and climatic conditions of our country agro technical measures to be carried out in accordance with scientifically established rules and on average per hectare of soybeans when done on time 25-30 s can be harvested *(Picture 1).*

Picture 1. *Soybean's crop*

Legume (Vigna radiata) is a perennial plant that is rooted belongs to the leguminous family. The amount of protein in the grains, leaves, and stems of the legume is 8.2-12.3% higher than wheat, barley, oats and corn. At the same time, amino acids that cannot be replaced by any other substance in the protein in the legume contain enough amino acids: tryptophan, lysine, valine, arginine, leucine, isoleucine, cysteine and tyrosine. When one of these amino acids is deficient, the metabolism in the human body is disrupted, leading to the development of various diseases. The main feature of the protein in the legume development tests is that they are easily soluble in water

and in organic solvents. The body absorbs protein that dissolves quickly and easily, and the quality and quantity of the product increases.

In the cultivation of legume in the soil and climatic conditions of our country agro technical measures to be carried out in accordance with scientifically established rules and when performed on time, an average yield of 10-15 s per hectare can be obtained from the furnace in production *(Picture 2).*

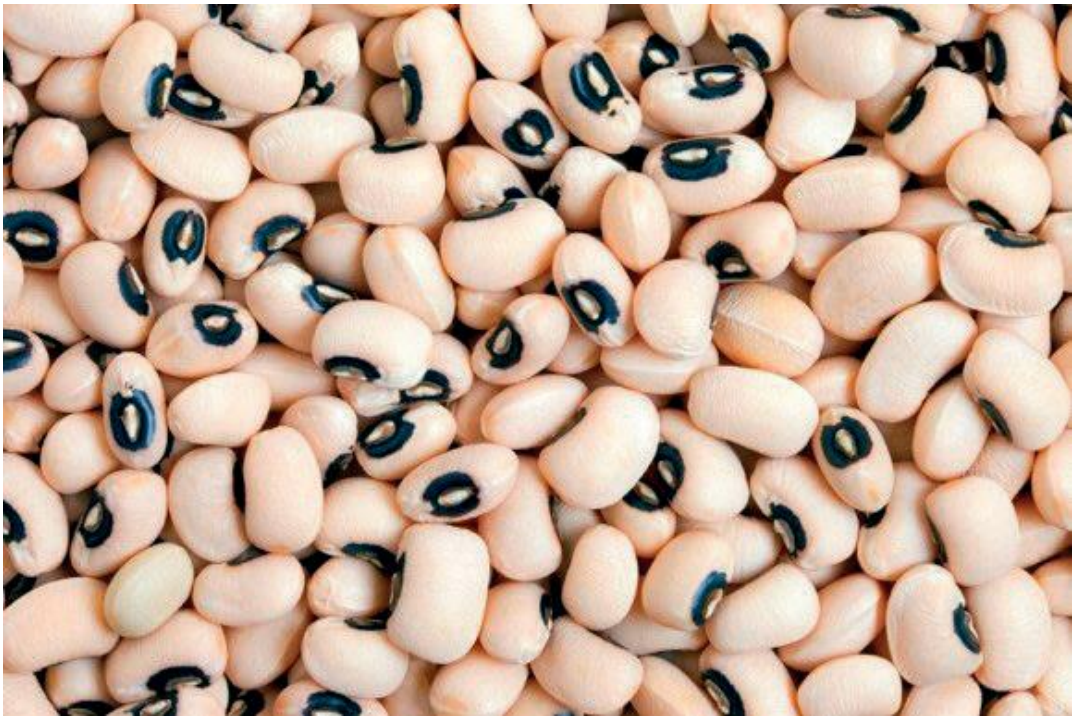
Picture 2. *The grain yield of the legume*

Peas (Cicer arietinum) are a one-year-old plant that grows legumes belongs to the leguminous family. Peas in legumes are the most resistant to drought. Thera are 25% of protein, 49% nitrogen-free extracts, 4.5% fat, 4% fiber and 3.5% ash are retained in contain of peas. In peas and growth tests contains vitamins A, B1, B2 and C.

In the cultivation of peas in the soil and climatic conditions of our country agro technical measures to be carried out in accordance with

scientifically established rules and on average per hectare of peas when done on time. It is possible to harvest 18-20 s *(Picture 3).*

Picture 3. *Pea crop*



Picture 4. *Bean grain yield*

Bean (Phaseolus vulgaris) is a perennial plant that belongs to the family of legumes. Its 100 grams of product contains 1.50 grams of fats, 22.33 grams of protein, 60.75 grams of carbohydrates, 12.10 grams of water, 3.32 grams of ash. Bean grains are only used for food preparation and are very tasty. In the cultivation of beans in the soil and climatic conditions of our country agro technical measures to be carried out in accordance with scientifically established rules and from the average hectare of beans when done on time yields of 17-25 s can be obtained *(Picture 4).*

Heat requirements of leguminous cereals Legumes grain heat requirements are varies; peas, pearls, china seeds begin to germinate at 6-9 degrees Celsius, the seeds of the soybean, the mash, the bean can grow at 12-15 degrees.

According to the duration of the growing season, these crops are divided into two groups. Peas, pearls, china are ripening quickly, beans and soybeans while they are distinguished by the fact that the period of development is continuous. However, there are varieties that grow quickly within the same species. In the soil and climatic conditions of our country, the development period of these crops lasts from 60-90 days (pearl, china, chickpea, peas) to 90-125 days (beans, soybeans).

Divide leguminous cereals into two groups according to heat demand: peas, pearls, china for those who require less heat; high demand includes soybeans and beans.

Light requirements of leguminous cereals. Leguminous cereals are divided into 3 groups according to their ratio to light.

1. Long-day plant: peas, pearls, china and others. The flowering period of the crops accelerates with the prolongation of the sun.
2. Short-day vegetation: some varieties of soybeans, oats and beans. The shortening of the sun speeds up flowering.
3. Intermediate day plants: many varieties of peas and beans.

Soil requirements of leguminous cereals. For the legumes grain the best soil for crops is clay, the soils rich in phosphorus, potassium, calcium (P2O5, K2O, and Ca O).

Water requirements of leguminous crops Grain with legumes the water demand of the crops is also not equal. Inside these crops soybeans are in high demand for water, i.e. hectares during development, Water is filled with a norm of 3200-4000 cubic meters. Leguminous grains, such as peas, nuts, and china, are characterized by drought tolerance, with 1-2 of them in the vicinity of groundwater and in areas with deep groundwater, 3-4 growth water a normal yield can be obtained by catching.

Nutrients requirements of leguminous crops 8-10 tons of manure per hectare of legumes, 400 kg of superphosphate and 100 kg of potassium chloride with plowing, with organic and mineral soils enrichment, improvement of agrochemical-agrophysical properties and creates favorable conditions for increased productivity. Cereal crops are atmospheric with the help of harvesting bacteria enriches the soil with nitrogen because it absorbs nitrogen. At the beginning of their growth, the yield bacteria are still growing at their roots to give 100-120 kilograms of ammonium nitrate per hectare before it starts considered expedient.

The role of leguminous cereals in crop rotation. Leguminous grains are considered the most suitable crop in crop rotation. The same is true of their pests as they spread rapidly planting on the ground and planting after alfalfa is not recommended. They include winter grains, cotton, corn, beets, and yields good when planted in the back of the sunflower. Beaded followed by cereals, winter cereals, cotton, corn, beet, and if crops like sunflower are planted, their yield increases.

This is because the soil is physio-chemical after cereal crops properties improve and it is high in nitrogen and not in large quantities enriches with rottenness.

II. AGROTECHNICS OF LEGUMINOUS GRAIN GROWTH

Due to the short-term maturity and cold-resistance of leguminous crops, they can be harvested in spring and summer.

Selection of fields for sowing leguminous crops To take a high yield of crops the importance of choosing a field is great. To sow legumes clay, light and medium clay, non-saline soils must be chosen. Extremely saline, superficially groundwater, clay and light sandy soils are unsuitable for planting these crops.

Preparation of soil for sowing To take high yields of legumes right preparing of soil is perfect is important. For regular sowing of legumes there are a number of agro technical measures taken. Each of them emphasizing the importance of which and the rules of conduct we pass.

Pre-sowing irrigation To improve the quality of the herd, 600 cubic meters per hectare of arable land is watered. This water is retained in the old preserved caches, and as a result of it the weeds sprout and create a favorable environment for combating them. This water is not supplied on surface areas of groundwater.

Spraying herbicides against perennial weeds Perennial systemic effects on weeds, especially reeds and grasses recommended herbicides are sprayed according to the norm. Fertilizing, plowing and leveling before plowing. When fertilized before plowing, the supply of nutrients to leguminous cereals is improved and favorable conditions are created for its high yield. Prior to plowing, 8-10 tons of manure per hectare, 400 kg of superphosphate and 100 kg of potassium chloride should be given. Proper and timely plowing is an important measure that ensures the effectiveness of all agro technical measures: soil salinization, irrigation, crop nutrition, treatment, and the fight against insects, diseases, weeds. The areas where the legumes will be sown are plowed to a depth of 28-30 centimeters and then leveled with special levelers. Good leveling of cropland is the key to water conservation, marginal germination of crops and high yields.

Preparing the field for washing and growth watering Areas of regular density and high yield from legumes the importance of timely washing and preparation of the catchment water is important. This measure ensures that it is accustomed to irrigation. In preparation for water catchment, temporary irrigation ditches are dug; the fields are

wetted and divided into irrigation ditches. Depending on the level of the terrain, the size of the ridges should be between 0.15-0.25 hectares in light soils and 0.25-0.35 hectares in medium and heavy soils. Temporary irrigation ditches should be drawn so that each irrigation horse is irrigated separately. In the slopes at the foot of the mountain, the water is caught by caches. Then the length of the caches should be 120-150 meters in light soils and 150-180 meters in medium and heavy soils with spacing of 60 centimeters. When the interval is 70 or 90 centimeters, the length of the caches is increased by 1.2-1.3 times. This work is being carried out after the completion of the leveling work.

Washing and growth watering Washing and growth watering are carried out at a rate of 1000-1200 cubic meters per hectare. According to the research, it is advisable to complete the watering of the throne 10-15 days before planting in light soils, and 20-25 days before medium and heavy soils.

Picture 5. *Ridging*

Pre-sowing preparing Moisture storage in irrigated areas and before sowing to get small soil, as soon as the lands are plowed, rake and cattle grazing are carried out. The soil is then treated with a set of chisel, rake and cattle. The depth of treatment should be 12-14 centimeters in light soils and 14-16 centimeters in medium and heavy soils. If, for some reason, no fertilizer is applied to the bottom of the herd, they should be given in a flat area before the treatment, and in the slopes before the rake is applied. Then the ridges are drawn on the slopes. *(Picture 5)*

Sowing of legumes grains High yields from these crops is important that the sowing is carried out in a timely and high-quality manner is important. Depending on the species, their sowing should begin when the average daily temperature reaches 4-5 º.

In our country, there are several varieties of soybeans, peas, peas and beans are cultivated and reap a bountiful harvest from them. More than that the most widely cultivated varieties are as follows:

Picture 6. *Soybean's Garagum variety*

Soybean's Garagum variety The growth period of the Garagum variety of soybeans, which are put into production in our country, is

115-120 days, the height of the plant is 75-80 centimeters, the length of the legumes is 3-5 centimeters, the average yield is 25-30 s per hectare, the weight of 1000 grains is 110-115 grams, the protein is 29-32 %., fat content 19-22%, carbohydrates 15-17% *(Picture 6).*

The "Bereketli" variety of the legume Legume's "Bereketli" variety introduced into production in our country in 2015, the growth period of this variety is 78-80 days, the height of the plant is 50-55 centimeters, the length of the stem is 9-12 centimeters, with an average yield of 15-20 s per hectare, 1,000 grains weight 75-80 grams, grain protein is 25-27%, starch 55-56% *(Picture 7).*

Picture 7. *"Bereketli" variety of the legume*

Pea's "Ýerli nohut" variety. The growth period this variety which cultivated in our country is 90-92 days, depending on the plant height 40-45 centimeters, leg length 3-5 centimeters, average yield 18-20 s per hectare, weight of 1000 grains 270-290 grams, with a protein content of 25-30% *(Picture 8).*

Picture 8. *“Ýerli nohut” variety of peas*

Bean’s “Adaty noýba” variety. The growth period of “Adaty noýba ” variety which cultivated in our country is 90-100 days, the length of the crop is 12-15 centimeters, with an average yield per hectare 17-25 s, the weight of 1000 grains is 240-250 grams, and the protein content of grains is 28-30% *(Picture 9).*

Picture 9. *Grain of the " Adaty noýba " bean variety*

According to research, the seed of leguminous cereals when prepared with nitragin before planting it is beneficial for high yields and large grains affect.

Nitragin - artificially enriched with club bacteria it is a mixture that contains soil, rot, and small amounts extinguished lime, mineral fertilizers, phosphorus, trace elements are stored. The mixture can be prepared independently in any household. Nitragin reddish-purple of farmland for preparation you need to get 3-4 kilograms of soil from colored soils. Such colorful soil contains naturally active crop bacteria. In particular, 3-4 kilograms of arable land limestone, phosphorus, and micronutrients taken into the soil and extinguished in small quantities mixed with other bacteria in this mixture and so on in a mixed thermostat at 55-60° C to avoid small particles holds for 24 hours. Then with this mixture, previously taken from the field reddish-purple soil is stored at 28-30° C for 1 week for seeds of mash, peas, beans and 2-3 weeks for soybean seeds in a thermostat. The mixture is then placed in a half-liter glass container. The day before the sowing, it was prepared pour 4 liters of water over the mixture in the container and mix for 3-5 minutes. The prepared nitragin mixture reaches 100 kilograms of legumes. When seeds are sown with nitragin, then the grain yield per hectare increase in 3-4 s. But the seeds 40 days in advance of treatment for diseases and pests because this chemical is responsible for the destruction of the resulting bacteria causes.

The seeds of legumes are 5-6 centimeters in medium and heavy soils centimeters, to a depth of 6-8 centimeters in areas with light sandy soils is planted *(Picture 10).*

When soybean planting rate is 60 centimeters then per hectare 46-50 kilograms, when it is 70 centimeters 40-45 kilograms per hectare, and when it is 90 centimeters 32-35 kilograms per hectare high quality seeds are consumed under *(Pic. 11).*

When the planting rate of the legume is 60 centimeters per hectare 21-25 kilograms, 16-20 kilograms per hectare at 70 centimeters, when it is 90 centimeters high quality seeds are consumed at a rate of 12-15 kilograms per hectare *(Picture 12).*

Picture 10. *Sowing*

Picture 11. *The harvesting period of soybean*

When pea planting rows are 60 centimeters 55-60 kilograms per hectare and 70 centimeters 46-50 kilograms per hectare, and when it is 90 centimeters 40-45 kilograms per hectare quality seeds are consumed.

Picture 12. *The period harvest of legume*

Bean sowing rows rules are 180 cm long and high quality seeds are consumed at a rate of 45-55 kg per hectare.

Inter-line work. Inter-line work the purpose is to keep the soil soft, moist consists in reducing losses, preventing the rise of salts, eradicating weeds, and creating favorable conditions for plants to grow and reap a good harvest. Grain legumes are treated 3 times in a row during development: 10-12 centimeters when 5-6 true leaves are formed for the first time; 16-18 centimeters at the time of second budding; the third time should be carried out with the help of a softener at a depth of 18-22 centimeters during the mass formation of the shoots.

Feeding with mineral fertilizers during the growth and growth watering Grain legumes 5-6 during development when the leaves are formed, they are additionally fed with 100-120 kilograms of

ammonium nitrate per hectare and the 1st growth water is retained, 2nd, in the period when the plants begin to germinate 3rd during flowering, mass formation of shoots 4th growth waters during the period and 5th growth waters during the ripening period of the grains caught (*Picture 13).*

Picture 13. *The harvesting time of the bean.*

Pests and diseases of leguminous crops. In growing period there are several types of pests and diseases occur, which have a detrimental effect on the quantity and quality of their harvest. It will hurt those who come in more often than pests fruit long-stem (Sitona lineatus L.), bean-seed (Bruchus pisorum L) and bean juice (Acyrthosiphon pisi Calt).

In particular, bean grains are common in these crops comes out and feeds on the formed beads and pierces them. During the development of excretory excretions and larvae they pollute the grains with the threshing bees. As a result, it is harmful the germination of the grains decreases; they are unpleasant odors and can be eaten considered invalid. Adult bean (imago) is beetle-shaped, and up to 4.5 meters long. Mother beetle puts a total of more than 130 yellow eggs

in crop yield tests. The larvae hatch from the egg in 6-10 days and immediately begin to feed on the seeds. The larvae are thick, fleshy, legless, small-headed, and up to 6 millimeters long. Of the grain it may include several larvae, but one of them remains, others die. The larvae feed on the grain for 1.5-2 months, then take a hole in the lid around the grain and put the doll in it becomes In the fall, a beetle is formed from the pupae inside the grain comes and winter in the grain as well. In the spring, the beetle was made before he removes the lid of the hole and comes out, and with the flowers of the plant nourishes and begins to multiply.

Insecticides recommended against emerging pests (e.g., ephedrine, imidor, awaunt, entowantkarate) should be used within the established rules and deadlines.

Ascohytosis is a common disease in legumes (spotting, Ascochyta pisi L.) and bean rust (Uromuces fungi D.) such as fungal diseases. Patient with ascohitosis on the leaves of the plants the middle is whitish and the surroundings are open brown, round or elongated spots appear. Then black matter (mushroom picnics) is formed in the middle of the spots and spreads to the stems of the plant, to all surface tests. The plant with ascohytosis Ascochyta pin odes John can also cause fungus.

But this mushroom is also distinguished by the fact that it touches the root of the plant and rots it. The main source of disease is the residues and grains of diseased plants. In order to prevent ascohytosis, the seeds contain fungicides containing imazazil + metallaxil + tebuconazole (benofis,scarlet) should be medicated. If fungal diseases occur any of the fungicides containing propiconazole + tebuconazole sprinkle one (Colossal Pro). In order to completely eradicate the disease, it is recommended to re-spray the fungicide several times.

Preparing to harvest the legumes and harvesting. Cultivated crop is not lost in time gathering is the most responsible task. To do this, you need to inspect and repair grain harvesters and grain transporters in a timely manner. In order for the grain harvesters to work smoothly, temporary closures, ditches, and areas around the

fields must be well leveled. The harvest of the oven and the bean does not ripen at the same time. Therefore, its crop is harvested in a bipartisan manner, first harvested and packaged, and after the bundles are well dried, it is recommended to harvest the grain by crushing it with the help of grain harvesters.

Table 1

Agro technical measures of growing soybeans in the spring

№	Agro technical measures	Norm	Deadline	
			In the regions Ahal, Balkans, Mary and Lebap	**In the Dashoguz region and north districts of Lebap region**
1	*2*	*3*	*4*	*5*
1	Fetching water before driving (when needed)	600 m3/ga	01-20.10	10-20.09
2	Conducting weed control measures	Recommended herbicides	10-30.10	15-25.09
3	Fertilizer before plowing	Rotting course - 8-10 t / ha, Superphosphate-400 kg / ha, Potassium chloride-100 kg / ha	25.10-01.12	25-30.09
4	Plowing	28-30 sm	01.11-10.12	01.10-10.11
5	Aligning	Cross-sectional	15.12-05.02	24.03-03.04

Continue of table 1

1	*2*	*3*	*4*	*5*
6	Preparation of lands for washing and water combination (split into row)	In light soils 0.15-0.25 ha, in medium and heavy soils 0,25-0,35 hectares	20.12-10.02	26.03-05.04
7	Ridges drawing	Rows 60, 70 we 90 cm	01.02-10.03	12-22.04
8	Land washing and water combination	1000-1200 m3/ha	05-10.04	15-25.04
9	Sowing	Rows: 60 cm - 46-50 kg/ha; 70 cm - 40-45 kg/ha; 90 cm - 32-35 kg/ha	10-15.04	20-30.04
10	Growing water catchment (in the case of water is not provided)	700-800 m^3/ha	After sowing	
11	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate - 100-120 kg/ha	10-15.05	15-25.05
12	1st catch water growth	600-800 m^3/ha	15-20.05	20-30.05
13	Conducting 1st line treatment	8-10 cm deep	20-25.05	25.05-05.06
14	2nd growth irrigation	600-800 m3/ha	05-15.06	25-30.06

Continue of table 1

1	*2*	*3*	*4*	*5*
15	Conducting 2nd line treatment	16-18 cm deep	15-20.06	01-15.07
16	3rd growth irrigation	600-800 m3/ha	05-10.07	20.07-05.08
17	Conducting 3rd line treatment	20-22 cm deep	10-15.07	01-10.08
18	4th growth irrigation	700-800 m3/ha	20-30.07	25.08-05.09
19	5th growth irrigation	700-800 m3/ha	20-25.08	15-25.09
20	To transfer measures to control pests and diseases	Recommended insecticides and fungicides	During the development period (when necessary)	
21	Harvesting	With combine harvester	10-15.09	10-20.10

Note. Depending on the weather, the recommended agro-technical norms and deadlines may change

Table 2

Agro-technical measures for growing soybeans in the summer

№	Agro technical measures	Norm	Deadline
			In regions Ahal, Balkan, Mary and Lebap
1	*2*	*3*	*4*
1	Fertilizer before plowing	Rotting course - 8-10 t / ha, Superphosphate - 400 kg / ha, Potassium chloride-100 kg / ha	10-15.06
2	Plowing	28-30 cm deep	20-25.06
3	Aligning	Cross-sectional	28-30.06
4	Ridges drawing	Rows 60, 70 and 90 cm	01-05.07
5	Irrigation	1000-1100 m3/ha	05-10.07
6	Sowing	Rows: 60 cm - 46-50 kg/ha; 70 cm - 40-45 kg/ha; 90 cm - 32-35 kg/ha.	10-15.07
7	Growing water catchment (in the case of water is not provided)	700-800 m3/ha	After sowing

Continue of table 2

1	*2*	*3*	*4*
8	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate - 100-120 kg / ha	25-30.07
9	1st growth irrigation	600-800 m3/ha	25-30.07
10	Conducting 1st line treatment	8-10 cm deep	01-05.08
11	2nd growth irrigation	600-800 m3/ha	15-25.08
12	Conducting 2nd line treatment	16-18 cm deep	20-30.08
13	3rd growth irrigation	600-800 m3/ha	25.08-10.09
14	Conducting 3rd line treatment	20-22 cm deep	15-20.09
15	4th growth irrigation	700-800 m3/ha	01-05.10
16	To transfer measures to control pests and diseases	Recommended insecticides and fungicides	During development (when needed)
17	Harvesting	With combine harvester	15-20.10

Note. Depending on the weather conditions, the recommended agro-technical norms and deadlines may change.

Table 3

Agro-technical measures for growing legume in the average time

№	Agro technical measures	Norm	Deadline	
			In the regions Ahal, Balkans, Mary and Lebap	**In the Dashoguz region and north districts of Lebap region**
1	*2*	*3*	*4*	*5*
1	Fetching water before driving (when needed)	600 m3/ha	15-20.06	20-25.06
2	Plowing	28-30 cm deep	20-25.06	25-30.06
3	Aligning	Cross-sectional	23-28.06	05-10.07
4	Ridges drawing	Rows 60, 70 and 90 cm	25-30.06	10-15.07
5	Sowing	Rows: 60 cm - 21-25 kg/ha; 70 cm - 16-20 kg/ha; 90 cm - 12-15 kg/ha.	01-05.07	15-20.07

Continue of table 3

1	*2*	*3*	*4*	*5*
6	Growing water catchment	800-1200 m3/ha	01-10.07	15-20.07
7	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate-100-120 kg/ha	15-20.07	25-30.07
8	1st growth irrigation	700-1200 m3/ha	20-25.07	27.07-01.08
9	Conducting 1st line treatment	8-10 cm deep	25.07-01.08	05-10.08
10	2nd growth irrigation	700-1200 m3/ha	10-20.08	20-25.08
11	Conducting 2nd line treatment	16-18 cm deep	15-25.08	25-30.08
12	3rd growth irrigation	800-1200 m3/ha	20-30.08	30.08-05.09
13	To transfer measures to control pests and diseases	Recommended insecticides and fungicides	During development (when needed)	
14	Harvesting	Partially:first reap, then with a combine harvester	30.08-02.09	01-10.10

Note. Depending on the weather conditions, the recommended agro-technical norms and deadlines may change.

Table 4

Agro-technical measures for growing pea

№	Agro technical measures	Norm	Deadline	
			In the regions Ahal, Balkans, Mary and Lebap	**In the Dashoguz region and north districts of Lebap region**
1	*2*	*3*	*4*	*5*
1	Fetching water before driving (when needed)	600 m3/ha	01-20.10	10-15.10
2	Conducting weed control measures	Recommended herbicides	10-30.10	20-25.10
3	Fertilizer before plowing	Rotting course - 8-10 t/ha, Superphosphate - 400 kg/ha, Potassium chloride-100 kg/ha	25.10-01.12	30.10-05.11
4	Plowing	28-30 cm deep	01.11-10.12	05-15.11
5	Aligning	Cross-sectional	13.12-30.01	20-30.11
6	Ridges drawing	Rows 60, 70 and 90 cm	25.01-25.02	-
7	Irrigation	900-1200 m3/ha	01-10.03	05-15.03

Continue of table 4

1	*2*	*3*	*4*	*5*
8	Sowing	Rows: 60 cm - 55-60 kg/ha; 70 cm - 46-50 kg/ha; 90 cm - 40-45 kg/ha	10-15.03	25.03-05.04
9	Growing water catchment (in the case of water is not provided)	700-900 m3/ha	After sowing	
10	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate - 100-120 kg / ha	20-30.04	05-10.05
11	1st growth irrigation	700-900 m3/ha	20.04-01.05	05-10.05
12	Conducting 1st line treatment	8-10 cm deep	30.04-10.05	10-15.05
13	2nd growth irrigation	700-900 m3/ha	25.05-01.06	30.05-05.06
14	Conducting 2nd line treatment	16-18 cm deep	31.05-10.06	10-15.06
15	3 rd growth irrigation	700-900 m3/ha	15-20.06	20-30.06
16	Conducting 3rd line treatment	20-22 cm deep	20-25.06	05-10.07
17	4 th growth irrigation (when the weather is dry)	700-900 m^3/ha	25-30.06	10-15.07
18	Conducting pest and disease control measures	Recommended insecticides and fungicides	During the development period (when necessary)	
19	Harvesting	with a combine harvester	05-15.07	20-30.07

Note. Depending on the weather conditions, the recommended agro-technical norms and deadlines may change.

Table 5

Agro technical measures for the cultivation of beans in the spring

№	Agro technical measures	Norm	Deadline	
			In the regions Ahal, Balkans, Mary and Lebap	In the Dashoguz region and north districts of Lebap region
1	*2*	*3*	*4*	*5*
1	Fetching water before driving (when needed)	600 m3/ha	01-20.10	15-25.10
2	Conducting weed control measures	Recommended herbicides	10-30.10	20-30.10
3	Fertilizer before plowing	Rotting course - 8-10 t/ha, Superphosphate - 400 kg/ha, Potassium chloride - 100 kg/ha	25.10-01.12	01-10.11
4	Plowing	28-30 cm deep	01.11-10.12	15.11-15.12
5	Aligning	Cross-sectional	15.12-05.02	25.12-10.02
6	Preparation of lands for washing and water combination (split into row)	In light soil 0,15-0,25 hectares 0,25-0,35 ha in medium and heavy soils	20.12-10.02	30.12-15.02

Continue of table 5

1	*2*	*3*	*4*	*5*
7	Ridges drawing	Rows 180 cm	05.02-10.03	05.02-10.03
8	Land wash and water combination	900-1200 m3/ha	01-10.04	10-15.04
9	Sowing	45-55 kg/ha	10-15.04	20-25.04
10	Growing water catchment (in the case of water is not provided)	900-1200 m3/ha	20-25.04	25-30.04
11	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate - 100-120 kg/ ha	10-15.05	20-25.05
12	1st growth irrigation	900-1000 m3/ha	15-20.05	25-30.05
13	Conducting 1st line treatment	8-10 cm deep	20-25.05	05-10.06
14	2nd growth irrigation	900-1000 m3/ha	10-15.06	15-25.06
15	Conducting 2nd line treatment	16-18 cm deep	15-20.06	20-30.06
16	Conducting pest and disease control measures	Recommended insecticides and fungicides	During the development period (when necessary)	
17	3rd growth irrigation	900-1000 m3/ha	05-10.07	10-15.07
18	Conducting 3rd line treatment	20-22 cm deep	10-15.07	15-20.07
19	4 th growth irrigation	900-1000 m3/ha	20-25.07	10-15.08
20	Harvesting	Partially: first reap, then with a combine harvester	10-15.09	01-10.10

Note. Depending on the weather conditions, the recommended agro-technical norms and deadlines may change.

Table 6

Agro-technical measures for growing beans in the summer

№	Agro technical measures	Norm	Deadline
			In Ahal, Balkan, Mary regions and in the southern districts of Lebap region
1	*2*	*3*	*4*
1	Fetching water before driving (when needed)	600 m^3/ha	15-20.06
2	Plowing	28-30 cm deep	20-25.06
3	Aligning	Cross-sectional	26-28.06
4	Ridges drawing	Rows 180 cm	29.06-01.07
5	Irrigation	900-1200 m3/ha	01-05.07
6	Sowing	45-55 kg/ha	10-15.07
7	Growing water catchment (in the case of water is not provided)	900-1200 m3/ha	After sowing

Continue of table 6

1	*2*	*3*	*4*
8	Feeding with nitrogen fertilizer for the first time	Ammonium nitrate - 100-120 kg/ha	20-25.07
9	1st growth irrigation	900-1200 m3/ha	25-30.07
10	Conducting 1st line treatment	8-10 cm deep	05-10.08
11	2nd growth irrigation	900-1200 m3/ha	20-25.08
12	Conducting 2nd line treatment	16-18 cm deep	25-30.08
13	Conducting pest and disease control measures	Recommended insecticides and fungicides	During the development period (when necessary)
14	3rd growth irrigation	900-1200 m3/ha	01-05.09
15	Conducting 3rd line treatment	20-22 cm deep	10-15.09
16	4th growth irrigation	900-1200 m3/ha	20-25.09
17	Harvesting	Partially:first reap, then with a combine harvester	10.10-15.10

Note. Depending on the weather conditions, the recommended agro-technical norms and deadlines may change.

CONTENT

Introduction 4
I. BIOLOGICAL FEATURES OF LEGUMINOUS GRAIN 6
II. AGROTECHNICS OF LEGUMINOUS GRAIN GROWTH 11

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AGRICULTURAL SCIENTIFIC-PRODUCTION CENTER

MANUAL FOR GROWING LEGUMINOUS CROPS

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