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Improving of Agricultural Technologies for Growing Jerusalem Artichoke (Helianthus Tuberosus l.) in Uzbekistan.

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Abstract

In the context of Uzbekistan, early growth rates for new varieties such as Mujiza and Etirof were studied, as well as the productivity of new varieties of artichoke.There were generated agricultural techniques of planting early spring and late-autumn varieties as separate feed for livestock and agro-techniques of individual growing for the food and pharmaceutical industry were also developed. Considering the high inulin yield in tuber, which grows in the mountainous and foothill areas of the republic, it is advisable to grow both annual and perennial crops for the food and pharmaceutical industry, as well as on the lowlands for the livestock industry.

Keywords: Jerusalem Artichoke (topinambur), variety, planting time, bush thickness, food, environmentally friendly products, tuber, number of stems, inulin, productivity, crop production practice, blue mass, cluster system, yielding capacity, topinamburcrop spraying.

Introduction

In recent years, new forms of ownership in agricultural production, crop production and livestock have been introduced in the cluster system. Improving efficiency and production profitability is the main focus of the program, which requires developing environmentally friendly products based on new varieties, technologies and technologies with low costs, saving water and maintaining soil fertility. In animal husbandry, 60% of efficiency depends on the substantiality of the feed base, the composition of nutrients, availability of high-calorie feed during the whole year. Multidisciplinary farms conduct following planting practices: cotton+ cereal crops, cereal crops+ forage products. For short-term crop rotationthey plant cereals and forage crops compared to the main food plants. According to the market requirements, it also calls to plant catch crops and double crops, while maintaining fertile soil while at the same time providing the population with clean environmental products and livestock feed. MavlyanovaR.F. [3; pages 25-30].

Topinambur is suitable for large-scale use in production cluster systems, which plays an important role in growing and ensuring food security for a wide range of healthy and highly profitable plants in the processing and consumption market.Jerusalem Artichoke varieties, like Camelia (Bonciu) Neagu and Gabriela Bahrim [4; 57-б] are not only suitable for animal husbandry but also good for elder generation because itis important that the diet is balanced with food. According to D. Abdukarimov and others, 40 tons of crop is harvested from one hectare and 5 tons of topinambur powder can be obtained from this yield.Topinambur powder is added to ensure food safety, which is included to the diet of people, who is suffering from diabetics by adding to the bread and baked goods, food and salads (Safarov A.K., 7; pages 32-33).It has been established that the blood and urine characteristic value of patients, who is using topinambur-inulin have lowered blood sugar levels to 16-17% and optimize hydrate metabolism using various cool dietary drinks made from topinambur.

De Mastro G., Manolio G. and Marzi V. [5; 372-б], Kocsis L, Kaul H-P, Praznik W. and Liebhard P [6; p.1164]. Topinambur is a perennial high-yield crop plant and havetubers that together give25-28 tons of nutrients per unit area and contains inulin and is a promising plant that is fully recyclable. The world agricultural practice shows that 85-100 tons of agricultural crops were collected from per hectare, where 28-40 tons of tuber yields and 25-30 tons of high-quality nutrients can be gained from per hectare. From these 40 tons of harvest, 5 tons of topinambur powder can be obtained or 4,680 kg of inulin per hectare can be extracted, and pulp, paper and ethanol are extracted from the stem and leaves[1].

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Topinambur powder is included as dietary supplement to make diet-bread and baked goods, salads, meals for diabetics. It has been established that the level of sugar in the blood and urine of patients, who is using topinambur-inulin, havelow sugar levels, i.e. up to 16-17%, and that they canoptimize carbohydrate metabolism by consuming various soft dietary drinks made from topinabur and

rootvegetables.Amonova M.E., Akhmedov T., Hasanov H.[2; page 70]

The exact determination of planting time of early spring plantings and density of sowing on the example of Andijan region will allow increase yields and provide quality livestock food.

Research Objectives

Improving agro technological practices in order to grow new varieties of topinambur in different climatic conditions for different purposes.

[1]Camelia (Bonciu) Neagu and Gabriela Bahrim.Comparative study of different methods of hydrolysis and fermentation for bioethanol obtaining from inulin and inulin rich feedstock/ St. Cerc. St. CICBIA, 2012. 13 (1) 2012, p.67

The Following Tasks Were Set for the Research

- Determining of growth, development and productivity when planting varieties of both annual and perennial crops in different soil conditions;
- Assessment of the dynamics of harvesting tuber yields and biomass of varieties planted both annual and perennial crops under different soil conditions;
- Assessment of crop quality when consuming biomass and tuber yields by different types of livestock in different soil conditions;
- Determining the amount of inulin in tuber yields when cultivated as annual and perennial crops in different soil and climatic conditions;
- Assessment of the patterns of biomass formation and tuber yields by methods of cultivation of varieties in different soil conditions;
- Determine the effectiveness of improving the cultivation of topinambur varieties as annual and perennial cropsin different soil-climatic conditions.

Conditions of Field Research

Field research is being carried out on farm companies in Bakhmaldistrict ofDjizzak region,Akdarya district of Samarkand region, Navbahor district of Navoiyregion since 2017.

The Object of the Study

The object of the study is 3 varieties of Topinambur (Mirza and Etirof), which were planted at meadow gray soils of Akdarin district of Samarkand region, meadow soils of the Bakhmal district of Djizak region and soils typical of the Navbahor district were used Navoiy region, they were planted as annual and perennial crops.Planting, planting time and density of the plants are the subject of research.

Materialsandmethods

All agro-technical measures, i.e. field experimental works, planting, phenological observation, biometric measurements, plant care, crop identification are held in conjunction with the Ministry of Agriculture and Water Management of the Republic of Uzbekistan, the Leningrad (St. Petersburg) Institute of Agriculture, the All-Russian Potato Research Institute andthe Agency for establishing new varieties of Crops. The work is carried out on the basis of methodical recommendations, instructions, methods of the State Commission for control of new varieties, as well as methodical recommendations, instructions, methods according to "Methodology of Field Experiments" (1985) of the State Testing Commission after the name of B.A.Dospekhov. Statistical analysis of the results obtained in field experiments will be performed on the programs WinQSB-2.0 and Microsoft Excel.

Agricultural activities have been developed to grow varieties based on their biological characteristics, as well as depending on the purpose of cultivation in different soil and climatic conditions. With this in mind, we grow Topinamburin mountainous areas (Jizzakh region), foothill areas (Samarkand region) and plains

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(Navoiy) region and analyze growth, development and productivity, as well as the amount of inulin in the regions according to the following analyses.

In the first experiment, there were two variants in all three regions: Option1: tuber yield -fodder:

When planting in the spring, the stand thickness of the shoot is 31,700 pieces per hectare(90x35 cm), N-250, P-180, K-150 kg/ha, number of watering is 6-8 times, harvesting time - in October, the above-ground part is processed separately as animal feed and tuber yield is harvested separately.

Option2: targetfodder-tuber yield: planting in autumn with a stand thickness of shoot is 55,500 pieces per hectare (60x30 cm), N-300, P-200, K-150 kg /, number of watering is 8-10 times, harvesting time - in September, above ground part and tuber yields are synchronically harvestedas fodder.

Planting of Etirof variety was carried out in spring on the scheme of 90x35 cm, and in autumn 60x30 cm. The number of repetitive plantings was 4. Planting area was 108 m2 in spring and 72 m2 in autumn.

Conduction of field experiments, plantings, phenological observations, biometric measurements, crop care, yield definition were based on methodical recommendations, instructions, methods of the Ministry of Agriculture of the Republic Uzbekistan, crop research institute, State Agency on testingof new varieties of agriculture.

In the experiment, the duration of the growing season was calculated from the moment of full growth of plants, for example in Navoiy region, this period was 171 days as per option 1, as it was planted in spring on typical gray soil. And as per the second option, this period was equal to 175 days, i.e. planting was done in autumn.

In Samarkand region, the growing season was equal to 163 days, when it was planted in foothill areas in spring time as per the option 1and in autumn it was equal to 168 days as per the option 2.

In the mountainous areas of Jizzak region, the growing season was equal to 149 days according to option 1, when it was planted in spring time, whereas in the autumn this period was equal to 168 days, when it was planted as per the option 2.

Due to the perennial nature of topinambur, as well as in areas with sufficient duration of warm days (Navoiy region), even seed formation was observed, but there was no full bloom cycle, especially in the mountainous areas of Samarkand and the Djizzak region and shorter interphase periods were recorded.

Results and Discussion

During the studies, the following biometric parameters of plants were recorded: on typical gray soils (on plains) the height of the plant 235.6-242.5 cm, number of stems 2.6-2.8 units, side bushes 32.4-36.7, number of leaves 88.7-95.6, in conditions of 7-95.6 meadow gray soils (in the foothills) the height of the plant is220.6 - 232.8 cm, number of stems - 2.4-2.5 pieces, number of lateral bushes - 26.5-32.1, number of leaves66.5-72.4 pieces, in the mountainous area (Djizzak region) the height of the plant is 198.7-209.6 cm, the number of stems 2.3-2.3 pieces.And the number of lateral bushes is 23.1-24.2 and the leaf quantity is 61.8-64.6 (table 1).

In pilot areas there are increases of absolute height, temperature, humidity and type of pasture lands, which have led to a decrease in the height of the plant, the number of stems, side bushes and leaves, which of course depend on biological characteristics of the plant.

Table #1: Plant growth and development rates

#	Plant varieties	Plant characteristics while bursting into blossom				
		The height of the plant,cm	The numberoffootstalk,	The number of leaves, pcs.	The number of lateral bushes, pcs.	Flatness of the leaves, thousand cm 2

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Navoiy region, plain lands, typical gray soils							
1	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,700 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time - October, the above ground part is harvested separate, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	235,6	2,8	95,6	36,7	192,5
2	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,5 thousandpcs./ha (60x30 cm), N300, P200, K150 kg/ha, waterapplications 8-10 times, harvestingtime – September, the above ground part is harvested together with tuber yields and is processed like silo.	242,5	2,6	88,7	32,4	186,1
Samarkandregion, foothill areas, pasture gray lands							
3	Orientation: tuber-yields fodder	Plantedinspring, plantthickness 31,7 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, waterapplication 6-8 times, harvestingtime-October,the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	220,6	2,5	66,5	31,2	154,6
4	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,500thousandpcs./ra (60x30cm), N300, P200, K150 kg/ha, water applications 8-10 times, harvesting time –September, the above ground part is harvested together with tuber yields and is processed like silo.	232,8	2,4	72,4	26,5	151,3
Djizzakh region, mountainous areas, pasture lands							
5	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,7 thousand pcs. /ha (90x35cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time –October, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	198,7	2,3	61,8	24,2	135,7
6	Orientation: fodder-tuber yields	Planted in autumn, plant thickness 55,5 thousand pcs./ha (60x30cm), N300, P200, K150 kg/ha, water application 8-10 times, harvesting time –September, the above ground part is harvested together with tuber yields and is processed like silo.	209,6	2,3	64,6	23,1	133,8

In the experiment, plant productivity rates varied considerably by region.

The following data were reported: in the plainlands (Navoiy region) the yield of the above-ground part is1704.5-2413.2 grams per bush, and the yield of tuber yield is 635.9-1345.7 grams, in the foothill areas the yield of the above-ground part is1482.8-221111.3 grams, and the tuber yield is 511.7-1214.5 grams, while in mountainous areas the yield of the above-ground part is1266.6-1851.7 grams, and the tuber yield is 477.4-927.4 grams.

Here are the inulin content of tuber yields, grown in mountainous region was 13.6-13.8%, in the foothill zone - 12.5-12.7%, and on plain areas - 9.5-10.3% (table #2).

Table #2: Nutritional value of the biomassand dynamics of inulin accumulation in the tuber yield

#	Plant varieties	Unit of measurement of nutritional value	Inulin content, %

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			As of Aug. 25	As of Sep. 25	As of Oct.25	As of Aug. 25	As of Sep. 25	As of Oct.25
Navoiy region, plain lands, typical gray soils								
1	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,700 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time - October, the above ground part is harvested separate, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	0,18	0,21	0,24	7,1	8,9	9,5
2	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,5 thousandpcs./ha (60x30 cm), N300, P200, K150 kg/ha, waterapplications 8-10 times, harvestingtime – September, the above ground part is harvested together with tuber yields and is processed like silo.	0,16	0,19	0,22	8,2	9,4	10,3
Samarkandregion, foothill areas, pasture gray lands								
3	Orientation: tuber-yields fodder	Plantedinspring, plantthickness 31,7 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, waterapplication 6-8 times, harvestingtime-October,the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	0,16	0,2	0,23	8,3	9,9	12,5
4	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,500thousandpcs./ra (60x30cm), N300, P200, K150 kg/ha, water applications 8-10 times, harvesting time –September, the above ground part is harvested together with tuber yields and is processed like silo.	0,15	0,18	0,22	8,7	10,6	12,7
Djizzakh region, mountainous areas, pasture lands								
5	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,7 thousand pcs. /ha (90x35cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time – October, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	0,16	0,18	0,22	10,1	11,2	13,6
6	Orientation: fodder-tuber yields	Planted in autumn, plant thickness 55,5 thousand pcs./ha (60x30cm), N300, P200, K150 kg/ha, water application 8-10 times, harvesting time – September, the above ground part is harvested together with tuber yields and is processed like silo.	0,15	0,17	0,22	10,5	12	13,8

Agricultural crops were focused on two directions, which was undergone to research, in three different climatic conditions with different soils, showed a significant difference in plant growth, development, productivity and inulin content in each soil cluster at cultivation in two agroactive complexes, namely tuber yields-fodder and fodder-tuber yields. It was defined that it is better to grow the plant according to the purpose of the crop.

Table #3: Productivity of biomass and tuber yields in the process of topinambur growth, t/ha

#	Plant varieties	Reproduction

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			I		II		III	
			Biomass	Tuber yields	Biomass	Tuber yields	Biomass	Tuber yields
Navoiyregion, plainlands, typicalgraysoils								
1	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,700 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time - October, the above ground part is harvested separate, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	76,5	42,6	68,3	35,2	64	33,2
2	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,5 thousandpcs./ha (60x30 cm), N300, P200, K150 kg/ha, waterapplications 8-10 times, harvestingtime – September, the above ground part is harvested together with tuber yields and is processed like silo.	94,6	35,2	84,6	29,1	75	27,4
Samarkandregion, foothillareas, pasturegraylands								
3	Orientation: tuber-yields fodder	Plantedinspring, plantthickness 31,7 thousand pcs./ha (90x35 cm), N250, P180, K150 kg/ha, waterapplication 6-8 times, harvestingtime-October,the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	70,1	38,5	65,2	34,3	61,7	28,6
4	Orientation: fodder-tuber yields	Plantedinautumn, plantthickness 55,500thousandpcs./ra (60x30cm), N300, P200, K150 kg/ha, water applications 8-10 times, harvesting time –September, the above ground part is harvested together with tuber yields and is processed like silo.	82,3	28,4	71,7	26,9	63,8	25,4
Djizzakhregion, mountainousareas, pasturelands								
5	Orientation: tuber-yields fodder	Planted in spring, plant thickness 31,7 thousand pcs. /ha (90x35cm), N250, P180, K150 kg/ha, water application 6-8 times, harvesting time –October, the above ground part is harvested separately, tuber yields are harvested separately as food products and processed.	58,7	29,4	56,5	28,2	54,1	24,9
6	Orientation: fodder-tuber yields	Planted in autumn, plant thickness 55,5 thousand pcs./ha (60x30cm), N300, P200, K150 kg/ha, water application 8-10 times, harvesting time –September, the above ground part is harvested together with tuber yields and is processed like silo.	70,3	26,5	63,8	26,1	55,7	23,8

The experiment provides data showing that 58.7-70.3 tons of biomass was obtained in the first reproduction of topinambur in mountainous areas and harvest of tuber yields was 26.5-29.4 tons per hectare whereas in the third reproduction, these figures decreased, reaching 54.1-55.7 and 23.8-24.9 tons per hectare accordingly. This decline in productivity was observed in other regions as reproduction increased, but the figures were higher in the foothill and plain areas. This is facilitated by the time length of warm days, as well as characterized by the completion of the full cycle of growth of the varieties, i.e. biological features, temperature, humidity, solar energy and high FAR utilization rates.

In mountainous and foothill areas, the density of crops will be about 31,700 units per hectare; the harvest containsnitrogen-250, phosphorus-180, and potassium-150 kg per hectare and is noted with high inulin

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content, when planted in spring time. When it is planted in October, the harvest is collected separately, i.e.the surface part and tuber yields are harvested separately, which will allow population to meet their dietary needs. Based on the first experience, we can conclude that in order to create a solid forage base by planting rotating crops in the cluster system of livestock production, topinambur is planted in late autumn, the density of which will be 55,500,000 units of plant per hectare, where you can also gain nitrogen-300, phosphorus-200, potassium-150 kg per hectare, by water application 8-10 times. It is harvested in September together with the tuber yields, and the harvest is subjected to silage storage, which will increase the efficiency and strengthening the livestock sector.

In the second experiment, which was conducted in gray soils of Samarkand region, it was studied the growth and development of crops, their harvest, inulin content and powder from tuber yields of species, like Mujiza and Etirof when it is grown to get inulin powder as annual crop whereas grown like perennial crop to get biomass.

Table 4 provides data on the growth and development of topinambur, which was obtained through the experiment. It is stated that thickness of planting will equal to 31.7 thousand units per hectare as an annual spring planting crop, while for the purpose of producing fodder silo and hay, thickness of planting will be more than 55,500 units per hectare and planting is conducted in late autumn and some alternative conditions for plant growth and development have been created.

The crop variety Mujiza is noted by its height (253.8 cm), with a large number of stems (3.1-3.2), as well as a large number of lateral branches (34.6-35.8), a large number of shoots (38.9-40.1) and high intensity of bloom (8-9 points). The crop variety Etirofis distinguished by its high intensity of growth (8-9 points), which is 231.8 cm, number of stems - 2.4-2.5 pieces, the number of side branches - 29.3-30.2, the number of shoots - 28.6-29.There were recorded 4 small evidences of the Etirofvariety, but the phenotypic similarity of the tuber yields was equal to 7-8 points, the average weight of the tuber yields is between 95-105 grams, the availability of wrinkles in tuber yields, which contains12.5% more inulin in the tuber yields.

Picture #1.Here we can see insects, like ladybugs on the leaves of topinambur.

During the rapid growth of experimental varieties, an interesting fact is the appearance of insects like ladybug in the upper growth points and at the base of the plant with a stem (see photo #1). The ability of these varieties to attract insects is considered to be a direct field bio laboratory.

Photo #2.Picture shows the efflorescence period of the experimental topinamburfield.

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Table #4: Plant biometric parameters and its intensity of efflorescence

№	Activities	Planting period	During efflorescence period								
			The height of the plant,cm	The number of stems,pcs.	The number of plant units per hectare, thousand pcs.	The number lateral baskets, pcs.	The number of flower baskets, pcs.	Total number of flower basket per hectare, thousand pcs.	The period of efflorescence of one flower basket, days	Time spread of efflorescence period, days	The intensity of efflorescence , grade
As an annual crop											
Mujiza variety											
1	Is grown with the purpose to harvest tuber yields, harvested in the third decade of October, the crop density is 31,700 / hectare.	5-7 times	235,6	3,2	101,4	34,6	38,9	1233,1	7	51	9
2	Thebiomassandtuberyieldsareharvestedtogether, the harvestingperiodis the third decade of October with the purpose of fodder, the crop density is 55,5thousands/hectare.		248,9	3	166,5	30,1	35,7	1981,3	6	44	8
3	Isgrown withthepurposeto harvesttuberyields, the harvesting period is the third decade of October, the crop density is 31,7thousand/hectare.	10-12 November	242,3	3,2	101,4	35,8	40,1	1271,2	7	52	9
4	Thebiomassandtuberyieldsareharvestedtogether, the harvesting period is the third decade of October, harvested as fodder, the crop density is 55,5thousand/ hectare		253,8	3,1	172	33,4	36,4	2020,2	6	44	8
Etirof variety											
5	Is grown with the purpose to harvest tuber yields, harvested in the third decade of October, the crop density is 31,700 / hectare.	5-7times	209,4	2,5	79,2	29,3	28,6	906,6	6	37	8
6	Thebiomassandtuberyieldsareharvestedtogether, the harvestingperiodis the third decade of October with the purpose of fodder, thecrop density is 55,5thousands/hectare.		231,8	2,3	127,6	25,4	25,9	1437,4	5	36	7
7	Isgrown withthepurposetoharvest tuberyields, the harvesting period is the third decade of October, crop density is 31,7thousand/hectare.	10-12 November	213,4	2,4	76	30,2	29,4	931,9	6	35	8
8	Thebiomassandtuberyieldsareharvestedtogether, the harvesting period is the third decade of October, harvested as fodder, the crop density is 55,5thousand/ hectare		227,8	2,3	72,9	27,1	26,7	1481,8	5	37	7
As a perennialcrop											
Mujiza variety											
9	In the first year it is harvested in October, the crop density in the first year is 31,7thousand/ hectare	10-12 November	245,8	3,1	98,3	35,2	36,5	1157	6	53	8
10	Inthesecondyearthefirst footstalkisharvested in summer, the second footstalk is harvested in November, the crop density is 55,5 thousand/hectare.		161,2	3,2	177,6	12,4	0	0	0	0	0
11	Inthethirdyearthefieldissownwithgreen forage with the purpose to harvest biomass, it will be harvested 4-5 times		120,5	2	102,5	5,6	0	0	0	0	0
Etirof variety											
12	In the first year it is harvested in October, the crop density in the first year is 31,7thousand/ hectare	10-12 November	221,9	2,3	72,9	26,4	28,3	897,1	5	39	7
13	Inthesecondyearthefirst footstalkisharvested in summer, the second footstalk is harvested in November, the crop density is 55,5 thousand/hectare.		152,5	2,1	116,5	13,4	0	0	0	0	0
14	Inthethirdyearthefieldissownwithgreen forage with the purpose to harvest biomass, it will be harvested 4-5 times		125,6	1,8	105,3	4,8	0	0	0	0	0

The crop productivity, nutritional value and inulin outputTable #5

№	Activities	Planting time	The productivity of biomass, t/hectare	Tuber yields capacity, t/ha	Fodder capacity, t/ha	Inulin capacity, kg/ha
As an annual crop						
Mujiza variety						
1	Is grown with the purpose to harvest tuber yields, harvested in the third decade of October, the crop density is 31,700 / hectare.	5-7times	69,1	40,2	27,6	502
2	Thebiomassandtuberyieldsareharvestedtogether, the harvestingperiodis the third decade of October with the purpose of fodder, the crop density is 55,5thousands/hectare.		77,3	34,5	28,8	431
3	Isgrown withthepurposetoharvest tuberyields, the harvesting period is the third decade of October, the crop density is 31,7thousand/hectare.	10-12 Nov.	68,3	36,8	27,4	460
4	Thebiomassandtuberyieldsareharvestedtogether, the harvesting period is the third decade of October, harvested as fodder, the crop density is 55,5thousand/ hectare		66,7	35,6	27,2	445
Etirof variety						
5	Is grown with the purpose to harvest tuber yields, harvested in the third decade of October, the crop density is 31,700 / hectare.	5-7times	65,1	39,2	27,3	490
6	Thebiomassandtuberyieldsareharvestedtogether, the harvestingperiodis the third decade of October with the purpose of fodder, the crop density is 55,5thousands/hectare.		64,3	36	26,2	450
7	Isgrown withthepurposetoharvest tuberyields, the harvesting period is the third decade of October, the crop density is 31,7thousand/hectare.	10-12 Nov.	66,1	40,2	27,9	502
8	Thebiomassandtuberyieldsareharvestedtogether, the harvesting period is the third decade of October, harvested as fodder, the crop density is 55,5thousand/ hectare		65,6	37,3	26,9	466
As a perennial crop						
Mujiza variety						
9	In the first year it is harvested in October, the crop density in the first year is 31,7thousand/ hectare	10-12 Nov.	77,5	33,5	28,7	418
10	Inthesecondyearthefirst footstalkisharvested in summer (in the third decade of June), the second footstalk is harvested in November, the crop density is 55,5 thousand/hectare.		97,4	7,8	25,7	
11	Inthethirdyearthefieldissownwithgreen forage with the purpose to harvest biomass, it will be harvested 4-5 times		194,9	0		
Etirof variety						
12	In the first year it is harvested in October, the crop density in the first year is 31,7thousand/ hectare	10-12 Nov.	72,5	36,7	28,3	458
13	Inthesecondyearthefirst footstalkisharvested in summer (in the third decade of June), the second footstalk is harvested in November, the crop density is 55,5 thousand/hectare.		105,3	10,5	28,4	
14	Inthethirdyearthefieldissownwithgreen forage with the purpose to harvest biomass, it will be harvested 4-5 times		192,4	0		

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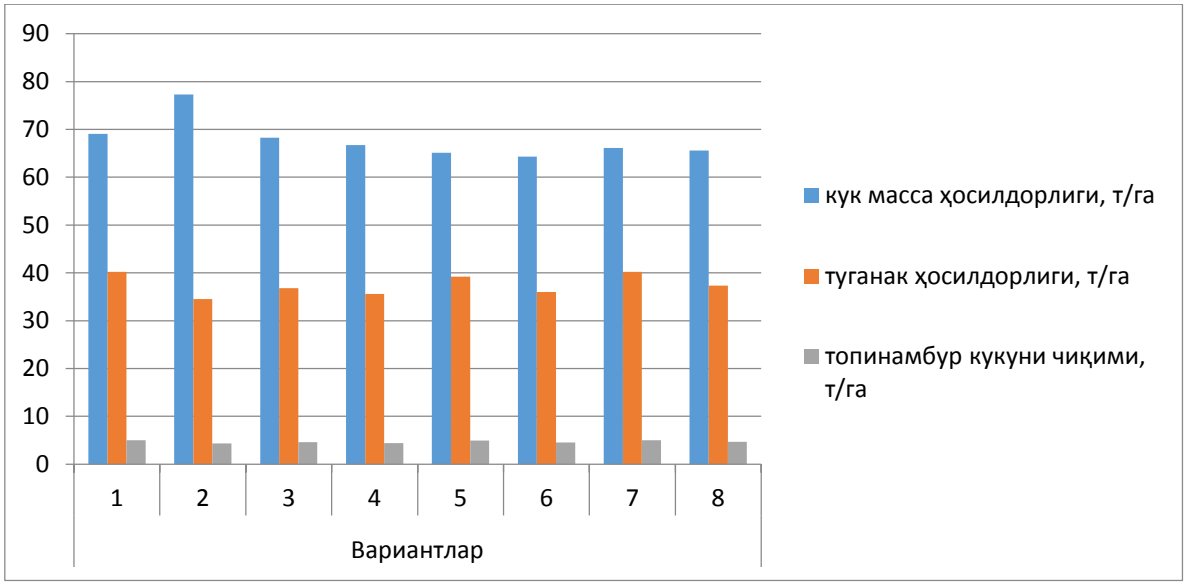

Picture #3. The experiment shows the productivity of biomass and inulin output of Mujiza variety (Activities 1-4) and Etirof variety (activities 5-8), when they were grown as an annual crop.

When the crops were grown as a perennial crop, it was decided to leave 4-5 tuber yields at every one meter during the second year.The footstalks were harvested in summer, i.e. in the third decade of June and were used as fodder. The repeated germination of topinambur from its root was noticed. Also, it was deeply cultivated by cultivator two times, then there were applied the following chemicals per hectare: nitrogen-150 kg, phosphorus-100 kg and Calcium-75.In late autumn the biomass together with tuber yields were harvested, depending the weather conditions. The productivity of biomass was equal to 97,4-105,3 tons/hectare, and tuber yields output was equal to 7,8-10,5 tons/hectare as of two harvest.

There was planted green forage on the third year of growing.There were produced 192,4-194,9 tons of quality feedstock per hectaredue to several harvests (4 times).These efforts as a result will facilitate not to grow the topinambur residues and we could plant mainly wheat or cotton.

This means that topinamburtuber yields, grown as an annual crop, canbe used in the food and pharmaceutical industries to produce powder.In gray soils, the number of crop seedlings will be 31.7 thousand/hectare, this will allowthe passage of the full maturation cycle, the crop stalks isharvest separately in the third decade of October.

The stem and leaves in dried condition can be used to produce paper or as coarse hay. A separate harvesting of tuber yields will provide the pharmaceutical industry with local raw materials for cluster workshops and will increase profitability.

In a cluster system specialized in the livestock sector, which are located near the Zerafshan valley, when topinamburis used as a perennial crop for three years, in its first year it is grown to get the biomass and tuber yields, which are harvested separately, and in the second year –it is harvested in late autumn together with non-ripened tuber yields in order to produce silage.In the third year of planting high-quality feedstockcan be produced due tomultiple harvests.

Conclusion

The experiment examined the growth, development and productivity of new varieties of topinambur, likeMujzsa and Etirof, which were grown for the first time on the soil conditions of Zerafshanvalley of Uzbekistan. Agricultural techniques were developed to grow varieties in early spring and late autumn to produce individual feed for livestock, as well as special agribusiness technology for the food and pharmaceutical industry.Taking into the account the high inulin content of tuber yields of topinambur, grown in mountainous, foothill and plain areas, it is recommended to grow annual and perennial crops in these areas for the food and pharmaceutical industries.

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