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Influence of fertilizers to the quantity of sugar in root fruit of sugar beet in the condition of west region of Azerbaijan

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Abstract
The article was dedicated to the potency of fertilizer norms to the sugar yield in root fruit of sugar beet in base of manure in irrigated grey-brown soil in west region of the Azerbaijan Republic. It is stated that in base of manure the utility of fertilizer norms raises the product of the root fruit of sugar beet, the quantity of sugar in root fruit, and at least it is significantly influenced to the sugar yield. The highest root fruit product, sugariness and sugar yield were observed in 10t/ha+$N_{90}P_{120}K_{90}$ manure variation.

Keywords: Grey-brown (hazel), irrigation, sugar beet, root fruit, harvest, manure, fertilizer, sugar, sugar yield.

Introduction

Sugar beet originates a root weight with rich of carbohydrates for the sugar production as the main nutritive product. In the root of sugar beet, on average, there is 17-18% of sugar, but in high sugared sorts, it is 20%, occasionally it is more up to 23-24%. Sugar is nearly used as nutritive product and also sugar is used in most of the nutritive products – in the manufacturing of candy and canned foods.

Sugar has the quality of good prepossess and taste, as well as it is a good energy source for the human organism. Among the cultivated plants, sugar beet gives the most caloric harvest as having the highest calorie in a unit field. In the roots of sugar beet, there are numerously C, B_1, B_2 vitamins, various salts (the sugar is used for their productions in living organism) and other substances, besides sugar. After sugar manufacturing from the root of the sugar, alcohol, glycerin, pectin clay, grist and other substances are originated from tailings.

The sugar beet has a huge agro technical importance: it raises the fertility in rotational planting system; it is related not only with its high fertility in comparison of other plants, but also with the raising influence to the fertility of other plants. That is why sugar beet is a good antecessor plant for the most plants, because before sowing it, it is spread deep tillage, manure and fertilizers are given, and in vegetation period, the plants are well served, cultivation works are done, and all of them are raised the soil fertility, it causes clearing the fields from weeds, pests, morbidities.

Sugar beet is more censorious to the fertility. Providing of the soil completely with the food-stuff which has the shape that can be prepossessed by the plants makes a normal condition for its development, and it provides getting high and qualitative yield. For the normal development and qualitative yield of the plants, including sugar beet, there must be enough nitrogen, phosphorus, potassium in soil. These elements are considered as the main nutritive substances for the plants and they are essential for forming of their vegetative and generative organs. Sugar beet shows sensitiveness to the quantity of the nutritive substances in soil. In soil in which this plant is grown, minority of the nutritive elements weakens its normal development and reduces fairly the ability of yielding. So that in soil where the sugar beet is seeded the nutritive balance of the soil must be reinstate. For this purpose, manure and fertilizers must be used in scientific bases. The quantity of the nutritive substances in soil must be determined and according to the requirements of the plant the manure norms must be defined [1].

According to the fact of State Statistic Committee, in Azerbaijan from 2014, sugar beet is seeded in 5706 ha, 173287 ton are produced and average fertility is 3,12 t/ha. But in the west region of Azerbaijan, from the 398 ha field, 11346 ton yield was manufactured, the average fertility was 3, 01 t/ha, in the research area, in "Samukh" region, accordingly, it was 289 ha and 9995 ton and 3, 67 t/ha [8].

If there is 14% of sugar in the 30 ton root fruit of sugar beet grown in the 1ha field, 4,2t/ha sugar is yielded. From 40t/ha, 4,2t/ha, 10-11% sugariness, 4,2t/ha sugar is yielded. From using of manure and fertilizer together, 67-89 kg root fruit is procured by 1kg influential substance.

In the researches led in Western Caucasus, the highest sugar product of 51,4-52,t/ha and (14-15% sugariness) biological sugar yield of 7,42-7,52 was procured from $N_{120}P_{160}K_{120}$ and $N_{60}P_{80}K_{60+30-60}$ t/ha manure variations of the highest norms of fertilizers in the condition of saving soil fertility.

In the researches of sugar beet led in the Republic of Tajikistan, the expanse of the norms of nitrous manures brings out negative effect, but it increases the yield that is got the general field. So the highest root fruit product is 64, 6 s/ha in the variation of $N_{240}P_{90}P_{90}$ and sugar yield is 105,2s/ha [7].

In the researches led in Voronezh region, without manure variation, sugar beet product is 25,3t/ha and sugar yield is 4,29t/ha, but in the variation of 50 t/ha + $(NPK)_{190}$ it is 51,6t/ha and 8,05t/ha, and the growth is 26,3 and 3,76t/ha [5].

In the Republic of Tatarstan, depending on the agrometerological condition, 36-39 t/ha of root fruit is getting from sugar beet. In Tatarstan, sugar beet is the main commercial and technical plant and is grown for sugar production. From 1 ha field, 30 ton root fruit gives 4 ton sugar. Besides that, during the manufacturing, remnants and "natka" (residue juice) are procured. Forage for animals, as well aspectine clay and grist are produced from remnants. Alcohol and glycerin are produced from the manufacturing of pectin [2].

In the Russian Federation, sugar beet is the only agriculture plant which is used for getting sugar. Sugar beet is very fertile

plant. In Europe, the main sugar beet producer countries are the Ukraine, Russia, German, France and Poland. The fertility of the sugar beet is more in European countries. This fertility depends on the soil-climate condition, providing of the soil with nutritive and applied technology. In German, Holland and France, 8-12 ton of sugar is yielded from 1ha, in Russia, Belarus and the Ukraine it is 1-3 ton [4].

Taking into consideration of the importance of sugar beet, the main purpose of our research work is increasing the fertility of the irrigated grey-brown (hazel) soil in "Ganja-Gazakh" region, determining the efficient norms of the fertilizers in the base of manure for getting exalted and qualitative product from sugar beet. The plantation practice is given the following scheme: 1. Monitoring (without manure); 2.Manure10t/ha (base); 3.Base+$N_{60}P_{90}K_{60}$; 4.Base+$N_{90}P_{120}K_{90}$; 5.Base+$N_{120}P_{150}K_{120}$.

The plantation practice is gained in the practice base of Azerbaijan SRCI Centre from the four repetitions with Lena F1 sort of sugar beet, the total area of the each variation is 112,0 m^2(40x2,80 m), the sowing is originated in the planting scheme of 60x25sm (20kg seed for a hectare) with series technique.100% of manure, 70% of phosphorus and potassium are given under the tillage in autumn, the rest 30% of phosphorus and potassium is used in feeding, it is used in the conforming development periods among of the ranges. But nitrogen is given for 3 times, 20% of it is given during the sowing, 40% of it is given when two leaves arise in plant and 40% is given in the period of forming the root circulars in the form of feeding. Phonological observations were led in 25 plants, and agro technical measures were arranged according to the rules of the region.

For learning agrochemical characteristics of the soils, before the practice, in samples that are taken from 0-30; 30-60 and 60-100 cm layers of the soil, the quantity of the general and assumed forms of the food-stuff is determined. The analysis of the soil samples shows that these soils are weakly provided by the assumed forms of nitrogen, phosphorus, potassium. In pH water solution, it is 7,8 in 0-30 cm, in the under layers, it gradually increases and it is 8,4 in the layer of 60-100 cm. Total humus, nitrogen, phosphorus and potassium are 2,15 in 0-30 cm; 0,15; 2,39 %.But in the under layers it gradually reduces, according to the layers, it can be 0,85; 0,06; 0,07;and 1,51%. Absorbed ammoniac nitrogen hesitates between 18, 5-6, 5 mg/kg, nitrate nitrogen 9, 7-2,6 mg/kg, motor phosphorus 15,8--4,5 mg/kg, and truck potassium between 263,5-105,3 mg/kg.

In the base of manure, the influence of the fertilizers to the quantity of the sugar in root fruit of sugar beet and sugar yield was learned in 2013-2014. The result of the researches is given in the table.

The influence of the fertilizers to the quantity of the sugar in root fruit of sugar beet in the base of manure

s/s	Variation of the practice	2013			2014			From 2 years avera-ge, t/ha	Increment	
		Fertility t/ha	Sugar, %	Sugar yield, t/ha	Fertility t/ha	Sugar, %	Sugar yield, t/ha		s/ha	%
1	Monitoring (without manure)	24,83	16,0	3,97	28,03	16,3	4,57	4,27	-	-
2	Manure 10t/ha (base)	31,63	16,2	5,12	34,33	16,5	5,66	5,39	1,12	26,2
3	Base+$N_{60}P_{90}K_{60}$	37,58	16,5	6,20	40,65	16,8	6,83	6,52	2,25	52,7
4	Base+$N_{90}P_{120}K_{90}$	46,05	17,2	7,92	48,08	17,6	8,19	8,19	3,92	91,8
5	Base+$N_{120}P_{150}K_{120}$	40,83	16,8	6,86	44,00	17,2	7,22	7,22	2,95	69,1

Seeing from the table, from the influence of the fertilizers, giving the fertilizers together increases root fruit of sugar beet, sugar and sugar yield in the base of manure in comparison of the monitoring and base (manure 10t/ha) variations.

Thus, in the variation of monitoring (without manure), the root fruit of sugar beet is 24,83-28,03 t/ha, sugar is 16,0-16,3 %, sugar yield is on average 4,27t/ha from 2 years, but in manure 10t/ha variation, this results are 31,63-34,33 t/ha, 16,2-16,5 % and 5,39 t/ha, increment of sugar yield is 1,12 t/ha or 26,2% in comparison of the monitoring. The results in the application of the different norms of the fertilizers in the base of manure are rather high than the monitoring and manure 10t/ha variation. The highest root fruit, sugariness and sugar yield were observed in base+$N_{90}P_{120}K_{90}$ variation and accordingly they are 46,05-48,08 t/ha, 17,2-17,6 %, 8,19t/ha ; 3,92 t/ha or 91,8 %.As increasing the fertilizer norms with the base together($N_{120}P_{150}K_{120}$), these results get down like 40,83-44,00 t/ha, 16,8-17,2 %, sugar yield gets 7,22 t/ha, increment sets up 2,95 t/ha or 69,1 %.From the influence of the fertilizers, sugar yield increases between 1,12-3,92 t/ha in comparison with monitoring variation. In the west region of Azerbaijan, for getting high and qualitative result from sugar beet, some advice was given for the application of manure 10t/ha + $N_{90}P_{120}K_{90}$ variation. It is determined the correlative relations between r=+0,986±0,013 of root fruit and sugar yield in the application of the fertilizers under the sugar beet; r=+ 0, 99 ± 0,008 of on ground product and sugar yield; r=+0,939± 0,053; r=+ 0,990±0,009.

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