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Selection and Cultivation of Productive Tomato Sorts in the Absheron Conditions

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Abstract

As a result of the research have been investigated the selection of high-yielding tomato sorts and some agrobiological features of their cultivation in Absheron conditions. It become clear that the productivity sort samples differ from each other and their productivity indicators varies between 500-590 sen/ha. It has been shown that it is possible to obtain favorable indices in the productivity of tomato plants by finding the optimal time for the seedling of tomato seeds and their transplanting to the field. For this purpose the feasibility of using sort samples such as Zarrabi(565,3 sen/ha), 80 Marvi x Utro (543,1 sen/ha), Leyla (563, 5 sen/ha), Zafar (539,7 sen/ha), 83 Kora x Garatakh 256 (547,9 sen/ha) və 104 Raduqa x Md 86 (547,2 sen/ha) has been experimentally confirmed. İn research has also been identified the high availability(90,29-96,50%) of the commodity portion of the product obtained from selected sorts.

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Keywords

Absheron peninsula, Tomato, Grade samples, Seedlings, Productivity, Agrobiological features.

Introduction

Provision of the population with fresh vegetables in all countries of the world, also in the Republic of Azerbaijan, especially in industrial cities such as Baku and Sumgait is a key component of food supply programs[7]. Although the agrarian sector plays an important role in the country's economy, today this area does not fully meet the population's demand for vegetable products, although some of the vegetable products are even exported. One of these both imported and exported products is a tomato.

Tomatoes are grown in almost all regions of the Republic of Azerbaijan and hundreds of thousands of tons of products are produced annually[1]. For a country with a rich and favorable nature, this indicator is not the last and hence increasing the productivity of cultivated tomato varieties is one of the important tasks facing the agrarian sector today.

Formation of the overall productivity of tomatoes is determined by factors that have complex effects[9] which one of this is obtaining high productivity sorts and hybrids resistant to disease and pests[14]. Besides, the use of more suitable technologies in the cultivation of selected varieties, the application of agrotechnical techniques to ensure high and stable production are also important issues.

Absheron peninsula where the located largest city of Azerbaijan, Baku, as well as Sumgayit, is a region of interest in terms of supplying these cities with fresh vegetables, including tomatoes. Favorable sunshine and

temperature conditions, as well as specific soil cover of here in the open field, allows getting a higher yield of tomato at the most profitable times of the year. Despite the favorable conditions, the yield of tomato plants grown is low. Despite the creation of new varieties over the past 20-30 years, as well as the dramatic changes in the soil and climatic conditions of the peninsula, in this direction was carried out research and in the specific soil-climatic conditions of the Absheron peninsula was a need to carry scientific research to create an efficient system of agrotechnical for the cultivation of tomatoes by high yield.

In general, it should be noted that to obtain early and high yield from agricultural plants it is necessary to select varieties that meet the requirements of the production and suitable to the concrete cultivation conditions[8]. Delay spring at the Apsheron peninsula, late warming of weather and soil compare to the other regions of the republic where cultivated vegetables, here in an open field slows down sowing as well as the planting of tomatoes as result, the chances of getting an early product are reduced. Therefore, to obtain early harvest it is necessary to select and cultivate high-yielding sorts and hybrids resistant to spring's cold weather and normal fertilization of flowers at the beginning of the summer when the heat suddenly falls.

The conditions of the Absheron Peninsula was created and zoned several different varieties of tomatoes that provide high yield[1]. However, these sorts due to their different purposes and plasticity in changing climatic conditions are cultivated in small areas. For the recommendation to receive high and quality products, the research these varieties as well as several other lines and hybrids for discovering more favorable ones in the presented work was suggested as a goal.

Materials and Methods

The research carried out in the practice areas of Support Practice Farm of Scientific-Research Institute of Vegetable in the Absheron. As a research object was selected sorts such as Leyla-for universal purpose, Zarrabi- for meal, Zafar- for canning and the following hybrids:

1. 80(Marvi x Utro)
2. 83(Kora x Garatakh 256)
3. 93 (Ottava 36 x 2 in) x Ottava 30
4. 104 (Raduqa x Md 86)
5. 111 (Marvi x Utro) x Zrrabi
6. A-75 $121x\left(\frac{F-145x21-4}{YT}F_{18}S19\right)x4$ shortish - A-75
7. X-142(Line selected from the Caspian variety)
8. 588 F-526 x QVQ x 100

Seeds were sown to the seed-plot in the III decade of March, depending on the years, then seedlings planted in a permanent place when the seedlings were 4-6 leaves, and height reach to the 15-18 cm. The experiment was conducted in 3 repetitions in the area of 11.2 sq. m. The number of counted plants was 40 (160 in 4 replications). Was carried out appropriate agro-technical maintenance of plants : irrigation, thin out, softening of the bottom of plants, feeding, etc Phenological observations are conducted: the dates of obtaining first (25%) and mass (75%) germination from sowing, formation of the first true leaf, formation of 4-5 leaves are noted. In each phase, biometric measurements were performed on the plants - the leaves were counted and the main trunk measured.

Formed seedlings planted in a permanent place in the 70 x 40 cm scheme by 3 repetitions, with 30 plants, in 10-15.IV, 20-25.IV, 1-5.V, 10-15, 20-25.V. dates, were implemented appropriate agrotechnical measures (irrigation, feeding, softening of the bottom of plants, filling, cleaning of weeds), and conducted phenological observations: planting, first (25%) and mass (75%) budding, first (25%) and mass (75%) flowering, the first (25%) and mass fruit formation, first (25%) and mass technical maturity, recorded first and last dates of harvest. This work was carried out by known methods [3, 11].

During the vegetation period measured 3-4 times the height of the plants, the length of the main and lateral trunk was counted branches, measured the mass of root. After the fruit is fully formed (technical maturity), the fruits on the bush are counted, the average weight (q) of the fruit is set. Were determined width, height, shape of fruit as well as a form of stem.

Were determined dry matter (%), acid (%), total sugars (%) and vitamin C (mg%) contained in ripe fruits taken from each period[2].

All experiments were performed in at least 4 times, and the obtained results were statistically processed [6] and were used data that is not in doubt ($P \leq 0,05$).

Results and Discussions

To obtain a high product the first task is to select sorts that are suitable to the local conditions and have high yields. For this purpose, experiments were conducted on the 11 sort samples. Sort samples were planted in the field in a period of optimum sowing (end of March) and the planting (end of the first decade of May) in 4 repetitions by 70x40 cm scheme. Phenological observations showed that the studied sorts slightly differ from each other due to maturity characteristics-was noted the difference in the duration of developmental phases between fast-and middle maturation.

The indicators of the different phases of growth and development are given in Table 1. As seen, have passed 14-15 days from sowing seeds to mass germination, were observed differences between sort samples as well as for years. The main reason for the relatively late germination is the irregularity of the temperature regime in the greenhouse.

The period from germination to sowing depending on years takes 33-37 days. Samples of the sort have been differed by the length of the period from germination to flowering. Thus, the time interval varied between 50 - 64 days depending on the biological characteristics of the samples of the sort. The fastest flowering samples of the sort were Zarrabi, №80 Marvi x Utro və 83 Kara x Garatakh 256, which period in them was 50 days. The studied sorts blossomed 17-33 days after sowing.

It is known that the temperature of the air is of great importance in the flowering of plants(including tomatoes), in the formation and development of buds and flowers. This phase in the studied sort samples during the years of research depending on weather conditions coincided at different times. This period during the years of the experiment changed from May 30 to June 12. In 2016 years, in the sort samples of Zarrabi, №80 Marvi x Utro və 83 Kara x Garatakh 256 the flowering was observed on May 30. The length of the vegetation period of the sort samples shown in the same year (89-98 days) was shorter compared to other varieties studied in 2015 and 2017. In the remaining sort samples, the mass flowering period coincided in the first decade of June.

The differences in the length of vegetation period of most tomato sorts studied in 2017 was insignificant (106-112 days). This can be explained by favorable weather conditions during the vegetation period.

The maturation of fruits of sort samples of Zarrabi, №80 Marvi x Utro, 83 and 111 (Marvi x Utro) x Zarrabi Kara x Garatakh 256 in 2016 started 10-15 days early that other sorts. The period in the other sorts from mass germination to fruit mature is 112 days.

It is known that the temperatures of the year can change the flowering and fruit mature of plants, including tomato plants in the field condition[4] but the regularity of early matures of sorts and heritability are preserved under any conditions, which is a characteristic feature.

Like all vegetable plants, the most important thing in the cultivation of tomatoes is their productivity and the period in which the product is produced. Getting early harvesting in cultivated tomato seedlings in the open field is of great economic importance[5]. But tomatoes grown in the autumn are especially important from the point of view of food security. Therefore, for the development of agrotechnical methods and techniques to ensure high-quality products, it is important to choose the earliest, productive, quality sorts of tomatoes. By using them in the spring-autumn plantings we can also grow tomatoes in the autumn, in the open field. The performance indicators of the studied sort samples are shown in Table 2. From the analysis of the table, it can be concluded that the productivity of the studied sort samples changes dramatically depending on the years, and has not been identified regularity in these changes.

All studied sorts in practice(except sort Zafar) are large fruit, the average weight of the fruit varies between 140-180g. The largest fruits were 93 (Ottava 36 x 2 in) x Ottava 30 and X-142 selected from the line of Caspian sort(accordingly 180 g). The relatively small fruits were Kora x Garatakh 256, 104 Raduqa x Md 86, A-75 and Zarrabi which indicators respectively were contained 177, 162, 170 and 159 g.

Sort samples differed from each other by the amount of yield per hectare and this indicator varied between 500-590 sen/ha. The highest productivity over the three years on average were obtained from the sort samples Zarrabi (565,3 sen/ha), 80 Marvi x Utro (543,1 sen/ha), Leyla (563, 5 sen/ha), Zafar (539,7 sen/ha), 83 Kora x Garatakh 256 (547,9 sen/ha) və 104 Raduqa x Md 86 (547,2 sen/ha). The productivity of these sorts is 20-50 centners more than indicators of other studied sorts. Commodity percent of the obtained product varied between 90,3-96,5%. This change is observed in an indefinite form (Table 2).

Table.1 The duration(length) of the development phases of different tomato varieties

Grade samples	Years	crops	obtained of seeds	planting	To flower	Mass ripening	Before planting	From the germination		From planting	
								before flowering	before mass ripening	before flowering	before mass ripening
					dates			number of days		number of days	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Zarrabi	2015	27.III	9.IV	14-15.V	10.VI	25.VII	37	62	107	26	71
	2016	28.III	11.IV	12-13.V	30.V	9.VII	33	50	89	17	56
	2017	27.III	10.IV	12.V	3.VI	31.VII	33	54	112	22	79
№ 80 Marvi x Utro	2015	27.III	9.IV	14-15.V	8.VI	29.VII	37	60	111	24	74
	2016	28.III	11.IV	12-13.V	31.V	18.VII	33	50	98	18	66
	2017	27.III	10.IV	12.V	4.VI	28.VII	33	55	109	23	76
83 Kora x Garatakh 256	2015	27.III	9.IV	14-15.V	8.VI	25.VII	37	60	107	24	70
	2016	28.III	11.IV	12-13.V	30.V	15.VII	33	50	94	18	61
	2017	27.III	10.IV	12.V	4.VI	30.VII	33	55	111	23	78
93 (Ottava 36 x 2 in) x Ottava 30	2015	27.III	9.IV	14-15.V	8.VI	25.VII	37	60	107	24	70
	2016	28.III	11.IV	12-13.V	10.VI	26.VII	33	61	106	28	73
	2017	27.III	10.IV	12.V	5.VI	29.VII	33	56	110	24	77
104 Raduqa x Md 86	2015	27.III	9.IV	14-15.V	7.VI	25.VII	37	61	107	23	70
	2016	28.III	11.IV	12-13.V	9.VI	20.VII	33	60	100	27	67
	2017	27.III	10.IV	12.V	5.VI	25.VII	33	56	106	24	73

continuation of table 1

1	2	3	4	5	6	7	8	9	10	11	12
111 (Marvi x Utro) x Zarrabi	2015	27.III	9.IV	14-15.V	10.VI	28.VII	37	62	110	26	73
	2016	28.III	11.IV	12-13.V	9.VI	15.VII	33	61	95	27	62
A75	2017	27.III	10.IV	12.V	7.VI	31.VII	33	58	112	26	79
	2016	28.III	11.IV	12-13.V	10.VI	26.VII	33	60	106	28	73
	2017	27.III	10.IV	12.V	5.VI	27.VII	33	56	108	24	75
X-142 Line selected from the Caspian variety	2015	27.III	9.IV	14-15.V	10.VI	25.VII	37	62	107	26	70
	2016	28.III	11.IV	12-13.V	12.VI	22.VII	33	62	102	30	69
	2017	27.III	10.IV	12.V	5.VI	31.VII	33	56	112	24	79
588 F-526 x QVQ x 100	2015	27.III	9.IV	14-15.V	8.VI	25.VII	36	62	107	24	83
	2016	28.III	11.IV	12-13.V	14.VI	28.VII	33	64	108	32	76
	2017	27.III	10.IV	12.V	4.VI	26.VII	33	55	107	22	85
Leyla	2015	27.III	9.IV	14-15.V	10.VI	25.VII	36	62	107	26	81
	2016	28.III	11.IV	12-13.V	15.VI	29.VII	33	64	109	33	76
	2017	27.III	10.IV	12.V	6.VI	25.VII	33	63	104	24	80
Zafar	2015	27.III	9.IV	14-15.V	4.VI	15.VII	37	56	97	20	60
	2016	28.III	11.IV	12-13.V	6.VI	18.VII	33	56	98	24	65
	2017	27.III	10.IV	12.V	4.VI	10.VII	33	58	91	26	58

Table.2 Productivity indicators of samples of different tomato sorts

Grade samples	Average fruit mass, g	Productivity, sen/ha					
		2015	2016	2017	Average for 3 years	Marketable %	Non-marketable, %
Zarrabi	159	590,5	532,5	562,6	565,3	94,54	5,46
№ 80 Marvi x Utro	149	523,6	565,5	540,1	543,1	90,29	9,71
83 Kora x Garatakh 256	117	547,7	558,5	537,5	547,9	92,21	7,79
93 (Ottava 36 x 2 in) x Ottava 30	180	500,7	528,3	510,1	513,0	91,50	8,50
104 Raduqa x Md 86	162	562,5	542,7	536,3	547,2	95,66	4,34
111 (Marvi x Utro) x Zarrabi	148	531,1	526,7	509,3	522,4	92,23	7,77
A-75	170	557,2	507,1	523,7	529,3	94,37	5,63
X-142 Line selected from the Caspian variety	180	547,7	502,3	538,0	529,3	90,91	9,09
588 F-526 x QVQ x 100	156	501,7	511,4	524,6	512,6	92,73	7,27
Leyla	140	553,7	565,9	571,0	563,5	93,30	6,70
Zafar	93	531,9	540,7	547,1	539,7	96,50	3,50

Table.3 Dynamics of crop production of tomato sort samples

The name of the sorts	Years	Productivity, sen/ha	Ripening of the product by periods				
			To-10.VII	10-20.VII	20-30.VII	1-10.VIII	10-20.VIII
Zarrabi	2015	590,5	83	180	185	80	62
	2016	532,5	57	173	180	81	41
	2017	562,6	81	182	170	87	43
№ 80 Marvi x Utro	2015	523,6	49	180	183	63	48
	2016	565,5	61	178	193	89	44
	2017	540,1	57	183	191	81	28
83 Kora x Garatakh 256	2015	547,7	51	179	190	93	45
	2016	558,5	43	180	183	95	57
	2017	537,5	49	183	173	91	42
93 (Ottava 36 x 2 in) x Ottava 30	2015	500,7	49	160	170	87	35
	2016	528,3	50	181	176	84	32
	2017	510,1	51	175	170	83	31
104 Raduqa x Md 86	2015	562,5	57	193	187	77	48
	2016	542,7	49	180	183	78	53
	2017	536,3	49	176	179	77	55
111 (Marvi x Utro) x Zarrabi	2015	531,1	45	190	180	75	31
	2016	526,7	51	170	180	63	53
	2017	509,3	39	186	155	65	64
A-75 $121x\left(\frac{F-145x21-4}{YT}F_{18}S19\right)x4$	2015	557,2	51	183	190	71	62
	2016	507,1	52	181	175	70	29
	2017	523,7	50	180	175	73	46
X-142 The line selected from the Caspian variety	2015	547,7	53	181	170	79	59
	2016	502,3	51	157	165	80	49
	2017	538,0	51	183	173	76	46
588 F-526 x QVQ x 100	2015	501,7	53	177	171	63	37
	2016	511,4	56	180	170	59	47
	2017	524,6	59	190	180	58	37
Leyla	2015	553,7	65	180	175	87	47
	2016	565,9	60	185	190	95	36
	2017	571,0	63	195	187	93	33
Zafar	2015	531,9	70	145	190	85	42
	2016	540,7	80	150	170	78	63
	2017	547,1	79	147	160	90	71

One of the most important factors in the cultivation of tomatoes is its full maturity [12] and is the issue when to deliver to the consumer[13]. This is very important from the point of view of economic, agriculture and food security. For this reason, were also studied the dynamics of ripe of products of the studied sort sample over the years and decades, and the results are given in Table 3. It should be noted that the tomato plant will produce its crop by the end of August if it cultivated in spring sowing. Our studied sort samples also gave their harvest in July-August and completed their vegetation. Depending on the sorts collected in the early July in Absheron total product of early sorts was 39-83 sen /ha. By the amount of early product sorts of Zarrabi, Leyla and Zafar differed.

The main parts of the ripe product were observed in the second and third decades of July which contains 60-75% of the total product. This indicator depending on the sort samples and years has indefinitely changed. Such indefinite changes can be explained by the biological characteristics of sort samples, as well as the soil - climatic conditions. The products obtained from sort samples in August was reduced by 10-15%, and by the end of the month, it was completely gone. The most recent picking was observed in the sorts of Zafar (2016, 2017 years) A-75 (2015), 111 (Marvi x Utro) x Zarrabi (2017) and Zarrabi (2015) from which were picked a very small amount of harvest.

Thus, from the carried out of research became that it is possible to obtain favorable indicators in the productivity of tomato plants by germination of tomato seeds for getting seedlings and finding an optimal period for moving seedlings to the field. For this purpose to use of sorts such as Zarrabi(565,3 sen/ha), 80 Marvi x Utro (543,1 sen/ha), Leyla (563, 5 sen/ha), Zafar (539,7 sen/ha), 83 Kora x Garatakh 256 (547,9 sen/ha) and 104 Raduqa x Md 86 (547,2 sen/ha) in the condition of Absheron is more advisable. Thus, their use allows an increase in both the amount of the total product and the commodity part, as well as the early occurrence of the ripening period.

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