



## PHENOLOGICAL, BIOMETRIC AND MORPHOLOGICAL CHARACTERISTICS OF DIFFERENT BULB ONION VARIETY ACCESSIONS

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### ABSTRACT

This paper aimed to study phenological, biometric and morphological characteristics of local and imported bulb onion variety accessions. There were total 34 variety accessions studied, 2 local variety from Vegetable Scientific-Research Institute and 32 imported varieties. 34 sortname and country of origin: *Local (Sabir and Hovsan); Turkey (Barakat, Mor Soghan, Beyaz soghan, Tekirdagh soghan, Casta, Beta Panko, Red Amposta, Betaki, Panko, Metan, Erkenci, Valenciana); Uzbekistan (Karatalskiy); Tajikistan (Peshpazak, Ispanskiy mestny, Mayskiy, Hissor); Ukraine (Khalchedon); America (Walla walla, Girmuzi bash soghan, Primero); The Netherlands (Red Baron, Shalot, Stardast, Rocardo); Spain (Sweet spanish yellow, Ispanyol beyaz soghan, Delfos); Italy (Sarı Parma soghan, Lilia); Great Britain (Brown Pickling); India (Poona Red).*

**KEYWORDS:** Bulb onion, Shallot, Phenological observation, Biometrical parameters, Morphological signs.

### 1. INTRODUCTION

Researchers who note that the bulbs are Iranian origin do not fully comprehend that before last century the territory of Azerbaijan entirely entered the Iranian empire and these plants (onion, garlic, grass) originated in the territory of Azerbaijan included in Iran. Today, these lands are the territory of the independent Republic of Azerbaijan and the onions are native, local and traditional plants.<sup>[1]</sup>

Bulb onion, garlic and leek take main have own place among cultivated varieties. As a vegetable variety, shallot also is planted in a little quantity.<sup>[2]</sup>

During sowing vegetable has great value in sowing material and seed manufacture. Some authors note that change of sowing time is change of warmth, light and humidity mode simultaneously.<sup>[3]</sup>

72 of the onion varieties are spread in the Caucasus. In the flora of Azerbaijan there are 52 onions varieties.<sup>[4]</sup>

The bulb onion is well-known in Central Asia, Iran, Pakistan, Afghanistan and India 4,000 years ago.<sup>[5]</sup>

People grow and use onion more than four thousand years. So onion varieties are grown in all continents of the world and its production gradually increased. In 1948-1968 onion production increased for 172% in Poland, 275% in Turkey, 300% in Japan. Onion plantations took 21,9% of vegetable planting areas, in Turkmenistan this percent was 23,7%, in Azerbaijan it was 12,5%.<sup>[6]</sup>

Bulb onion is one of the most popular vegetable varieties and its growing areas are getting larger constantly. Its application diversity relates to its chemical content directly. Bulbs have indispensable amino acids and vitamins (B, B<sub>2</sub>, B<sub>6</sub>, PP, E, C). Leaves and bulbs have essential oils, sugar, polysaccharides (inulin, pectin), glycosides (spireoside), essential acids (lemon, apple), disulfide (with bactericidal activity), alkaloids, flavonoids (kvercetin), potassium salts, calcium, iron; sulphur, iodine and phosphorus. Onion also is evaluated with the medicinal features and used in folk medicine.<sup>[7]</sup>

Bulb onion consists of 0,7-0,9 % dietary fibers, 0,5-0,8 % of cellulose, 0,1-0,6 % of hemicellulose, 0,5-0,6 % of pectin.<sup>[8]</sup>

It is the second vegetable plant after tomato in the world. In spite of its use as food and economic value, genetic research of onion is behind than other plants.<sup>[9]</sup>

Onion is considered a biennial plant of the family of Liliaceae and is one of the important vegetable plants in the world of about 55 million tons.<sup>[10]</sup>

At present in our republic the local and imported varieties of bulb onion are grown. In spite of growing of high yield and quality varieties, their number is not enough. Most of imported onion varieties are imported by local farmers from different countries of the world and among

them have some varieties with GMO (genetic modified organism), which give rise to spread of diseases in our republic. To solve the depending of farmers of this problem it is necessary to create of our national varieties and organization of primary seed-growing.

The main aim consists of collection of gene pool material of bulb onion and study in Absheron conditions.

## 2. MATERIALS AND METHODS

The study was conducted on the local and imported varieties of bulbs. There were total 34 onion variety studied, 2 locals (Sabir and Hovsan) onion variety accessions for experiments have been collected from the Vegetable Scientific-Research Institute; imported bulb variety accessions from different countries.

As the onion plant is light demander and cold-resistant, its area should be open. Depending on soil and climatic conditions, the onions can be sown in autumn and spring. In Absheron, the optimal sowing time for bulbs is from February 20 to March 15. For this reason, the practice was held in Absheron – in an open environment. Sowing of local and imported varieties of bulbs was on 25.02.2017. Immediately after seed sowing, the so – called organic soil regulator called Lifos Leonardit was mixed with water and applied to the soil. The amount of fertilizer mentioned was 2.5 kg and the same fertilizer was mixed with 55 liters of water to this amount.

**Table 1: Phenological observations in the varieties of the onion plant.**

Varieties	Date				Days			
	Mass output	Appearing of 2-3 leaves	Forming of bulb	Harvesting	Mass output from sowing	Appearing of 2-3 leaves from sowing	Forming of bulb from sowing	From sowing to harvesting
Sabir	27.03.17	03.04.17	10.06.17	29.07.17	31	38	106	155
Mor soghan	25.03.17	01.04.17	09.06.17	29.07.17	29	36	105	155
Valenciana	25.03.17	01.04.17	09.06.17	29.07.17	29	36	105	155
Karatalskiy	31.03.17	07.04.17	12.06.17	16.07.17	35	42	108	142
Red Baron	08.04.17	15.04.17	14.06.17	16.07.17	43	50	110	142
Khalchedon	25.03.17	01.04.17	12.06.17	29.07.17	29	36	108	155
Barakat	31.03.17	07.04.17	12.06.17	29.07.17	35	42	108	155
Shalot	05.04.17	12.04.17	14.06.17	29.07.17	40	47	110	155
Delfos	25.03.17	01.04.17	12.06.17	29.07.17	29	36	108	155
Poona Red	29.03.17	04.04.17	15.06.17	06.07.17	33	39	111	132
Primero	08.04.17	15.04.17	15.06.17	06.07.17	43	50	111	132

Beyaz soghan	25.03.17	01.04.17	09.06.17	29.07.17	29	36	105	155
Tekirdagh Soghan	27.03.17	03.04.17	10.06.17	16.07.17	31	38	106	142
Casta	29.03.17	04.04.17	10.06.17	29.07.17	33	39	106	155
Beta Panko	05.04.17	12.04.17	14.06.17	29.07.17	40	47	110	155
Panko	23.03.17	31.03.17	04.06.17	29.07.17	27	35	100	155
Red Amposta	31.03.17	07.04.17	12.06.17	29.07.17	35	42	108	155
Betaki	05.04.17	12.04.17	14.06.17	06.07.17	40	47	110	132
Metan	23.03.17	31.03.17	04.06.17	29.07.17	27	35	100	155
Erkenci	23.03.17	31.03.17	02.06.17	06.07.17	27	35	98	132
Walla walla	31.03.17	07.04.17	09.06.17	29.07.17	35	42	105	155
Gırmızı baş soghan	25.03.17	01.04.17	07.06.17	06.07.17	29	36	103	132
Sarı Parma soghan	25.03.17	01.04.17	07.06.17	29.07.17	29	36	103	155
İspanyol Beyaz soghan	31.03.17	07.04.17	09.06.17	29.07.17	35	42	105	155
Sweet Spanish yellow	25.03.17	01.04.17	07.06.17	29.07.17	29	36	103	155
Peshpazak	25.03.17	01.04.17	07.06.17	16.07.17	29	36	103	142
İspankiy mestniy	29.03.17	04.04.17	10.06.17	16.07.17	33	39	106	142
Mayskiy	29.03.17	04.04.17	10.06.17	16.07.17	33	39	106	142
Hissor	31.03.17	07.04.17	10.06.17	06.07.17	35	42	106	132
Brown Pickling	12.04.17	20.04.17	16.06.17	16.07.17	47	55	112	142
Lilia	12.04.17	20.04.17	16.06.17	16.07.17	47	55	112	142
Stardast	15.04.17	24.04.17	18.06.17	16.07.17	50	59	114	142
Rocardo	15.04.17	24.04.17	16.06.17	16.07.17	50	59	114	142
Hovsan	20.04.17	30.04.17	18.06.17	29.07.17	55	65	114	155

Table 2: Biometric parameters of the onion plant.

Varieties	Plant height (sm)	Leaf quantity	Width of leaf(sm)	Length of leaf (sm)
Sabir	25	4	0,35	25,7
Mor soghan	26,5	5,2	0,32	23,5
Valenciana	30,2	4,3	0,38	28,5
Karatalskiy	30,5	5,4	0,31	28,7
Red Baron	25,3	4,6	0,22	23,5
Khalchedon	28,4	5	0,48	25
Barakat	25,5	4	0,32	21,5
Shalot	29,2	6,2	0,24	25,4
Delfos	24,3	6,5	0,29	21,3
Poona Red	23,5	6,9	0,33	22,5

Primero	26,8	5,3	0,49	22
Beyaz soghan	27,5	6,4	0,48	23,5
Tekirdagh Soghan	28,8	4	0,39	23,4
Casta	22,5	4,5	0,25	17,8
Beta Panko	24,6	6,5	0,21	20
Panko	22,7	6,4	0,23	18,5
Red Amposta	26,5	5,5	0,19	23
Betaki	25,6	5,7	0,22	22
Metan	24,5	6,8	0,23	19,5
Erkenci	29,5	6,3	0,42	23,5
Walla walla	26,9	6,6	0,4	22
Gırmızı bash soghan	25,7	7,5	0,23	20,4
Sarı Parma soghan	22,5	7,8	0,3	19
İspanyol Beyaz soghan	27,7	6,2	0,29	23
Sweet Spanish yellow	26,8	6,5	0,24	21,2
Peshpazak	27,5	6	0,38	22,3
İspankiy mestniy	30,7	7,7	0,44	28,2
Mayskiy	25,3	6,4	0,3	21,6
Hissor	23,5	6,9	0,35	20,7
Brown Pickling	28,7	4,5	0,21	22,6
Lilia	18,5	7,8	0,22	12
Stardast	10,5	5,2	0,25	8
Rocardo	24,5	8,6	0,23	20,8
Hovsan	22,4	4,4	0,21	22,1

### Biometric parameters of the onion plant.

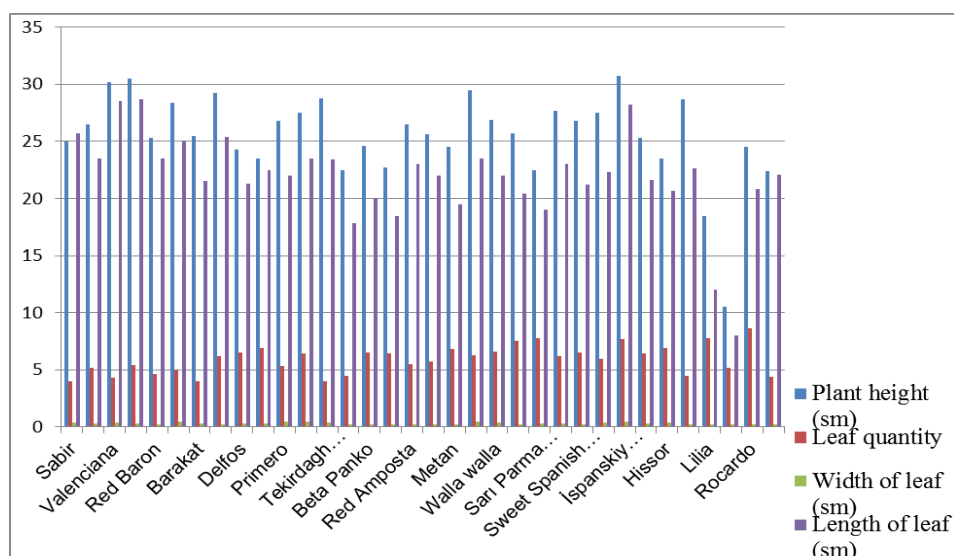


Table 3: Morphological features of bulb onion.

Varieties	Shape of bulb	Colour of bulb	Bulb		Flavor of bulb	Cross-section of bulb
			width(sm)	length(sm)		
Sabir	round	red	4,6	4,2	semi-bitter	Whitish
Mor soghan	cone-shaped	dark red	4,36	4,97	bitter	Whitish
Valenciana	oblong	yellow	5,2	4,98	semi-bitter	Whitish

Karatalskiy	oval	yellowish	4,6	5,7	semi-bitter	Whitish
Red Baron	oval	yellowish	3,9	4,9	semi-bitter	Whitish
Khalchedon	oval	yellow	4,5	5,1	bitter	Whitish
Barakat	round	yellowish	5,06	4,8	semi-bitter	Whitish
Shalot	round	yellowish	5,2	4,9	bitter	white
Delfos	round	yellowish	4,94	4,4	semi-bitter	whitish
Poona Red	oval	red	2,8	3,2	semi-bitter	reddish
Primero	round	white	3,3	3,1	semi-bitter	White
Beyaz soghan	round	white	4,7	4,3	semi-bitter	White
Tekirdagh Soghan	oval	dark-redı	3,6	4,2	bitter	Light-red
Casta	oval	yellowish	4,8	5,04	semi-bitter	White
Beta Panko	round	dark-yellow	5,2	4,56	semi-bitter	White
Panko	oval	yellow	4,7	5,4	mild	yellowish
Red Amposta	round	red	5,3	5,08	bitter	whitish
Betaki	oval	yellowish	3,9	4,2	semi-bitter	whitish
Metan	oblongish	yellowish	5,1	6,44	semi-bitter	whitish
Erkenci	oblongish	yellowish	3,2	4,7	mild	whitish
Walla walla	oval	yellowish	5,02	5,3	semi-bitter	whitish
Gırmızı baş soghan	oval	red	3,6	3,8	mild	Light-red
Sarı Parma soghan	oval	yellowish	4,1	4,5	semi-bitter	whitish
Ispanyol Beyaz soghan	round	white	5,3	4,8	mild	white
Sweet Spanish yellow	oblong	yellowish	4,8	5,4	semi-bitter	white
Peshpazak	oblong	yellowish	4,2	5,5	semi-bitter	whitish
Ispanskiy mestny	oblong	yellowish	4,5	5,8	semi-bitter	whitish
Mayskiy	oval	yellowish	3,8	4,5	bitter	whitish
Hissor	oblong	yellowish	3,3	3,6	semi-bitter	whitish
Brown Pickling	oval	yellowish	3,5	4,7	semi-bitter	whitish
Lilia	oval	dark red	3,2	3,5	bitter	Light-red
Stardast	oblong	yellowish	3,1	3,7	semi-bitter	whitish
Rocardo	oblong	pink	3,3	3,9	semi-bitter	Light-pink
Hovsan	oblong	red	3,4	4,6	bitter	Whitish

### 3. RESULTS

#### 3.1 Phenological Results

The fast-growing species in the phenological observation table are the Erkenci (23.03.17), Panko (23.03.17) and Metan (23.03.17) varieties of Turkish origin. The late ripening varieties were Brown Pickling from the UK origin (12.04.17); Lilia of Italian origin (12.04.17); Stardast (15.04.17) and Rocardo (15.04.17) of Dutch origin. The formation of the 2 to 3 leaves was also the same.

Formation of the onion was more frequent in the Erkenci of Turkish origin (02.06.17). Compared to others, late form groups are Local Hovsan (18.06.17) and Stardast of Dutch origin (18.06.17).

### 3.2 Biometric Results

According to the biometric parameters table on the height of the plant, the highest varieties were Valenciana of Turkish origin (30.2 cm), Karatalskiy (30.5 cm) of Uzbekistan origin and Ispanskiy mestniy of Tajikistan origin (30.7 cm). The variety with the smallest height was Stardast of Netherlands origin (10.5 cm). The majority of leaf numbers was in Ispanskiy mestniy of Tajikistan origin (7.7); Gırmızı bash soghan of American origin (7.5); Italy's Yellow Parma bulbs (7.8) and Lilia (7.8) varieties. Those with less leaf than others were Local Sabir (4); Barakat of Turkish origin (4) and Tekirdagh onion (4) variety accessions.

The width of the leaf in Beyaz onion of Turkish origin (0.48); in Khalcedon of Ukrainian origin (0.48) and American origin Primero (0.49) was greater. The variety with the smallest width was the Red Amposta (0.19) of Turkish origin.

The varieties accessions, with the longest leaves were Valenciana (28.5 cm) of Turkish origin, Karatalskiy (28.7 cm) of Uzbekistan origin and Ispanskiy mestniy of Tajikistan origin (28.2 cm). Looking at the above-mentioned varieties, we see that the varieties of Turkish and Tajik origin are predominantly dominant, and these varieties are better suited to cultivate in Absheron. Nowadays research works are continued on the varieties of each onion plant.

### 3.3 Morphological features

The shape, color, width, length, flavour and cross-sections of the bulbs are recorded in the table of morphological signs, The differences in this table are clear. Mor Soghan (conishaped) of Turkey origin differs from other varieties for its shape. The most distinctive for their colour are Mor soghan (dark red), Tekirdagh soghan (burgundy), Beyaz soghan (white) and Beta Panko (yellow) of Turkey origin, Lilia of Italy origin (purple); Primera of America origin (white); Hispanic White Soghan (white) and Rocardo (pink) origin of Dutch origin. The varieties with bitter flavor are Yerli Hovsan (bitter); Mor soghan (bitter), Tekirdagh soghan (pain), Red amposta (bitter) of Turkey origin; Mayskiy of Tajikistan origin (bitter); Khalchedon of Ukrainian origin (bitter); Shalot of Dutch origin (bitter) and Lilia



Italian origin (bitter) varieties. For their width superiority are White Soghan (5.3) of Spain origin and Metan of Turkey origin differs from others for its length superiority. (6.44)

#### 4. CONCLUSIONS

As can be seen from the table of phenology observations, the fastest ripening varieties are the Erkenci, Panko and Metan of Turkish origin and the latest ripening varieties are Brown Pickling, Lilia, Stardast and Rocardo. Formation of 2 – 3 leaves in these varieties occurred in the same way. In the formation of the bulb, the Erkenci of Turkish origin was more frequent.

Biometric parameters of each sample have been repeatedly recorded 3 times. Finally, these dimensions are illustrated in the table below. As can be seen from the table of biometric measurements, according to the height of the plant, Valenciana of Turkey origin, Karatalskiy of Uzbekistan origin and Ispanskiy mestniy of Tajikistan origin are predominant. The variety with smallest height is Stardast of the Netherlands origin. The length of the leaf was also the same.

As can be seen in the Morphological features Table, the most distinctive varieties are Mor Soghan, Tekirdagh Soghan, White Soghan and Beta Panko from Turkish origin; Lilia of Italy origin; Primero of America origin; Ispanyol White Soghan of Spain origin and Rocardo of Dutch origin. The varieties with bitter flavor are the Yerli Hovsan (local); Mor soghan, Tekirdag soghan, Red amposta of Turkey origin; Maysky of Tajikistan origin; Khalchedon of Ukraine origin; Shalot of Dutch origin and Lilia of Italian origin. By comparing colors and flavor, we see that the flavor becomes more bitter depending on the tones.

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