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Big life cycle *hordeum bulbosum* L. In cultural conditions

Makhmudov Valijon[1], Mahmudov Azizbek Valijonovich[2]
[1] Ferghana State University of the Republic of Uzbekistan, Uzbekistan
[2] Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan, Uzbekistan

Abstract
The article is devoted to the study of the biomorphological features of *Hordeum bulbosum* under conditions of introduction in the mountainous semi-desert zone and the determination of their economic prospects for introduction into rain fed culture.

Keywords: ontogenesis, latent, virginal, seedlings, juvenile, immature, generative periods, cereals, *Hordeum bulbosum*.

Introduction
Livestock farming in Uzbekistan is based mainly on natural pastures, suitable for use throughout the year and providing cheap feed. However, the pastures of the desert and semi-desert zones are low-yielding and do not meet the needs of the growing livestock population. Livestock farms of the densely populated Fergana Valley are especially affected by the lack of forage. Here fodder production can be increased by radical phytomelioration of the low-productive foothill lands surrounding the Fergana oasis and used as autumn - winter - spring pastures.
The main stages of ontogenesis of some meadow, forest and steppe loose shrub grasses with varying degrees of detail are considered in the works of T.I. Serebryakova (1956, 1968, 1971) [1]. I.M. Ermakova (1968, 1972) [4, 5]. A.R. Matveeva (1972), V.I. Egorova (1973) [6]. E.I. Kurchenko (1979) [7]. A.A. Uranova (1973), H.F. Shomurodov (2018) [10]. and others. However, no data on the features of ontogeny of loose sod grasses introduced into the mountain semi desert were found in the literature.

Objective
Study of biomorphological features of *Hordeum bulbosum* under conditions of introduction in the mountainous semi-desert zone and determination of their economic prospects for introduction into rainfed culture.

Research Methods
The biomorphological characteristics of plants under cultural conditions were studied in the phases of ontogenesis (Smirnova, 1976) [2]. The small life cycle or shoot ontogeny was described according to the phases proposed by T.I. Serebryakova (T.I. Serebryakova, 1971) [1]. According to the method of M.S. Shalyta studied the root system of individuals of each age state in plants of the first year on a monthly basis, the second and subsequent years - at the end of the growing season.

Results and Discussion
The prospects for the introduction of wild-growing drought-resistant perennial grasses in the Chartak foothill have been established. In rain fed culture, these species go through a full cycle of ontogeny. The main stages of development are described, the process of shoot formation and vegetative propagation of plants is studied. Improvement of conditions in the early stages of ontogenesis promotes early growth of axillary buds, which leads to a reduction in the duration of the juvenile stage.

Latent Period
The fruit of bulbous barley is a caryopsis, oval, 9-11 mm long, 1, 5-2, 5 mm wide. The absolute weight of 1000 seeds from natural conditions (the Chirchik river basin) is 11,5 g, from the Chartak site 10,9-11,8 g, from the Tashkent site slightly higher than 11,9-12,2 g. Bulbous barley kernels are capable of germinating in a wide temperature range from +5 to + 35^{0}C. Laboratory germination at a temperature of 5-200C is 90-99%, and at a higher temperature it sharply decreases, at 350C the seeds hardly germinate (table 1). At the optimum germination temperature of 5-100C, the germination rate is 97-99%, the germination energy is 40%. Our data are close to the literature. According to Keldiyarov Kh.A. (1981), laboratory germination of bulbous barley from the Zeravshan ridge at 150C is 97%, and the germination energy is 65, 5%.
Thus, the seeds of bulbous barley have a high germination capacity. For 12 months of storage in room conditions, only 6-8% of germination is lost, and in two years 10-12%.
Field germination at the Chartak site is slightly lower than at the Tashkent site. In the dry first year, 33% of seeds germinated in the Chartak site, 61, 3% in the wetter second year, and 48, 4 and 70, 5%, respectively, in the Tashkent site.

Table 1: Germination of seeds of bulbous barley at different temperatures in laboratory conditions

Growing conditions	Germination temperature, ^{0}C						
	5	10	15	20	25	30	35
Natural thickets	99,0	98,2	91,0	93,6	85,4	8,9	1,0
Chartak site	94,2	93,5	90,1	90,0	82,3	5,4	0
Tashkent site	99,1	97,8	92,8	92,5	87,4	10,7	3,1

The Virginal Period
Sprouts
Seedlings of bulbous barley are uniaxial, rosette plants up to 4-6 cm long, consisting of coleoptile, 1-2 short leaves and an embryonic root. Seed germination at Chartak and Tashkent sites is usually observed at the end of February.

On February 22 of the first year, despite the fact that there was still snow on the soil (snow cover 2 cm), the formation of an embryonic root up to 1 cm long was noted in caryopsis. March 27, in the second year a little later from March 9 to April 1. The mass appearance of seedlings in the first year was noted in mid-March, and in the second year at the end of March. Around the same time, that is, in early spring, bulbous barley seeds germinate in other geographical sites. In especially favorable conditions of the upper adyr of the Gissar ridge, the seeds sown in October sprouted in November and in a juvenile state went under the snow (Sinkovskiy *et al.*, 1972) [3].

Coleoptile growth continues until 1-2 true leaves appear. At this time, the entire aerial part of the seedling reaches a length of 6 cm. Coleoptile is 1, 5-2 cm long, scarious, glabrous with two brown veins. Its underground part is whitish, aboveground it is whitish-green, 1-4 mm long. The length of the leaf blade is 2, 5-5 cm, the width is 2-3 mm. The sheaths of the leaf are white-green. Sheaths and leaves are covered with sparse hairs, sometimes bare. 7-13 days after the appearance of the first narrow-linear leaf, the 2nd leaf grows. At this stage, the plant still retains its connection with the caryopsis.

The root system is represented by embryonic (6-8 cm) and 1-2 unbranched (2-4 cm) adventitious roots. The roots are covered with fine hairs on which small soil particles stick, forming a kind of cover of the soil. The duration of the age state of the seedling on the Chartak site is 25-30 days (until the end of March), and on the Tashkent site 20-25 (until March 25).

Juvenile Plants

Juvenile plants, like seedlings, are uniaxial, rosette. Drying of the aboveground part of the coleoptile is taken as the beginning of this stage. At the Chartak and Tashkent sites, it was noted in late March - early April. The average height of juveniles is 8-12 cm. They have 3-4 very close internodes (0.5-1 mm in length). The length of the first leaf in juvenile plants is 3-4, the second 5-7, the third 4-5, the fourth 2-2, 5 cm, their width is 3-4 mm. The next 4th and fifth internodes are large, up to 5 mm. In the juvenile age state, one of them begins to grow, giving rise to a pseudo bulb. The connection with the weevil remains.

The root system of juvenile plants in the Chartak site reaches 25 (30) cm depth, the roots branch up to the third order. The number of roots of the first order is 3 (4). The length of the roots of the second order is 0, 6-4, 5 cm, the third is 0, 3-1, 5 cm. In the Tashkent site, the roots of the first order are 4, they are shorter than 14-16 cm, and they form the roots of the second order, 0, 7-2, 5 cm length.

The duration of the juvenile age state in the Chartak site is 25-27 days, and in the Tashkent site it is 23-24 days.

Immatures Plants

The appearance of a lateral shoot characterizes the entry of plants into the immature stage of the virginal period of ontogenesis. In the Chartak site, in some specimens of bulbous barley, this is observed from April 8-10, and most individuals enter this age state at the end of April.

There is no connection with the caryopsis; only some plants retain the remains of the caryopsis. In plants aged 29-33 days, lateral buds develop in the axils of the first and second lower leaves located below the pseudo-bulb (in the tillering zone) at a depth of 2-2, 5 cm. These are future shoots of the second order. The kidney is dressed on top with a pre-leaf, that is, a closed type (Serebryakova 1959-1961). The structure of the prelist resembles a coleoptile and plays the role of protecting the lateral bud (Serebryakova 1971) [1]. It is whitish green in color, up to 2 cm long. In most barley plants, the second-order bulbous shoot appears in the axil of the first leaf (basiton tillering), but there are specimens where tillering begins with a bud laid in the sheath of the second and third leaves (mesotonic tillering).

In this age period, on the main shoot, on average 2-3 lateral shoots of the second order were formed. Their biometric characteristics are shown in Table 1. The leaf is covered with short and sparse hairs. The vagina is white-green in color with sparse pubescence, a well-defined membranous tongue, and 1-2 mm in length.

Shoots of bulbous intravaginal type of barley, that is, intravaginal (Smirnov 1958, Serebryakova 1971) [1]. T.I. Serebryakova (1971) [1]. notes that intravaginal shoots are characteristic mainly of xeromorphic grasses of steppe and semi-desert sites. With intravaninal branching, the young growing shoot is protected by the pre-leaf and sheath of the cover leaf from drying out and sharp temperature fluctuations. In the immature age state, the growth of the pseudo-bulb of the main shoot continues and a pseudo-bulb appears in the shoots of the second order.

The underground part is better developed in the plants of the Chartak site. The pseudo-bulb is larger, the roots of the main shoot are 24, 2 ± 0, 71 cm, and they branch up to the third order (Table 1). The number of roots of the first order of the main shoot is 7, 3 ± 0, 23, of the second order, 5, 4 ± 0, 17 pcs. First-order roots vary in thickness. Young ones are thick, almost do not branch, their surface is covered with small hairs, on which soil particles stick, forming a soil cover. As they increase in length, they become thinner and lateral roots appear. When the shoots of the second order form 2-3 true leaves, 4-5 adventitious roots are formed at the base of their pseudo-bulb.

The duration of the immature age state in the Chartak site is 26-28 days (until the beginning of May), moreover, no tillering was observed in 20% of the plants. In half of those individuals in which tillering was not observed in the first year, in May the main shoot becomes generative. The remaining 10% of plants form only one elongated vegetative shoot - these are adult virginal individuals.

On the Tashkent site, the first tillering in single individuals was noted from April 3, and in the majority from April 20-22. As can be seen from the data in Table 1, the aboveground part of the plants in the Tashkent site was better developed.

Virginile Plants

Plants that have passed the immature stage, that is, virginile by the middle of May, reach an adult vegetative state, form 6,0±0,20 vegetative shoots of different lengths (3,5±0,12 – 24,6±0,69 cm) (Table 2). Adult virginal plants differ from immature ones in larger leaves, pseudo-bulbs, long length, number of shoots and dead leaves. In addition, vegetative shoots branch up to the third order.

The number of dead leaves according to the count as of May 20 at the Chartak site was 7, 2±0, 20 pieces. In May, buds are formed in the soil at a depth of 2 cm at the base of the pseudo-bulb on the main shoot and shoots of the second order along the sheath of 3-4 lower leaves (in the tillering zone), the development of which continues only in the fall

after summer dormancy. In the first year of life, 70% of plants enter summer dormancy in a virginal age state.

After summer dormancy at the end of October, virginal plants formed 3,9±0,16 rosette shoots of I-III order 14,7±0,49 cm long, bearing 4,3±0,15 leaves, 12,6±0,39 cm long, 6,5±0,21 mm wide. Young leaves, formed in autumn, do not bear pubescence either on the leaf blades or on the sheaths. As in the previous stages of ontogeny, the root system in plants from the Chartak site is better developed than on the Tashkent site (Table 2).

The formation of new shoots is always accompanied by the appearance of young roots. In the second year of life, virginal plants form, on average, 13, 7±0, 42 vegetative shoots, up to 29, 3±0, 79 cm in length. The shoot bears 7, 1±0, 21 leaves 17, 2±0, 50 cm long and 8, 3±0, 20 mm wide. On April 17, the second year, an average of 1, 9±0, 08 dried leaves from the leaves of the autumn generation were noted. The leaves of the autumn generation completely dry up in May.

The root system of biennial virginal plants reaches 45,4±1,57 cm, branches up to the third order. The number of roots of the first order is 28, 7±0, 95 pcs. The length of the roots of the second order is 4-15 cm, the third is 3-5 cm.

Due to the fact that the second year was very dry, in the second year of life, only 15% of adult vegetative individuals passed into the generative period of ontogenesis, and 55% of the plants still remained in the virginal age state (30%, as mentioned above, even in the first formed generative shoots). Only in the third year of vegetation did all plants enter the generative period of ontogenesis. Thus, the duration of the virginile age state in the Chartak site is from 15 days to 2 years. On the Tashkent site, the aboveground part of adult virginal plants is better developed than on the Chartak site (table 2). The main shoot is 8-10 cm longer, forms a larger number and longer shoots of II-III orders. The plants are less pubescent, leafy is better, the leaves are larger and the diameter of the turf is slightly larger, the number of dead leaves is half.

On the Tashkent site, by the time of summer dormancy, 40% of plants do not reach the generative period. The regrowth of shoots after summer dormancy begins 10-12 days earlier, and at the end of October 23,7±0,61 shoots of 14,4±0,45 cm in length were observed in plants, branching to the third order. The roots are shorter than those of the plants of the Chartak site, but their number is greater.

Plants of the Tashkent site virginal stage pass from 8 days to the first year, that is, twice as fast as in the Chartak site.

Generative Period of Ontogenesis

Young Generative Plants

On the Chartak plot, the appearance of generative shoots in the first year of life was observed in 30% of plants (10% of them entered the generative period without tillering), in the second year in 45%, and in the third year - in 100%. The morphological differences in generative individuals of the first, second and third years of vegetation in different sites can be judged from the data of tables 3 and 4.

With age, the number of pseudo-bulbs increases and, accordingly, the diameter of the turf - it becomes loose, partial bushes are clearly visible, as the pseudo-bulbs of 1-2 years of vegetation dry up. The number of generative shoots and roots of the first order increases sharply, their length increases. With age, the internodes of generative shoots are lengthened.

In the first year of vegetation, 1,1±0,05 generative (semi-rosette orthotropic) and 4,8±0,14 vegetative (of which 1,7±0,07 are elongated and 3,1±0,09 shortened, rosette) shoots are formed. Plants branch up to third order.

The sod is formed by 4, 3±0, 15 pseudo-bulbs, its diameter is 5, 1±0, 19 cm. In the second year of vegetation in the Chartak site, the number of pseudo-bulbs doubles, and in the third year their number becomes 23, 8±0, 81 pcs.

Under natural conditions, in the upper adyr of Bostanlyk district of Tashkent region, generative shoots reach 135,8±4,34 cm and more, and vegetative ones 35,3±1,12 cm.

Table 1: Biometric indicators of bulbous barley in immature age state (May)

Sites	Turf diameter, cm	Bine the first order					Bine the second order	
		Length, cm	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, cm.
				Amount, pcs.	Length, cm	Width, cm		
Chartak	2,9±0,10	18,3±0,49	9,1±0,32	6,3±0,22	13,9±0,42	6,1±0,19	7,5±0,24	2,7±0,09
Tashkent	2,5±0,08	24,1±0,57	5,6±0,17	6,8±0,24	17,8±0,64	6,8±0,21	17,4±0,59	3,1±0,11

Sites	Bine the second order				Roots	
	Turf diameter, cm	Leaf blade			Amout the first order, pcs.	Length, cm
		Amount, pcs.	Length, cm	Width, cm		
Chartak	7,1±0,23	3,3±0,12	7,9±0,25	4,2±0,15	12,6±0,39	29,7±0,97
Tashkent	4,3±0,15	4,2±0,15	16,6±0,51	5,4±0,15	14,1±0,39	20,5±0,63

Table 2: Biometric indicators of bulbous barley in virginal age state (first year of vegetation, May)

Sites	Turf diameter, cm	Bine the first order					Bine the second order					
		Length, cm	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade		
				Amount, pcs.	Length, cm	Width, cm				Amount, pcs.	Length, cm	Width, cm
Chartak	3,8±0,13	24,6±0,69	14,4±0,44	7,8±0,26	16,9±0,53	7,3±0,20	13,8±0,33	3,6±0,13	11,8±0,38	5,9±0,19	10,2±0,35	5,8±0,16
Tashkent	4,7±0,16	34,3±0,87	11,3±0,35	9,5±0,32	19,5±0,32	7,9±0,21	27,4±0,71	5,9±0,20	8,8±0,25	7,1±0,22	17,3±0,55	6,6±0,18

Sites	Bine of the third order							
	Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade			Roots	
				Amount, pcs.	Length, cm	Width, cm	Amout the first order, pcs.	Length, cm
Chartak	3,5±0,12	1,4±0,06	4,4±0,15	2,2±0,07	2,4±0,08	3,5±0,03	14,6±0,44	36,3±1,09
Tashkent	12,1±0,34	2,1±0,08	3,3±0,12	4,9±0,17	7,4±0,22	4,5±0,15	17,2±0,55	30,7±1,04

The amount of first-order roots in plants on the Chartak site doubles during the second and third years of the growing season. The annual growth of roots in length in the Chartak site is 20-30 cm and they branch up to the third order. In the third year, the plants form 8, 2±0, 29 partial bushes.

At the end of April, as in plants in the virginal period of ontogeny, buds are laid at the base of the pseudo-bulbs. The pseudo-bulbs of the generative shoot are larger than the vegetative ones. In autumn (October), rosette shoots are formed from the soil laid in the tillering zone under the pseudo-bulb, there are 5, 6±0, 18 of them in each partial bush, and they branch to the second order. At first, they grow due to storage substances and moisture of the parent pseudo-bulb, as a result of which the pseudo-bulbs shrink, as it were, dry out and in February completely die off together with the roots extending from them.

On the Tashkent site, the appearance of generative shoots in the first year of life was observed in 60% of the plants, and the next year all plants entered the generative phase.

In the second year of vegetation, the number of pseudo-bulbs was 22, 9±0, 81, that is, significantly more than that of the plants of the Chartak site. The annual growth of roots reaches 50 cm in length, and they branch to the third order. The formation of partial bushes is faster than in the Chartak site; in the second year of vegetation, there are the same number of them as in the Chartak site in the third year.

Thus, young generative individuals in the Tashkent site, as well as virginal ones, develop much faster. Already in the second year, their sizes correspond to the data of three-year-old plants of the Chartak site.

The duration of the age state on the Chartak site is 2-2.5 years, and on the Tashkent site, 1-2 years.

Middle-Aged Generative Plants

On the Chartak site, from the third year of vegetation, 90% of plants enter the middle-aged generative stage of ontogenesis. The stage differs from young generative plants in the maximum increase in biomass and seed productivity. With a favorable spring, generative shoots reach 155, 6±4, 22 cm, their number is 13, 8±0, 43 pcs; in dry years, they are less (Table 4). Generative shoots branch up to II-III orders. In bulbous barley, generative shoots are almost two times smaller than vegetative ones. The number of partial shrubs increased in the fourth year of vegetation to 10, 5±0, 37, and the diameter of the turf due to the withering away of the parent pseudo-bulbs increased to 8, 2±0, 26 cm. The root system reaches 100, 6±3, 21 cm in depth, and the roots branch up to the third order.

In the Tashkent site, from the second year of vegetation, 95% of the plants have a middle-aged generative stage. Generative and vegetative shoots increase in number and they are longer due to elongated internodes (Table 6). The ear width is almost the same in both sites, but in the Chartak site its length is 1–2 cm longer.

The root system reaches 98, 9±3, 31 cm in depth, the roots branch to the third order.

The duration of the age state in the Chartak site is 2-3, and in the Tashkent site 3-4 years. Since, plants with a lack of moisture age faster.

Table 3: Biometric indicators of bulbous barley in a young generative age state in the Chartak site (May)

Vegetation year	Turf diameter, cm	Amount of partial bushes, pcs.	Vegetative bine						Generative bine		
			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm
						Amount, pcs.	Length, cm	Width, cm			
1 year	5,1±0,19	0	25,3±0,73	4,8±0,14	11,4±0,42	5,1±0,17	17,3±0,51	8,6±0,26	74,9±2,15	1,1±0,05	14,2±0,45
2 year	5,9±0,21	3,1±0,10	20,6±0,59	14,2±0,48	8,6±0,31	6,5±0,22	11,3±0,33	5,7±0,16	77,4±2,30	3,9±0,12	14,1±0,45
3 year	6,7±0,24	8,2±0,29	26,2±0,80	20,3±0,71	10,1±0,32	7,0±0,23	14,9±0,42	7,5±0,22	145,8±3,94	8,3±0,25	14,3±0,46

Vegetation year	Generative bine					Roots	
	spica		Leaf blade			Amout the first order, pcs.	Length, cm
	Length, cm	Width, cm	Length, cm	Amount, pcs.	Width, cm		
1 year	8,5±0,23	7,1±0,20	18,6±0,56	8,3±0,24	9,7±0,27	19,3±0,58	41,6±1,28
2 year	10,7±0,31	8,2±0,25	13,8±0,41	9,1±0,26	6,7±0,21	50,6±1,53	58,7±1,73
3 year	14,8±0,43	7,0±0,22	22,1±0,63	11,4±0,34	8,8±0,27	105,3±3,15	91,3±2,71

Table 4: Biometric indicators of bulbous barley in a young generative age state in the Tashkent site (May)

Vegetation year	Turf diameter, cm	Amount of partial bushes, pcs.	Vegetative bine						Generative bine		
			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm
						Amount, pcs.	Length, cm	Width, cm			
1 year	5,0±0,17	0	18,8±0,62	5,9±0,19	7,7±0,24	5,9±0,21	12,3±0,37	6,2±0,16	72,2±2,11	1,1±0,04	11,7±0,34
2 year	8,3±0,24	4,2±0,19	25,6±0,81	8,3±0,23	8,1±0,25	6,7±0,21	18,4±0,53	5,8±0,20	140,5±3,51	14,9±0,50	12,1±0,36

Vegetation year	Generative bine					Roots	
	spica		Leaf blade			Amout the first order, pcs.	Length, cm
	Length, cm	Width, cm	Length, cm	Amount, pcs.	Width, cm		
1 year	8,4±0,23	7,6±0,23	10,6±0,31	15,3±0,43	7,4±0,23	21,2±0,58	35,1±0,91
2 year	15,8±0,44	6,1±0,16	11,2±0,29	23,4±0,54	9,8±0,26	110,5±3,08	23,9±2,85

Table 5: Biometric indicators of bulbous barley in the middle-aged generative age state in the Chartak site (May)

Vegetation year	Turf diameter, cm	Amount of partial bushes, pcs.	Vegetative bine						Generative bine		
			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm
						Amount, pcs.	Length, cm	Width, cm			
3 year	7,9±0,25	8,7±0,29	28,7±0,84	23,3±0,75	11,3±0,32	7,2±0,23	15,1±0,42	8,4±0,25	155,6±4,22	13,8±0,46	15,1±0,43
4 year	8,2±0,26	10,5±0,37	19,3±0,62	15,9±0,62	11,5±0,32	5,7±0,21	13,4±0,47	5,2±0,18	110,3±2,64	8,6±0,29	15,3±0,44

Vegetation year	Generative bine					Roots	
	spica		Leaf blade			Amout the first order, pcs.	Length, cm
	Length, cm	Width, cm	Length, cm	Amount, pcs.	Width, cm		
3 year	15,6±0,46	7,6±0,24	11,9±0,37	23,1±0,70	9,5±0,23	120,4±3,04	95,9±3,45
4 year	12,3±0,39	7,1±0,24	9,4±0,31	22,3±0,31	8,1±0,23	116,7±3,26	100,6±3,21

Table 6: Biometric indicators of bulbous barley in the middle-aged generative age state in the Tashkent site (May)

Vegetation year	Turf diameter, cm	Amount of partial bushes, pcs.	Vegetative bine						Generative bine		
			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm	Leaf blade			Length, cm	Amount, pcs.	Pseudo-bulb diameter, cm
						Amount, pcs.	Length, cm	Width, cm			
2 year	9,7±0,22	12,3±0,39	35,4±1,20	11,6±0,31	8,9±0,24	7,5±0,23	24,2±0,74	6,0±0,19	158,9±3,97	19,3±0,51	13,1±0,43
3 year	13,2±0,41	15,7±0,51	21,3±0,59	51,7±1,73	8,7±0,23	6,9±0,23	16,8±0,51	5,7±0,19	167,4±4,08	12,1±0,37	13,3±0,45

Vegetation year	Generative bine					Roots	
	spica		Leaf blade			Amout the first order, pcs.	Length, cm
	Length, cm	Width, cm	Length, cm	Amount, pcs.	Width, cm		
2 year	16,2±0,42	6,8±0,19	26,7±0,81	12,0±0,35	10,3±0,29	148,8±4,62	85,4±2,39
3 year	14,2±0,39	7,1±0,23	28,3±0,79	12,1±0,36	9,6±0,29	295,5±7,97	98,9±3,31

Old Generative Plants.

On the Chartak site, signs of aging, that is, a sharp weakening of generative functions, as well as very passive shoot formation, are observed from 5-6 years of vegetation. At this stage, most (8/10) of the turf dies off. In the sixth year of the growing season, 21,3±0,65 shoots are formed, of which generative ones are single, no more than 60,1±2,12 cm in length. The sod increases in diameter to 14, 8±0, 51 cm (including the dried parts), the root system becomes shorter to 40, 2±1, 32 cm in depth. In each partial bush, only 1-2 shoots form pseudo-bulbs, which are smaller than in younger plants. The duration of the age state is 0.5-1.5 years. Thus, the total duration of the generative period is 4-5 years.

Postgenerative Period

Subsenile Stage

On the Chartak site, since the seventh year of vegetation, the plants show a lack of generative functions. There are 2-3 partial shrubs of 1-2 vegetative shoots. Pseudo-bulbs are formed only in single shoots. At the base of the pseudo-bulb, 1-2 lateral buds are laid, but most of them die off during the summer drought. The process of root formation weakens, the root system does not penetrate deeper than 32, 4±0, 97 cm. The duration of the subsenile stage is 0, 5-1 year.

Senile Stage

Bulbous barley on the Chartak site in the eighth year of life retains 1-2 partial bushes with 1-2 vegetative shoots, up to 11, 3±0, 35 cm in length. Shoots have 4, 8±0, 19 leaves, 6, 7±0, 25 cm long, 4, 6±0, 19 mm wide. Almost no pseudobulbs are formed. Senile plants die at the beginning of summer, that is, the duration of the growing season is 4-5 months.

Thus, the total duration of ontogenesis of bulbous barley in culture on the Chartak site is 7-9 years.

Conclusions

The possibility of introducing the drought-resistant cereal Hordeum bulbosum L. in a mountainous semi-desert, where at least 250 mm of precipitation falls, has been proved.

The reaction to severe xerothermic conditions is the lengthening of the virginal period of ontogenesis, the reduction of the generative one. Bulbous barley is characterized by intravaginal branching of shoots, which is an adaptation to xerothermal conditions and sharp temperature fluctuations. In summer, the axillary buds of plants are protected from drought by a dried pre-leaf and 1-2 rudimentary leaves. With a lack of moisture, shoot ontogenesis is lengthened. The beginning of the phases of non-branching rosette shoot and primary tillering is determined by the time of autumn precipitation. In dry years, in the phase of primary tillering, an n+1 shoot forms shoots of the second order, and in wet years, up to the fourth order. The duration of the phases of autumn tillering is determined by meteorological conditions: during drought, it decreases. The maximum accumulation of aboveground forage mass is observed in the heading phase. The yield of bulbous barley is subject to significant fluctuations depending on moisture conditions.

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