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BIG LIFE CYCLE *Agropyron cristatum* (L.) Beauv. IN THE CONDITIONS OF CULTURE

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ABSTRACT: The article is devoted to the study of the biomorphological features of *Agropyron cristatum* under the conditions of introduction in the zone of mountain semi-desert. Defined their economic prospects for the introduction of rainfed culture.

***Keywords*:** Ontogenesis, Biomorphology, Thickets, Life cycle, Coleoptile, age condition.

1. INTRODUCTION

The livestock industry of Uzbekistan is based mainly on natural pastures suitable for use throughout the year and giving cheap feed. However, the pastures of the desert and semi-desert zones are low-yielding and do not satisfy the needs of growing livestock. The livestock farms of the densely populated Fergana Valley especially suffer from a lack of feed. Here the production of feed can be increased by means of the root phytomelioration of the low productive adyr (foothill) lands surrounding the Fergana oasis and used as autumn - winter - spring pastures. The main stages of the ontogeny of some meadow, forest and steppe loose-grasted cereals with different degrees of detail are considered in the works of T.I. Serebryakova [1], A.R. Matveev [2], I.M. Ermakova [3,4], V.I. Yegorov [5], E.I. Kurchenko [6], A.A. Uranov [7], H.F. Shomurodov [8] and others. However, data on the features of the ontogeny of ryhloderous cereals introduced into the mountain semi-desert have not been met in the literature.

2. Method

Biomorphological features of plants in culture were studied in ontogenesis phases [9]. The small life cycle or escape ontogenesis was described by the phases proposed by T.I. Serebryakova [1]. According to the method of M.S. Shalyt 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 vegetative season [10].

3. Result

The perspective of the introduction of wild-growing drought-resistant perennial grasses in the conditions of Chartak arches has been established. In rainfed culture, these species undergo a full cycle of ontogenesis. The main stages of development are described, the process of shoot formation and vegetative propagation of plants is studied. Improving conditions in the early stages of ontogenesis contributes to the early growth of axillary buds, which leads to a reduction in the duration of the juvenile stage.

3.1. Latent period

The comb fruit is a kernel, in which the inner seed coat is densely adhered to the outer fruit coat (pericarpium) seed of light yellow color, oblong oval, grooved on the inner side, 5–7 mm in length, 1–1.5 mm in width. It is tightly covered with flowering scales attached to the fruit. According to our data, the mass of 1000 seeds of natural reproduction is 2.2 g. An even greater mass is in the seeds obtained in our crops: from the Chartarsky plot - 2.7 g, and from the Tashkent section - 2.9 g. The comb seeds are not organic.

Freshly harvested seeds from the Tashkent site give good germination under laboratory conditions: at + 50 ° C - 94%, at + 10 ° C - 96.3%, at +150 - 90%, and at a higher temperature, it decreases significantly - at + 250 ° C -

86% at + 320C - 61% (tab. 1). Approximately the same seed germination in wheatgrains is observed in culture in Siberia [11]. The period of post-harvest dormancy of seeds, noted N.I. Ryzhov, in our conditions was not observed [12].

Table 1. Laboratory germination of seeds of Agropyron cristatum at various temperatures (%)

Origin seed	Germination temperature, ^{0}C						
	5	10	15	20	25	30	35
Natural Thickets	83,3	86,1	87,4	85,2	78,4	56,9	42,0
Chartak plot	91,5	92,0	90,0	88,2	81,3	60,4	52,1
Tashkent plot	94,0	96,3	94,5	93,5	86,0	68,1	61,0

Germination energy at a temperature of 15-200C is 20%.

The field germination of grabber grass depends on meteorological conditions. In the Chartak area, it was only 16.3% in dry years, and 44.5% on average for moisture supply. In the Tashkent area due to better moisture conditions, germination was better: 33.1% and 58.7%, respectively, by year. Seeds sown in the soil, with adverse dry spring germinate only next spring.

3.2. Virginal period

Sprouts. Comb sprouts - uniaxial rosette plants up to 3-6 cm long, consisting of a coleoptile and 2-3 short narrow linear leaves. Coleoptile 1.3-1.7 cm long, membranous, naked, with two veins of purple.

Under the conditions of culture in the Fergana plot, mass germination of seeds is observed in mid-March, and in Tashkent 10-12-12 days earlier, which is due to the peculiarities of the temperature regime. On Chartaksky site on February 22, and in Tashkent on February 15, despite the fact that snow lay on the soil (2-5), the kernels had a 0.5 cm long root and coleoptile. March 9 to 27. The growth of the coleoptile continues until 1-2 linear leaves appear. The underground part of it is whitish, aboveground whitish-green, 1-2 mm long. In some seedlings, the coleoptile is located in the soil at a depth of 1-3 mm or at the level of the soil surface. Leaf leaf length 3-6 cm, width 1-2 mm. Leaf blades are pubescent with simple hairs. On the lower side and at the base of the leaf, the hairs are larger than on the upper side and top of the leaf. Vaginas of leaves whitish-purple, densely pubescent with simple long and short hairs. After 6-8 days after the appearance of the first narrow linear sheet, the second grows, and after 9-12 days - the third sheet. The root system consists of the germinal and adventitious roots, ending with a growing, thickened ending of white-brown. The average length of the embryonic root is 4-6 cm, accessory ones up to 7 (11) cm. Roots branch up to 2 orders of magnitude. The length of the roots 2 of the order of 0.3-3.0 cm.

The duration of the age condition of seedlings in the Chartak area is 30-35 days (until mid-April), and in Tashkent this stage of ontogenesis is 10 days shorter (until the end of March). Dead organs at this stage is not observed. Connection with the weevil is preserved.

3.2.1. Juvenile plants. We regard individuals as juveniles after the death of a coleoptile. These are uniaxial rosette plants. On the Chartak plot, the drying of the above-ground parts was noted from April 5 to 20. The average height of juvenile specimens is 7-9 cm, on a shortened stem - 3-4 leaves. According to the observations of April 16, the length of the plate of the first leaf in juvenile plants is 3-4 cm, the second 4-6, the third 5-8, the fourth 2-5 cm, their width 1-2 mm. Vagina at this stage brown-purple, shortly pubescent.

The root system of juvenile plants reaches 23-29 cm in length, the number of roots is 1 is about 3-4, they branch, roots of 2 are about 0.5-4.5 cm. The duration of the juvenile age is 36-39 days (until mid-May).

In the Tashkent section, the drying of the aerial part of the coleoptile is observed 15 days earlier on March 18-20. Leaf blades of juvenile plants are somewhat larger in length (1-2 cm) and width (1-2 mm). Vaginas of leaves retain pubescence and color of the seedling type. The root system is 10–14 cm shorter, but the number of roots is greater (1 is of the order of 4-5).

The duration of juvenile age is 7-8 days shorter (until the end of April). At this stage, the connection with the weevil is preserved, but the individual feeds independently.

3.2.2. Immature plants. We attribute to plants of an immature age state individuals who first entered the tillering stage, but have not yet reached the size of an adult plant. They differ from juvenile individuals by a large number of leaves and roots, the presence of turf 0.3–1 cm in diameter, and there is no connection with the weevil. Dying off of the lower leaves is observed.

In the Chartak area, individual specimens of comb-like grasses enter the tillering stage from April 28-30, and the mass phase is marked from May 10. At the age of 1.5-2 months, the first lateral bud develops in the sinus of the first, second, or third lower leaves. The next (second) lateral kidney may appear both above and below the first. The kidney on top is wearing a predlist, i.e. it is of a closed type [1]. Predstyl zhytnyak comb on average 1.3-1.6 cm in length, its outer part is purple-green.

In the immature age state, on the main shoot 12–14 cm long (length of the shoot — from the base to the top of the top leaf), an average of 1-2 side shoots 2 were formed on the order of 5–9 cm long. Branching - intravaginal. The length of the leaves of the main shoot is 6-8 cm, width is 3-4 mm, and in shoots of 2 orders of magnitude, 4-6 cm and 2-3 mm, respectively. Vaginas of leaves of white-violet color, rarely pubescent with simple hairs. From mid-April, 3-4 leaves are drying on the lower metamers.

Roots reach 28-30 cm in length, the number of roots 1 is about 7-8 pcs. The duration of the immature age state in the Fergana plot is 40-50 days (until June).

In the Tashkent area, tillering begins almost a month earlier than in Fergana - from April 2, and the mass entry into this phase - April 25. The formation of the first lateral kidneys is observed already at 1-1.5 months of age, i.e. earlier than at the Chartak station. The shoots are longer and longer, the leaves on the lower metamers dry up later; at the immature stage, 1-2 dry leaves are noted (Table 2). The root system is 9-10 cm shorter, but the roots of 1 order are more than 9-10 pcs.

The immature stage in the Tashkent area is shorter, it lasts 35-40 days (until mid-May).

3.2.3. Adult virginal plants. They are characterized by larger leaves, a large number of shoots and internodes, as well as dead leaves. On the Chartak station on May 25, 30% were in this age state, on June 10, 50%, on June 20, 100% of the plants.

The appearance of semi-outlet shoots is characteristic. The main escape from the rosette becomes a semi-outlet, an escape of 2 orders in a semi-outlet and outlet, and 3 in a receptacle.

The root system in the virginal age state is more powerful than immature plants, which is abundantly branching into three orders of magnitude roots. Roots 1 are about 38–40 cm long, their number is 9–10 (Table 3).

In July, the entire above-ground part of plants dies.

In the Chartak area, in the first year of vegetation, all plants (in favorable years, 25%), and in the second year, 20% remain in the virginal period of ontogenesis.

In the fall, the plants grow and actively bush. In the Chartak area, they form 8–13 new rosette shoots 9–13 cm long, bearing 3–4 leaves 4–9 cm long, 3–4 mm wide. Autumn shoots branch up to 2 orders of magnitude. The diameter of the turf is 1.52 cm.

After the first rains, new adventitious roots appear in the plants. On average, one plant has 30-42 adventitious roots, i.e. their total number increases almost 3 times. The roots of two types: spring - thin, richly branched up to 3 orders of magnitude, and autumn - thick, short, less branched than spring, covered with soil particles, adhered to short hairs, densely covering the roots.

In the second year, virginal plants reached 20-23 cm in height and formed 18-20 shoots of 3 orders by May 13. Extended vegetative shoots carry 7–8 leaves 4–6 cm long, 3–4 mm wide, 3–4 of which are dry. The internodes are slightly longer, but their number is less than in the first year of the growing season. The diameter of the turf is 3-5 cm. The plants have 38-45 adventitious roots, branching up to 3-4 orders of magnitude. The length of the roots is 2 of the order of 3-6 cm, 3 of the order of 1-4 cm, 4 of the order of 0.2-0.8 cm.

On the Tashkent plot in this age state, the plants entered on average 15 days earlier - May 10 -10%, May 20 - 50%, July 5 -100%. In the first year of vegetation in the dry years, 45-50% of the plants remained in the virginal period, and the following year they all reached the generative period of ontogenesis.

Table 2. Biometric indicators of *Agropyron cristatum* in an immature age condition

Plots	Diameter of turf, cm	Escape of order 1				Root		The number of dead leaves, cm
		length, cm	Leaf plates			Number 1 order, pcs.	Length, cm	
			number pcs.	length, cm	width, cm			
Chartak	0,5±0,03	13,7±0,28	6,9±0,37	7,1±0,42	3,5±0,12			
Tashkent	0,9±0,06	16,9±0,48	7,7±0,40	9,3±0,39	4,4±0,10			
		Escape of order 2						
Chartak		7,5±0,47	2,6±0,13	5,7±0,22	2,9±0,10	7,6±0,41	29,6±1,6	3,7±0,13
Tashkent		10,7±0,40	3,9±0,16	7,6±0,31	3,7±0,15	9,4±0,52	21,3±1,1	1,9±0,11

Table 3. Biometric indicators of *Agropyron cristatum* in virginal age condition

Plots	Diameter of turf, cm	Escape of order 1				Root		The number of dead leaves, cm
		length, cm	Leaf plates			Number 1 order, pcs.	Length, cm	
			number pcs.	length, cm	width, cm			
Chartak	1,8±0,07	21,8±0,67	8,6±0,33	8,9±0,31	3,8±0,06			
Tashkent	3,4±0,12	31,4±0,57	10,2±0,41	10,1±0,35	4,9±0,09			
		Escape of order 2						
Chartak		12,1±0,42	3,7±0,11	6,3±0,23	3,3±0,05			
Tashkent		19,0±0,41	7,3±0,25	9,4±0,31	4,2±0,07			
		Escape of order 3						
Chartak		-	-	-	-	9,4±0,44	38,9±0,49	7,6±0,27
Tashkent		10,3±0,41	4,7±0,19	6,8±0,21	3,3±0,10	14,2±0,31	36,7±0,36	5,6±0,19

In this age state, differences in the habit of plants growing in the two experimental plots are further enhanced. In the Tashkent area, adult virginal plants are higher, the number of metameres is larger, branching is up to 3 orders of magnitude, and the diameter of the turf is almost twice as large — 2.4 cm. Dying off of the aerial parts of plants is observed a month later - in August. Autumn tillering is more abundant than at the Chartak station: on average, there were 15–20 new shoots 12–15 cm long on one plant, 4–6 leaves 5–11 cm long, 3–4 mm wide.

The duration of the virginal age at the Chartak station is 1-2 years, and at the Tashkent one from 0.5 to one year.

4. Generative period of ontogenesis.

4.1. Young generative plants. At the Chartak station, the first generative shoots appeared only in the second year of vegetation, in 80% of the plants, and in the rest - in the third year. We believe that if the weather is more favorable in the first year, then all the plants in the second year of vegetation would enter the generative period of ontogenesis. In the wet years, in the Chartaksky area, already in the first year of the growing season, 75% of the plants showed the appearance of generative shoots.

Adult generative shoots of grasses, according to the classification of T.I. Serebryakova [1], belong to the type of semi-chain orthotropic.

Spike formed on shoots 1-2 (3) orders of magnitude. The axis of the inflorescence is sinuous, spikelets are angled to the axis, their length with awn 1.5-1.8 cm, width 5-7 mm. Spikelets are bare, awn is rough from finely toothed hairs.

About the morphological differences of generative individuals of the first, second and third years of vegetation in different areas can be found according to tables 4 and 5. As can be seen from the tables, the number and length of generative shoots increase with age. The number of spikelets almost doubled and 10–12 times the grains in the ear. The length of vegetative shoots in the second year is shorter than in the first year of entry into the generative phase.

In the Chartak area in the first year of entry into the generative phase (the second year of the growing season), 7.3 ± 0.23 generative shoots are formed in the plants and they branch up to 2 orders of magnitude, and the next year - 24.7 ± 0.70, the shoots branch up to order 3.

In the second year, generative shoots were almost twice as long as in the first year, due to the large length of internodes. Leaves become larger. Reproductive organs in the second year were also better developed: the spike is almost twice as long, wider (Table 4).

Lateral closed buds are formed in the spring in the tillering zone (under the pre list) on shortened internodes located in the soil at a depth of 1-3 cm. Their formation ends by the period of the onset of summer rest. In the Chartak area, there are 3-4 of them on the generative shoot, and 2-3 on the vegetative shoot.

Pre sheet at the end of May dries, becomes hard, performing the function of protecting leaf buds in the bud during the summer drought. The kidney, located in the first interstice, 5-7 mm long, in the subsequent they are longer, reaching 1.7-2.3 mm.

The roots for the year are extended by 20-30 cm, the number of roots 1 is of the order of 43.4 ± 1.91, they branch up to 3 orders of magnitude. In the fall, summer roots remain alive and new adventitious growing roots appear, branching up to 2-3 orders of magnitude.

By November 15, young generative plants of the Chartak area formed 30–35 rosette shoots 4–5 cm long. Escape on average carries 3 leaves 1.5-4 cm long, 1-2 mm wide, branches up to 2 orders of magnitude.

In the Tashkent area, the appearance of generative shoots in the first year of life was observed in 50% of the plants, and in the second year all the plants entered the generative phase. The length of vegetative shoots in the second year is twice as short as in the first year of entry into the generative phase. The generative shoots are much

longer than in the Chartak area (Table 5), there are more buds in the tillering zone: 4-5 in the generative shoot, and 3 in the vegetative shoot.

Slightly differing in length, the root systems of plants in the compared plots differ in abundance of roots, especially in the second year, when the number of adventitious roots of 1 order increases sharply (Table 4-5). In the Tashkent section, the number of 1 order roots exceeds 99.2 ± 2.74 and they branch up to 4 orders.

Table 4. Biometric indicators of *Agropyron cristatum* in a young generative age condition on the Chartak site

Vegetation year	Diameter of turf, cm	Vegetative shoots					Generative shoots	
		length, cm	number, pcs.	Leaf plate			length, cm	number, pcs.
				number, pcs.	length, cm	width, cm		
1st year	2,3±0,07	11,6±0,35	18,2±0,44	7,6±0,18	6,3±0,24	3,8±0,11	35,1±0,82	7,3±0,23
2nd year	3,4±0,13	10,1±0,35	20,4±0,71	5,6±0,18	5,7±0,20	4,0±0,12	65,7±1,72	24,7±0,70
		Generative shoots						
		Spica		Leaf plate			The roots	
		length, cm	width, cm	number, pcs.	length, cm	width, cm	Order number 1	length, cm
1st year		3,6±0,09	1,1±0,04	8,3±0,22	8,0±0,18	4,8±0,15	43,4±1,9	55,1±1,74
2nd year		6,1±0,17	**2,1**±0,08	8,6±0,26	11,2±0,38	5,7±0,19	86,1±2,63	105,3±3,44

Table 5. Biometric indicators of *Agropyron cristatum* in a young generative age condition in the Tashkent area

Vegetation year	Diameter of turf, cm	Vegetative shoots					Generative shoots	
		length, cm	number, pcs.	Leaf plate			length, cm	number, pcs.
				number, pcs.	length, cm	width, cm		
1st year	4,6±0,15	27,7±0,61	9,4±0,28	9,8±0,37	8,5±0,20	4,7±0,15	54,3±1,09	8,8±0,29
2nd year	5,5±0,17	15,8±0,42	20,4±0,58	5,8±0,16	8,9±0,24	4,9±0,13	78,3±2,51	28,6±0,93
		Generative shoots						
		Spica		Leaf plate			The roots	
		length, cm	width, cm	number, pcs.	length, cm	width, cm	Order number 1	length, cm
1st year		5,2±0,17	1,8±0,08	10,7±0,31	10,5±0,33	5,9±0,23	15,6±0,62	40,3±1,45
2nd year		6,3±0,20	2,3±0,09	10,6±0,35	14,3±0,43	6,5±0,22	99,2±2,74	65,7±1,81

Table 6. Biometric indicators of *Agropyron cristatum* in the middle age generative age condition on the Chartak site

Vegetation year	The number of partial bushes, pcs.	Diameter of turf, cm	Vegetative shoots					Generative shoots	
			length, cm	number, pcs.	leaf plates			length, cm	number, pcs.
					number, pcs.	length, cm	width, cm		
1st year	17,1±0,54	4,8±0,13	12,1±0,34	20,3±0,59	5,8±0,17	6,4±0,21	4,4±0,14	69,7±2,11	39,2±1,12
2nd year	20,3±0,71	5,7±0,12	13,3±0,40	8,4±0,29	6,1±0,17	6,4±0,21	4,3±0,15	60,7±1,58	56,1±1,74
			Generative shoots						
			Spica		leaf plates			The roots	
			length, cm	width, cm	number, pcs.	length, cm	width, cm	Order number 1	length, cm
1st year			6,3±0,19	2,3±0,07	9,4±0,30	12,5±0,39	6,2±0,18	115,9±3,24	110,6±3,33
2nd year			6,1±0,17	2,0±0,08	8,9±0,22	10,2±0,35	6,0±0,18	170,8±5,97	114,4±3,51

Table 7. Biometric indicators of *Agropyron cristatum* in the middle age generative age condition in the Tashkent area

Vegetation year	The number of partial bushes, pcs.	Diameter of turf, cm	Vegetative shoots					Generative shoots	
			length, cm	length, cm	leaf plates			length, cm	number, pcs.
					number, pcs.	length, cm	width, cm		
1st year	6,6±0,20	19,1±0,53	17,4±0,49	25,1±0,72	6,1±0,22	7,8±0,24	5,2±0,14	80,3±2,41	54,5±1,57
2nd year	8,5±0,24	29,3±0,90	17,8±0,51	51,3±1,51	7,2±0,27	8,5±0,25	5,2±0,14	87,6±2,52	68,9±2,05
3rd year	9,7±0,28	26,1±0,80	18,4±0,62	15,3±0,56	6,3±0,21	10,2±0,38	4,1±0,15	95,1±2,59	68,3±2,12
			Generative shoots						
			Spica		leaf plates			The roots	
			length, cm	width, cm	number, pcs.	length, cm	width, cm	Order number 1	length, cm
1st year			6,8±0,22	2,1±0,08	10,3±0,40	14,5±0,50	6,8±0,21	169,4±5,13	68,3±2,09
2nd year			7,2±0,25	2,3±0,09	10,3±0,40	15,4±0,49	7,4±0,23	470,7±15,6	105,3±3,13
3rd year			7,2±0,25	2,2±0,09	10,1±0,38	18,7±0,61	7,5±0,25	466,4±13,5	110,5±3,64

Autumn tillering begins much earlier - from September. In the first year of the growing season, 17-23 shoots are formed 14-16 cm long with 5-6 leaves. The main shoot branches on the shoots 2 and 3 of the order. In the second year of the growing season, during autumn tillering, an average of 44-46 rosette shoots are formed.
The duration of this age state in the Chartak area is 2-3, and in Tashkent 1-2 years.

4.2. Middle age generative plants. At the Chartak station, the age data is observed in 85% of plants from 3 years of growing season. At this stage, generative shoots are distinguished by the maximum number and greatest length (Table 6). In the 3rd year of the growing season, 39.2 ± 1.12 generative shoots are formed, and the following year 56.1 ± 1.74, i.e. almost 15 times more than vegetative. Generative shoots branch up to 3 orders of magnitude. The diameter of the turf on the 4th year of the growing season reached 5.7 ± 0.12 cm. In the center of the turf, old shoots die off, in which 8-10% of all shoots are noted. On the 4th year of the growing season, the number of partial bushes slightly increases compared to the 3rd year of the growing season - 20.3 ± 0.71 (Table 6).

The root system is more powerful, the length of the roots reaches 114.4 ± 3.51 cm, the number of 1 order roots is 170.8 ± 5.97 and they branch up to 3-4 orders (Table. 6).

At the Tashkent site, this age stage is observed from the 2nd year in 90% of the plants. The diameter of the turf, the number of generative and vegetative shoots is much larger and longer than in the Chartak area (Table 7). In the turf, the number of dead shoots in the 3rd year of vegetation was 7–9%, and the next year, 12–15% of all shoots. The roots of the 1st order reach 110.5 ± 3.64 cm and they branch up to 4th order.
The duration of the age state in the Chartak district is 5-6, and in Tashkent it is 4-5 years.

4.3. Old generative plants. Most of the turf dies off, the number of generative shoots decreases sharply on each partial bush. There is a very passive shoot and root formation.
In the Chartak area, for 1 year of vegetation, 24.6 ± 0.82 shoots were noted for one conditionally average seed plant, of which 8.2 ± 0.24 are generative up to 44.7 ± 1.42 cm, with 3-4 buds, however 1-2 buds dry out in summer. Most of the turf dies (90%), living partial bushes are saved only in its small peripheral area. The number and length of the roots are reduced, live roots are marked to a depth of 47.1 ± 1.51 cm.
The duration of the age of 2-3 years.
Thus, the duration of the generative period of the grapefruit on the Chartak plot is 8-10 years.

5. Post-generation period.
5.1. Sub-senile stage. In the Chartak area, 4.2 ± 0.15 living partial bushes of 1-2 vegetative shoots 13.9 ± 0.42 cm tall, not branching or branching only up to 2 orders of magnitude, are preserved in the turf of the *Agropyron cristatum*. Sometimes some vegetative shoots become hidden-generative, their length is not more than 19.3 ± 0.64 cm, since their internodes are shortened. Leaves shorter than younger plants. Each partial bush forms 2-3 roots of 1 order, branching up to 2 orders and deepening to 29.3 ± 0.90 cm soil. Root growth is not marked. The duration of the age of 1-2 years.

5.2. Senile stage. In the Chartak area, near a grapefruit at the 15th year of life, 2-3 partial shrubs with a single rosette vegetative shoot of up to 14.5 ± 0.41 cm are preserved.
Senile stage lasts 6-12 months.

6. Discussion

According to the research carried out, it was proved that it is possible to introduce in the mountain semi-desert, where at least 250 mm of precipitation falls, of the drought-resistant perennial *Agropyron cristatum*.

7. Conclusion

Agropyron cristatum is characterized by intravaginal branching of shoots, which is an adaptation to xerothermic conditions and sharp temperature fluctuations. In the summer period, all species of axillary buds are protected from drought by dried pre sheet and 1-2 rudimentary leaves.

With a lack of moisture, shoot ontogeny is prolonged. The beginning of the phases of a non-branching rosette shoot and primary tillering is determined by the time of fallout of autumn precipitation. In dry years, in the phase of primary tillering, the shoot of n + 1 order forms shoots of 2 order, and in wet phase up to 4 orders.

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