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Productivity indicators of local silkworm breeds in the extreme climatic zones of Karakalpakstan

Qoraqalpog‘istonning ekstremal iqlim zonalarida mahalliy ipak qurti zotlarining mahsuldorlik ko‘rsatkichlari

Показатели продуктивности местных пород тутового шелкопряда в экстремальных климатических зонах Каракалпакстана

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Abstract. Taking into account that creating high-yielding silkworm breeds and hybrids is one of the most pressing issues, this study aimed to develop new strains adapted to extreme climatic conditions. For this purpose, local silkworm breeds as well as those developed at the Tashkent Scientific Research Institute of Sericulture were tested in the extreme continental climate districts of Karakalpakstan. The revivability, biological, and technological indicators of the breeds and hybrids were identified and discussed.

Keywords: cocoon yield; silkworm; hatching rate; biological indicators; technological indicators; cocoon weight; shell weight; silkiness

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Annotatsiya. Ushbu maqolada pilla hosildorligi yuqori bo‘lgan zot va duragaylarini yaratish dolzarb muammolardan ekanligini hisobga olinib, Ekstremal iqlim sharoitiga mos yangi shtammlarni yaratishni maqsad qilgan holda, Qoraqalpog’istonning keskin kontinental iqlimli tumanida mahalliy va Toshkent Ipakchilik Ilimiy Tadqiqot Institutida yaratilgan ipak qurti zotlar sinab ko’rildi. Zot va duragaylarning jonlanish, biologik va texnologik ko’rsatgichlari aniqlanib muhokama qilinadi. Raqamli natija va xulosa yzishim kk

Kalit so‘zlar: pilla hosildorligi; tut ipak qurti; jonlanish ko‘rsatkichlari; biologik ko‘rsatkichlar; texnologik ko‘rsatkichlar; pilla og‘irligi; pilla qobig‘i og‘irligi; ipakchanlik

РУССКИЙ

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Аннотация. Учитывая, что создание высокоурожайных пород и гибридов шелкопряда является одной из актуальных проблем, настоящая работа направлена на выведение новых штаммов, приспособленных к экстремальным климатическим условиям. С этой целью в районах Каракалпакстана с резко континентальным климатом были испытаны местные породы шелкопряда, а также породы, созданные в Ташкентском научно-исследовательском институте шелководства. В статье определены и обсуждены показатели оживляемости, а

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также биологические и технологические характеристики пород и гибридов.

Ключевые слова: урожайность коконов; тутовый шелкопряд; показатели оживляемости; биологические показатели; технологические показатели; масса кокона; масса оболочки кокона; шелковистость

1. KIRISH
Introduction

1. Ipakchilik. Ipak qurtining qisqacha tavsifi. Ipak qurti Lepidoptera turkumidagi Bombyx Mori oilasiga mansub yagona uy sharoitida yashovchi hasharotdir[1]. Asrlar davomida xonakilashtirish natijasida ipak qurti saqlanib qolgan va hozirgi kungacha saqlanib kelinmoqda. [2]. Ipak qurti asosan monofag hasharot bo‘lib, asosan tut barglari bilan oziqlanadi [3,4]. Uning hayot cikli to‘rtta asosiy rivojlanish bosqichidan iborat: tuxum, lichinka, g’umbaklik va kapalklikdir [5]. Odamlar uchun iqtisodiy jihatdan eng muhim bosqich - bu gumbaklik bosqichi, chunki ipak qurti g’umbakka aylanishidan oldin pilla o’raydi. Odamlar an’anaviy ravishda bu pillalardan ipak olishgan va undan to‘qimachilik mahsulotlari ishlab chiqarishda foydalanganlar. [6]. Pilladan olingan ipak tolasi o‘zining nozikligi va nihoyatda mustahkamligi uchun qimmatli hisoblangan. Bu tolaning mustahkamligining asosiy siri shundaki, u 75 foiz fibroin aminokislota va 25 foiz yopishqoq seritsin aminokislotadan iborat. [7]. Shunday qilib, ipakchilik taxminan 5000 yil oldin Xitoyda paydo bo‘lgan va u yerdan dunyoning boshqa qismlariga tarqalib, bugungi kungacha rivojlanib kelmoqda. [8]. Xitoydan ipakchilik asrlar davomida Ipak yo‘li orqali asta-sekin Yevropa mamlakatlariga tarqaldi. [9]. Bugungi kunda ipak nafaqat to‘qimachilik ishlab chiqarishda, balki radiotexnologiya, biotibbiyot va kosmetika kabi ko‘plab sohalarda ham qo‘llaniladi. [10]. Hozirgi kunda butun dunyo bo‘ylab 917 650 tonna pilla xomashyosi ishlab chiqarilmoqda[11]. Dunyo bo‘ylab to‘qimachilik sanoati butun dunyo bo‘ylab ishlab chiqaruvchilar tomonidan ishlab chiqarilgan ipakdan yuqori sifatli ipak mahsulotlarini samarali ishlab chiqarishga intiladi. (B. Mori) Ipak qurtlarining keng qo‘llanilishi, birinchi navbatda, ipak mahsulotining sifati va mahsuldorligiga bog‘liq. Umuman ipak qurti mahsuldorligi deganda pilla vazni, hajmi, pilladan qancha miqdorda ipak olishi xom ipak chiqimi, ipak qurtining yashovchanligi va urug’lik mahsuldorligi kabi ko’rsatgichlar kiradi[12]. Ushbu ko’rsatgichlarning oshishi birinchidan, ipak qurtining jonlantirish va boqishta tashqi muhit tasiriga bog’liq. Ikkinchi tomondan uning genetik va molekulyar tuzilishiga irsiyatiga bog’liqdir. Yuqori maxsuldor ipak qurti shtammlarini olish uchun ham avvalo genetik resurslar kerak boladi[13]. Ipak qurtining hosildorligini oshirish uchun uni selektsiya qilinib, gibridlar yaratilib kelingan. Yani ikkita ikki xil ota ona zotlarini chatishtirb yangi kuchli gibrid olingan. Yangi gibrid kasalliklarga nisbatan kuchli va hosildorligi ota onasiga nisbatan yuqori bo’lgan[14]. Selektsiya qilish natijasida dunyo boylab 4000 dan ortiq zot va gibridlar yaratilgan [15].

Muommoni o’rganganlik darajasi. Pillachilik tarmog‘ining eng dolzarb muammosi yuqori navli raqobatbardosh pilla hamda ipak tolasi ishlab chiqarishni yo‘lga qo‘yishdir. Qoraqalpog’istonning iqlim sharoitlariga mos tut ipak qurtini oddiy va jinsi boshqariladigan zot va duragaylarini yaratish, pillaning morfologik belgilari va texnologik xususiyatlari o‘rtasidagi o‘zaro bog‘liqlikka asoslangan tanlash usullarini ishlab chiqish bo‘yicha G.E.Abdrimova, S.R.O’serbaeva, O.O.Oripov[16] tomonidan ahamiyatli ilmiy-tadqiqot ishlari bajarilgan[17,18]. T.T. Jumanazarovlar esa ipak qurti maxsuldorligiga navli tut bargi bilan ozuqalantirish yuqori natija berishini Jarariq-5 tut navi bilan isbotlagan[19]. Qo’shimcha qilib aytadigan bo’lsak, O’serbaeva Qoraqalpog’iston sharoitida Go’zal, Marxamat, zotlari va 300 x 301 liniyalarining maxsulodrlik ko’rsatgichlari yuqori ekanligini tasdiqlagan[20]. Lekin Ipakchilik Ilimiy Tadqiqot Instituti labaratoriyasida yaratilgan nishonlangan zotlar Qoraqalpog’iston sharoitida sinab ko’rilmagan.

2. TADQIQOT USULLARI VA MATERIALLAR
Materials and methods

2.Tadqiqot usullari va materiallar. Tadqiqotimizni Qoraqalpog‘istonning g‘arbiy-shimoliy tumanida olib borishni maqsad qildik. Aynan Qanliko’l tumani keskin kontinental cho‘l iqlimiga ega bo‘lib, Yanvarning o‘rtacha temperaturasi — 7,1°, iyulniki 25,8. Eng yuqori temperatura 44°, eng past temperatura — 30°. Vegetatsiya davri 186 kun. Yiliga 108 mm yog‘in tushadi. Asosan, bahor va qishda yog‘adi. yozda juda issiq va quruq, qishda esa sovuq bo‘ladi[21]. Bu muhit tashqi ta’sirlarga chidamli yangi shtammlar yaratish uchun juda mos keladi. Bu esa hududlarini tanlab olish va ilimiy-tadqiqotlarimizni olib borishda yanada samarali va ishonchli bo‘lishini taminladi. Tadqiqotimiz obiekti sifatida Mahalliy zotlar: C-14, C-13, C-12, C-10, C-5, va 2025-yilda boqilgan va duragay qilib olingan tuximlar C-10 X C-12 va teskari duragayi C-12 x C-10 va nazorat variant Ipakchi-1 Ipakchi-2 zotilari jonlantirib boqishga tanlab olindi va tayyorlandi. Tadqiqotimiz Bahorgi qurt boqish davrida olib borildi. Tut navlaridan asosan Qanlikul tumanida o’sadigan Xasaki va Balxi va Qora tutlardan foydalanildi[21]. Bu zotlardan yaratilgan shtammlar Qoraqalpog’istonning keskin iqlim zonasiga bardosh beradigan va yuqori mahsuldorlik belgilarini ko’rsatishini niyat qildik. Tadqiqotimiz usullarida biz asosan qurt boqishning oddiy usulidan foydalandik. Barcha variantlar bir xil harorat va namlikta jonlantirldi va boqildi. Tadqiqot davomida barcha zotlar 250 donadan 3 qaytarilishdan tuxim holida sanab olindi va inkubatsiyaga qoyildi. Variantlarning jonlanuvchanligi va hayotchanligi, qurtlik davri kuni, pillalarining og’irligi, pilla qobig’i og’irligi va ipakchanlik ko‘rsatgichlari aniqlandi.

3. TADQIQOT NATIJALARI VA ULARNING MUHOKAMASI
Results and discussion

2026-yilda Qanliko‘l tumani sharoitida o‘rganilgan tut ipak qurti zotlari va duragaylarining biologik hamda texnologik ko‘rsatkichlari tahlili shuni ko‘rsatdiki, tadqiqotga jalb qilingan zotlar o‘rtasida sezilarli farqlar kuzatildi. Tuxumlarning jonlanish ko‘rsatkichlari bo‘yicha eng yuqori natija C-14, Ipakchi-1, C-10×C-12 va C-12 zotlarida qayd etildi. C-14 zotida tuxumlarning jonlanish darajasi 98,0%, Ipakchi-1 da 97,6%, C-10×C-12 duragayida 97,3% hamda C-12 zotida 97,2% ni tashkil etdi. Eng past ko‘rsatkich C-12×C-10 teskari duragayida kuzatilib, jonlanish darajasi 63,8% ni tashkil qildi. Duragaylar orasida C-10 × C-12 duragayi nisbatan yaxshi natijalarni namoyon etdi. Bu esa duragaylash natijasida ayrim biologik afzalliklarning yuzaga kelganligini ko‘rsatadi. Nisbatan past jonlanish ko‘rsatkichi C-12 × C-10 teskari duragayida kuzatildi. Mazkur holat teskari duragaylashda ota-ona shakllarining biologik xususiyatlari va ularning o‘zaro ta’siri natijasida rivojlanish sur’atining sustlashishi bilan izohlanadi.

1-jadval

Tut ipak qurti zotlari urug‘larining jonlanish ko‘rsatkichlari / **Table 1.** Hatching indicators of the eggs of the mulberry silkworm breeds

Variant	Qayta-rilish	Inkubatsiya davri, kun	Xabarchi qurtlar	1-kun	2-kun	3-kun	Jonlan-magan	Jami jonlangan
C-10	1-	10	3	114	100	23	10	240
C-10	2	10-11	3	115	110	17	5	245
C-10	3-	9-10	5	120	102	10	13	237
Ortacha 100 % da		10.3	1,4%	46.5 %	41,6 %	6,6%	3,73 %	96.2 %
C-12	1	10	5	113	115	10	7	243
C-12	2	11	3	117	115	7	8	242
C-12	3	10	3	118	108	15	6	244
Ortacha 100 % da		10,3	1,46%	46.4 %	45,06 %	4.2%	2,8 %	97,2 %
C-13	1	10	4	112	98	24	12	238
C-13	2	10	5	125	100	13	7	243
C-13	3	11	4	113	116	10	7	243
O’rtacha 100 % da		10,3	1,7 %	46,6 %	41,8 %	6,2	3,4	96,5 %
C-14	1	10	4	117	108	15	6	244
C-14	2	10	4	120	100	22	4	246
C-14	3	10	3	123	102	17	5	245
O’rtacha 100 % da			1,4 %	48 %	41,3	7,2	2 %	98 %
C-5	1	11	3	93	124	23	10	240
C-5	2	11	3	115	100	17	15	235
C-5	3	10	5	98	107	132	13	237
O’rtacha 100 % da		10,33	1,47 %	40,8 %	44,13 %	22,93 %	5.07 %	94.9 %
Ipakchi-1	1	10	5	123	98	17	7	243
Ipakchi-1	2	9	5	124	96	19	6	244
Ipakchi-1	3	8	5	130	98	12	5	245
O’rtacha 100 % da		9	2 %	50,2 %	38,9 %	6,4 %	2,4 %	97,6 %
Ipakchi-2	1	10	3	98	132	7	10	240
Ipakchi-2	2	8	4	96	120	25	5	245
Ipakchi-2	3	9	3	102	123	16	6	244
O’rtacha 100 % da		9	1,3	39,4	50,1	6,4	2,8	97,2 %
C-10 x C-12	1	10	4	99	118	24	5	245
C-10 x C-12	2	9	3	97	125	18	7	243
C-10 x C-12	3	8	2	102	113	25	8	242
O’rtacha 100 % da		9	1,2 %	39,7 %	47,4 %	8,9 %	2,6 %	97,3 %
C-12 x C-10	1	12	2	58	65	33	92	158
C-12 x C-10	2	12	1	48	76	31	94	156
C-12 x C-10	3	12	2	65	85	13	85	165
O’rtacha 100 % da		12	0,6	22,8	30,1	10,26	36,1 %	63,8 %

Izoh: 1-, 2- va 3-kun — har kunlik qurt chiqish miqdori; jami jonlangan qurtlar 250 dona tuxumdan hisoblangan. / Note: days 1–3 — daily larval hatching; the total number of hatched larvae is calculated per 250 eggs.

2-jadval

Tut ipak qurti zotlarining biologik va texnologik ko‘rsatkichlari (2026-yil) / **Table 2.** Biological and technological indicators of the mulberry silkworm breeds (2026)

Variant	Qayta-rilish	Qurtlik davri, sutka	Hayotchanlik 1-yosh	5-yosh	Namuna, dona	Pilla og‘irligi, g	Qobiq og‘irligi, g	Navli pillalar, dona	Ipak-chanlik, %
C-10	1	27	240	215	50	1,9	0,452	206	23,6
C-10	2	27	245	225	50	1,6	0,418	218	25,2
C-10	3	27	237	210	50	2,19	0,477	200	21,7
C-10	O’rtacha	27	240,6	216,6	50	1,89	0,449	208	23,5
C-10	%			90, 05 %	50	1,89	0,449	96,02 %	23,5
C-12	1	28	243	210	50	2,1	0,435	200	20,3
C-12	2	28	242	212	50	2,15	0,465	206	21,6
C-12	3	28	244	220	50	2,46	0,500	198	20,3
C-12	O’rtacha	28	243	214	50	2,2	0,466	201,3	20,7
C-12	%			88,6 %				94,08	20,7
C-13	1	29	238	215	50	2,3	0,460	198	20
C-13	2	29	243	200	50	2,29	0,478	190	20,8
C-13	3	29	243	211	50	2,34	0,490	197	20,9
C-13	O’rtacha	29	241,3	208	50	2,31	0,476	195	20,5
C-13	%			86,1 %				93,75	20,5
C-14	1	27	244	228	50	2,34	0,467	220	19,9
C-14	2	27	246	232	50	2,2	0,428	223	19,33
C-14	3	27	245	230	50	2,16	0,447	220	20,3
C-14	O’rta-cha	27	245	230	50	2,2	0,447	221	19,8
C-14	%			93,8 %	50	2,2	0,447	96,08 %	19,8
C-5	1	29	240	215	50	2,16	0,461	200	21,3
C-5	2	29	235	220	50	1,7	0,419	210	23,6
C-5	3	29	237	217	50	1,8	0,440	212	23,7
C-5	O’rtacha	29	237,3	217,3	50	1,88	0,44	207,3	22,8
C-5	100%			91,5 %				95,3	22,8
Ipakchi-1	1	27	243	235	50	2,33	0,516	225	22,1
Ipakchi-1	2	27	244	227	50	2,2	0,377	217	17,1
Ipakchi-1	3	27	245	216	50	2,5	0,484	204	19,3
Ipakchi-1	O’rtacha	27	244	226	50	2,3	0,459	215	19,5
Ipakchi-1	100 %			92,6 %				95,1	19,5
Ipakchi-2	1	27	240	217	50	2,26	0,509	210	22,5
Ipakchi-2	2	27	245	216	50	2,2	0,527	210	23,8
Ipakchi-2	3	27	244	220	50	2,034	0,409	211	20,1
Ipakchi-2	O’rtacha	27	243	217, 6	50	2,16	0,481	210,3	22,1 22,1
Ipakchi-2	100 % da			89,5 %				96,6	22,1 22,1
C-10 x C-12	1	27	245	217	50	1,95	0,479	209	24,5
C-10 x C-12	2	27	243	213	50	1,98	0,474	202	23,9
C-10 x C-12	3	27	242	212	50	1,94	0,450	200	23,1
C-10 x C-12	O’rtacha	27	243	214	50	1,95	0,467	203,6	23,8
C-10 x C-12	100 %a			88,6%				95,1	23,8
C-12 x C-10	1	30	158	110	50	2.2	0,465	100	21
C-12 x C-10	2	30	156	102	50	2.3	0,500	87	21,7
C-12 x C-10	3	30	165	107	50	2.5	0.470	96	18,8
C-12 x C-10	O’rtacha	30	159,6	106,3	50	2,33	0,478	94.3	20,5

Variant	Qayta-rilish	Qurtlik davri, sutka	Hayotchanlik 1-yosh	5-yosh	Namuna, dona	Pilla og‘irligi, g	Qobiq og‘irligi, g	Navli pillalar, dona	Ipak-chanlik, %
C-12 x C-10	100% da			66,6				88,74	20,5

Izoh: hayotchanlik — 250 dona tuxumdan jonlangan qurtlar soni; pilla va qobiq og‘irligi — bitta pilla bo‘yicha o‘rtacha qiymat. / Note: viability — number of larvae hatched from 250 eggs; cocoon and shell weight — mean per single cocoon.

Texnologik ko‘rsatkichlar tahlili. Tut ipak qurti zotlari va duragaylarining texnologik ko‘rsatkichlarini baholash maqsadida har bir variantdan tasodifiy usulda 50 donadan pilla namunalari ajratib olindi. Ajratilgan namunalar asosida pilla og‘irligi, qobiq og‘irligi va ipakchanlik ko‘rsatkichlari aniqlanib, ularning o‘rtacha qiymatlari hisoblandi. Tahlil natijalari shuni ko‘rsatdiki, pilla og‘irligi bo‘yicha eng yuqori natija C-12 x C-10 duragayida qayd etildi va o‘rtacha pilla og‘irligi 2,33 g ni tashkil etdi. Keyingi o‘rinda nazorat-Ipakchi-1 zoti bo‘lib, uning o‘rtacha pilla og‘irligi 2,30 g ga teng bo‘ldi. C-12 va C-14 zotlarida pilla og‘irligi mos ravishda 2,20–2,25 g atrofida kuzatildi. Pilla qobig‘i og‘irligi bo‘yicha eng yaxshi natija C-10 x C-12 va teskari C-12 x C-10 duragaylarida kuzatildi va ushbu ko‘rsatkich 0,478 g va 0,467 g ga teng bo‘ldi. Yuqori qobiq og‘irligi pilla tarkibida ipak moddasining ko‘proq to‘planganligini bildiradi. Qobiq og‘irligi boshqa variantlarda nisbatan pastroq bo‘lib, ayrim zotlarda bu ko‘rsatkich 0,45–0,50 g oralig‘ida qayd etildi. Ipakchanlik ko‘rsatkichi bo‘yicha aniq farqlar kuzatildi. Eng yuqori natija C-10×C-12 duragayi (23,8%), C-10 (23,5%), C-5 (22,8%) va Ipakchi-2 (22,1%) joylashdi. Nisbatan past ko‘rsatkichlar C-13 (20,5%) va nazorat-Ipakchi-1 (19,5%) zotlarida kuzatildi. Natijalar tahlili shuni ko‘rsatdiki, C-10×C-12 va C-12 xC-10 duragaylari va C-10 zoti texnologik ko‘rsatkichlar bo‘yicha yuqori natijalarni namoyon etib, pilla qobig‘i og‘irligi va ipakchanlik jihatidan boshqa variantlardan ustun bo‘ldi. C-13 zoti eng yirik pillalarni hosil qilgan bo‘lsa-da, C-10×C-12 ning ipakchanlik ko‘rsatkichi 3,8 foizga yuqori bo’ldi. Ipakchi-1 zoti yirik pilla hosil qilganiga qaramasdan, ipakchanlik darajasi 4,3% ga pastroq ekanligi kuzatildi. Umuman olganda, texnologik ko‘rsatkichlar bo‘yicha C-10×C-12 va C-13, C-12 va C-12 x C-10 istiqbolli natijalarni namoyon etdi, C-14 hamda ayrim duragaylar esa nisbatan past ko‘rsatkichlarga ega bo‘ldi.

4. XULOSA

Conclusion

4.Xulosa. Qanliko‘l tumani sharoitida biologik hamda texnologik ko‘rsatkichlarning maqbul uyg‘unligi (yuqori jonlanish, qisqa qurtlik davri, yuqori hayotchanlik va ipakchanlik) bo‘yicha C-10×C-12 duragayi hamda C-10 va Ipakchi-2 zotlari eng istiqbolli va ishlab chiqarishga tavsiya etishga loyiq variantlar deb baholandi. Teskari C-12×C-10 duragayining pilla og‘irligi yuqori bo‘lsa-da, past biologik ko‘rsatkichlari (jonlanish 63,8%, hayotchanlik 66,6%) sababli ushbu hudud sharoitida yetishtirish uchun kam samarali deb topildi. Tuxumlarning jonlanish ko‘rsatkichi bo‘yicha eng yuqori natijalar C-14 (98,0%), Ipakchi-1 (97,6%), C-10×C-12 (97,3%) va C-12 (97,2%) variantlarida qayd etildi. C-12×C-10 teskari duragayida jonlanish darajasi eng past ko‘rsatkichni -63,8% ni tashkil etdi. Bu holat teskari duragaylashda ota-ona shakllarining genetik-biologik mutanosibligi hamda o‘zaro ta’siri natijasida embrional rivojlanish sur’atining sustlashishi bilan izohlanadi. Qurtlik davrining davomiyligi bo‘yicha Ipakchi-1, Ipakchi-2, C-10, C-14 zotlari va C-10×C-12 duragayida minimal muddat (27 sutka) qayd etildi. C-12×C-10 teskari duragayida esa qurtlik davri 30 sutkagacha uzayganligi aniqlandi. Qurtlarning hayotchanlik ko‘rsatkichi (5-yosh oxirida) bo‘yicha eng yuqori ko‘rsatkich C-14 (93,8%), Ipakchi-1 (92,6%) va C-5 (91,5%) zotlarida, eng past hayotchanlik esa C-12×C-10 (66,6%) duragayida kuzatildi. Eng yirik pillalar C-12×C-10 (o‘rtacha 2,33 g), C-13 (2,31 g) va nazorat Ipakchi-1 (2,30 g) variantlarida shakllandi. Pilla qobig‘i og‘irligi: Pilla tarkibida ipak moddasining to‘planish darajasini belgilovchi eng yuqori pilla qobig‘i og‘irligi Ipakchi-2 (0,481 g), C-12×C-10 (0,478 g) va C-13 (0,476 g) hamda C-10×C-12 (0,467 g) variantlarida namoyon bo‘ldi. Eng yuqori ipakchanlik ko‘rsatkichi C-10×C-12 (23,8%), C-10 (23,5%), C-5 (22,8%) va Ipakchi-2 (22,1%) variantlarida qayd etildi. Yirik pilla hosil qilganiga qaramay, nisbatan past ipakchanlik C-13 (20,5%) va Ipakchi-1 (19,5%) zotlarida kuzatildi. C-10×C-12 duragayining ipakchanligi C-13 zotiga nisbatan 3,3% ga, Ipakchi-1 zotiga nisbatan esa 4,3% ga yuqori ekanligi isbotlandi.

DECLARATIONS

Declarations

Author contributions *CRediT*

Conceptualization; Methodology; Investigation; Data curation; Writing – original draft; Writing – review & editing. All authors have read and agreed to the published version of the manuscript.

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Not applicable. This study did not involve humans, animals or other regulated materials.

Informed consent

All authors have read and approved the final version of the manuscript and have given their consent to its submission and publication. The study involved no human participants and no personal data.

Data availability statement

All data supporting the findings of this study are presented in the article and are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflict of interest.

Generative AI disclosure

Generative AI was used only partially. The authors used Claude (Anthropic, Opus 5) for language editing, formatting of the reference list and preparation of the English and Russian metadata. No text, data, figures or conclusions were generated by AI. The authors reviewed and verified all output and take full responsibility for the content of the publication.

EXTENDED SUMMARY IN ENGLISH

Kengaytirilgan inglizcha xulosa / Расширенный реферат на английском языке

Mandatory for all articles whose full text is not in English. Length 600–1000 words. It must be independently readable: a reader who does not know the language of the full text should understand the problem, the method, the numerical results and the contribution without consulting the main text. Do not copy the 250-word abstract.

Purpose and research problem

Sericulture is a traditional branch of agriculture in Uzbekistan and in the Republic of Karakalpakstan, and the creation of silkworm breeds and hybrids with a high cocoon yield is among its most pressing problems. The domesticated silkworm Bombyx mori L. (Lepidoptera, Bombycidae) is the only fully domesticated insect used for silk production, and its biological and technological performance depends strongly on the temperature and humidity regime under which the rearing takes place. The western and northern districts of Karakalpakstan are characterised by an extreme continental climate, which places local breeds under conditions markedly different from those of the traditional silk-producing zones of the country. The aim of the study was to evaluate, under the conditions of Qanlikol district,

the hatching, biological and technological indicators of local mulberry silkworm breeds and hybrids and to identify the variants that combine these indicators most favourably.

Materials and methods

The experiments were carried out in 2026 in Qanlikol district in the western and northern part of the Republic of Karakalpakstan. Local silkworm breeds and their hybrids were reared in three replications under identical feeding and microclimate conditions. For each variant the incubation period, the number of pilot larvae, the daily hatching of larvae over the first, second and third day, the number of unhatched larvae and the total number of hatched larvae were recorded, and the hatching rate was expressed as a percentage. The biological and technological assessment covered the duration of the larval period in days, larval viability at the first and fifth instars, a sample of fifty cocoons per replication, single-cocoon weight, cocoon shell weight, the number of graded cocoons and the silk content expressed as a percentage. The results are summarised in Tables 1 and 2.

Results and discussion

The hatching data show that the breeds differed both in the length of the incubation period, which ranged around ten to eleven days, and in the distribution of hatching over the first three days. In the breed C-10 the mean hatching rate reached 96.2 %, with 46.5 % of the larvae hatching on the first day, 41.6 % on the second and 6.6 % on the third, and 3.73 % of the larvae failing to hatch. The breed C-12 gave a higher overall result, with a mean hatching rate of 97.2 %, a more even distribution between the first and second days (46.4 % and 45.06 %) and a lower proportion of unhatched larvae (2.8 %). The biological and technological indicators followed a different ranking. In C-10 the larval period lasted 27 days, viability at the fifth instar was 90.05 %, the mean single-cocoon weight was 1.89 g, cocoon shell weight 0.449 g, the proportion of graded cocoons 96.02 % and silk content 23.5 %. In C-12 the larval period was longer at 28 days, viability at the fifth instar lower at 88.6 %, single-cocoon weight higher at 2.2 g and shell weight 0.466 g, while the proportion of graded cocoons was 94.08 % and silk content 20.7 %. The comparison therefore shows a trade-off: the breed with the better hatching and heavier cocoons was not the breed with the higher silk content and cocoon grade.

Conclusion and contribution

Under the conditions of Qanlikol district the most favourable combination of biological and technological indicators — a high hatching rate, high larval viability, and satisfactory cocoon and shell weight together with a high proportion of graded cocoons and a high silk content — was achieved by the variants identified in the article, and these can be recommended for further use in the extreme climatic zones of Karakalpakstan. The results confirm that a single indicator, whether hatching rate or cocoon weight, is not a sufficient basis for selecting a breed for such conditions and that the assessment must be made on the complex of biological and technological characters. The contribution of the work is to provide the first comparative dataset of this kind for local silkworm breeds reared in the extreme continental climate of the western and northern districts of Karakalpakstan.

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