

RESEARCH ARTICLE • PEER-REVIEWED • OPEN ACCESS • HAC/OAK 06.00.00 — AGRICULTURAL SCIENCES • UDC: 635.65:631.527:575.1

Inheritance characteristics of morphological traits in mungbean cultivars and F1 hybrid combinations

Morfologik belgilarning mosh navlari va F1 duragay kombinatsiyalarida irsiylanish xususiyatlari**Характер наследования морфологических признаков у сортов маша и в гибридных комбинациях F1****Aydos Djarasovich DJARASOV^{1*} , Tanjarbay Dauletmuratovich ALLAMBERGENOV¹ , Sevara Axmetovna JAÑABAEVA¹**¹ Karakalpak Institute of Agriculture and Agrotechnologies, Nukus, Republic of Karakalpakstan, Uzbekistan* Corresponding author: aydosdjarasov@gmail.com**ARTICLE INFO****ARTICLE TYPE**

Research Article

LANGUAGE OF FULL TEXT

O'zbekcha (UZ)

SCIENTIFIC FIELD / OAK☒ 06.00.00 – Agricultural Sciences

Qishloq xo'jaligi fanlari

HAC Presidium decision No. 382/5, 05.03.2026

UDC / UDK

635.65:631.527:575.1

ARTICLE HISTORY**Received:** 2026-07-20**Revised:** 2026-07-30**Accepted:** 2026-08-04**Published:** 2026-08-31 **DOI**<https://doi.org/10.66073/ReFocus.V5I8.0801>**CONTACT**ReFocusJournal@gmail.com**LICENSE**

Creative Commons Attribution 4.0 International (CC BY 4.0). This is an open access article distributed under the terms of the CC BY 4.0 licence.

AUTHOR, TITLE AND ABSTRACT METADATA (EN / UZ / RU)**ENGLISH****Aydos Djarasovich DJARASOV^{1*} , Tanjarbay Dauletmuratovich ALLAMBERGENOV¹ , Sevara Axmetovna JAÑABAEVA¹**¹ Karakalpak Institute of Agriculture and Agrotechnologies, Nukus, Republic of Karakalpakstan, Uzbekistan

Abstract. This article identifies the morphological traits and inheritance characteristics of mungbean cultivars and their F1 hybrids. Diallel crosses were performed between two local and two foreign mung bean lines to produce hybrid combinations. Phenotypic variations in morphological traits—such as plant height, productive branches, and pod length—were examined in the F1 hybrids derived from these parental forms. S. Wright's formula was used to determine whether the F1 hybrids exhibited positive or negative heterosis relative to the parental cultivars and lines. Based on the research results, hybrid combinations demonstrating superior performance in specific morphological traits compared to the parental samples were selected as promising candidates for further breeding research.

Keywords: mungbean; hybrid; morphological traits; inheritance; dominance; heterosis; breeding; crossing

O'ZBEKCHA**DJARASOV Aydos Djarasovich^{1*} , ALLAMBERGENOV Tanjarbay Dauletmuratovich¹ , JAÑABAEVA Sevara Axmetovna¹**¹ Qoraqalpog'iston qishloq xo'jaligi va agrotexnologiyalar instituti, Nukus, Qoraqalpog'iston Respublikasi, O'zbekiston

Annotatsiya. Mazkur maqolada mosh navlari va ulardan olingan F1 duragaylarda morfologik belgilari va irsiylanish xususiyatlari aniqlangan. Tadqiqotlarda moshning 2 ta mahalliy hamda 2 ta xorijiy tizmalari o'rtasida diallel chatishtirish ishlari olib borilgan hamda duragay kombinatsiyalar olingan. Ota-ona shakllaridan olingan F1 duragaylarda o'simlik bo'yi, hosil shoxlari hamda dukkak uzunligi kabi morfologik belgilarida fenologik farqlanishlar o'rganilgan. F1 duragaylarning ota-ona nav va tizmalariga nisbatan ijobiy yoki salbiy geterozis hosil qilishi S. Wright formulasi yordamida aniqlandi. Tadqiqot na'tijalariga asoslanib har bir morfologik belgilari bo'yicha ota-ona namunlariga nisbatan yuqori ko'rsatkishga ega bo'lgan duragay kombinatsiyalari istiqbolli namunalar sifatida keyingi selektsiya tadqiqotlari ushun tanlab olingan.

Kalit so'zlar: mosh; duragay; morfologik belgilar; irsiylanish; dominatlik; geterozis; selektsiya; chatishtirish

РУССКИЙ**ДЖАРАСОВ Айдо́с Джарасович^{1*} , АЛЛАМБЕРГЕНОВ Танжа́рбай Даулетмура́тович¹ , ЖАНАБАЕВА Сева́ра Ахметовна¹**¹ Каракалпакский институт сельского хозяйства и агротехнологий, Нукус, Республика

How to cite / Iqtibos keltirish / Как цитировать: DJARASOV, A. D., ALLAMBERGENOV, T. D., JAÑABAEVA, S. A. (2026). Inheritance characteristics of morphological traits in mungbean cultivars and F1 hybrid combinations. Research Focus International Scientific Journal, 5(8), [pp–pp]. <https://doi.org/10.66073/ReFocus.V5I8.0801>

© 2026 The Author(s). Published by Research Focus International Scientific Journal. Open access article under the CC BY 4.0 licence.

HAC / OAK: On the HAC list of national scientific publications (Academy of Sciences of the Republic of Uzbekistan) for 06.00.00 Agricultural Sciences and 16.00.00 Veterinary Sciences. O'zbekiston Respublikasi FA huzuridagi OAK ro'yxatida: 06.00.00 – Qishloq xo'jaligi fanlari; 16.00.00 – Veterinariya fanlari.

Каракалтакстан, Ўзбекистан

Аннотация. В данной статье определены морфологические признаки и особенности наследования у сортов маша и их гибридов F1. Для получения гибридных комбинаций были проведены диаллельные скрещивания между двумя местными и двумя зарубежными линиями маша. У полученных гибридов F1 анализировалась фенотипическая изменчивость таких морфологических признаков, как высота растения, количество продуктивных ветвей и длина боба. Для определения наличия положительного или отрицательного гетерозиса у гибридов F1 по сравнению с родительскими сортами и линиями использовалась формула С. Райта. На основании результатов исследования гибридные комбинации, продемонстрировавшие превосходные показатели по определенным морфологическим признакам по сравнению с родительскими образцами, были отобраны в качестве перспективных кандидатов для дальнейшей селекционной работы.

Ключевые слова: маш; гибрид; морфологические признаки; наследование; доминирование; гетерозис; селекция; скрещивание

1. KIRISH

Introduction

Dehqonchilikda dukkakli ekinlar ichida eng asosiy oziq-ovqat ekinlaridan biri mosh hisoblanadi. Mosh doni oqsil, uglevod, vitaminlar hamda mineral moddalarga boy bo'lib, oziq-ovqat ishlab chiqarishda keng foydalaniladi. Shuningdek, mosh ekinining biologik xususiyatlari, qisqa vegetatsiya davri hamda tashqi muhit omillariga bardoshliligi bu ekinni istiqbolli ekinlardan biri ekanligini isbotlaydi. Hozirda yer yuzida iqlim o'zgarishi qishloq xo'jaligi ekinlari hosildorligiga sezilarli ta'sir ko'rsatmoqda. Bunday sharoitda hosildorligi yuqori, tez pishar hamda agroekologik sharoitlarga moslashgan navlarni yaratish seleksiya sohasining eng asosiy vazifalaridan biri hisoblanadi. Bunday navlarni yaratishda genetik xilma-xillikka ega bo'lgan boshlang'ich materiallardan foydalanish, morfologik va xo'jalik belgilari bo'yicha o'zgaruvchanlik va irsiylanish qonuniyatlarini tahlil qilish katta ahamiyatga ega. Mosh ekinida o'simlik bo'yi, hosil shoxlari soni, dukkak uzunligi kabi morfologik belgilar navlarning biologik xususiyatlari bilan birga yuqori hosildorlik imkoniyatlarini ham belgilab beradi. Moshning ota-ona navlari va F1 duragaylarida morfologik belgilarining irsiylanishini o'rganish kombinatsiyalarining seleksion qiymatini ifodalaydi. Shu sababli seleksiya va genetik tadqiqotlarida mosh navlari va ulardan chatishtirib olingan F1 duragaylarida morfologik belgilarining irsiylanishini tahlil qilish ilmiy va amaliy jihatdan dolzarb hisoblanadi. Ushbu tadqiqotning maqsadi moshning mahalliy va xorijiy nav namunalari va ularda diallel chatishtirish usulida olingan F1 duragay kombinatsiyalarida morfologik belgilarining irsiylanish qonuniyatlarini o'rganish va seleksiya tadqiqotlari ushuni istiqbolli kombinatsiyalarni tanlab olishdan iborat.

X. Idrisovning [5; 30-31-b.]. malumotlariga qaraganda mosh – o'tsimon va shoxli o'simlik bo'lib, suvli poyasi ichi bo'sh. Mosh o'simligining barglari yashil va uch bargli, gullari sarg'ish va dukkaklari jigarrang, har bir novda 10-12 urug'dan iborat. Urug'i yashil va yumaloq shaklga ega. U kuchli ildiz tizimiga ega va atmosfera azotini o'g'it sifatida ishlatilishi mumkin bo'lgan ammiakga birlashtirish qobiliyatiga ega.

X.A. Idrisov., M.A. Gaziyeu va boshqa olimlarning [6; 42-45-b.]. tadqiqotlarida keltirilishicha sug'oriladigan tipik bo'z tuproqlar sharoitlarida barcha hisoblash muddatlarida mosh navlarida ekish me'yori oshgansari poya balandligi ham oshib boradi. Oxirgi yani 15-iyulda ekish muddatida poya balandligini kamayishi kuzatiladi. Bunga sabab yozning ikkinchi yarmida vujudga keladigan tashqi muhit omillarining ta'siridir.

H. N. Atabayeva va X. A. Idrisovning [1; 422-426-b.]. aytishicha, barglarning rivojlanishi ekish muddati va me'yorlariga bevosita bog'liqdir. Iyul boshlarida ekilgan moshda barglar soni ortib boradi, biroq ekish me'yorining ko'payishi bilan barglar soni kamayadi. Har qanday navda ekish me'yori 40 kg/ga qilib belgilanganida, barcha muddatlarda barg yuzasi eng yuqori

ko'rsatkichga ega bo'lgan. Ammo ekish muddati kechiktirilgan sari barg yuzasi pasayish tendensiyasini ko'rsatgan.

X.A. Idrisov., O.N. Dexqonovlarning [7; 855-858-b.]. tadqiqotlarida, moshning 4 ta xorijiy nav namunalari nav tanlov ko'chatzorida mahalliy Radost navi bilan biometrik ko'rsatkichlari solishtirib o'rganilgan. Tajiribalarda xorijiy 412441 (Filippin) va 430177 (Afg'oniston) namunalari vegetatsiya davri bo'yicha hamda 414360 (Filippin) namunasi esa o'simlik bo'yi, hosil shoxlari soni va 1-o'simlikdagi dukkaklari soni bo'yicha standart navga nisbatan qimmatli xo'jalik belgilari yuqori ekanligi qayd etilgan.

2. TADQIQOT MATERIALLARI VA USLUBLARI

Materials and methods

Ilmiy tadqiqotlar joriy yilda Qoraqalpog'iston qishloq xo'jaligi va agrotexnologiyalar institutining oquv tajriba maydonida olib borildi. Tajiribalarda asosan to'rtta Durdona, Osiyo, VI-062909 hamda VI-060020 A-G nav va liniyalari hamda ulardan diallel chatishtirish usulida olingan F1 duragay kombinatsiyalarining morfologik belgilarining irsiylanishi tahlil qilindi. Duragay namunalari tajriba maydoniga 28-aprel kuni ota-ona navlari bilan birgalikda 60x15x1 sxemada ekildi. Tadqiqotlarda fenologik kuzatishlar, biometrik o'lchovlar, ekin parvarishi ishlari B. A. Dospexovning "Metodika polevogo opita" (1985) kabi manbalari, tavsiyalari va uslublari asosida amalga oshirildi.

F1 duragaylarda dominantlik darajasi G.M. Beil va R.E. Atkins (1965) ishlari keltirilgan S.Wright formulasi bo'yicha hisoblanadi;

$$hp = \frac{F_1 - MP}{P - MP} \quad (1)$$

hp – dominantlik koeffitsienti;

F1 – duragayning o'rtacha arifmetik ko'rsatkichi;

MR – ikkala ota-ona shakl belgisining o'rtacha arifmetik ko'rsatkichi;

R – eng yaxshi ota yoki ona shakl belgisining o'rtacha arifmetik ko'rsatkichi.

hp = 0 – dominantlik yo'q;

0 < hp < ±1,0 – oraliq dominantlik;

p = ±1,0 – to'liq dominantlik;

hp > ±1,0 – o'ta dominantlik.

3. TADQIQOT NATIJALARI VA MUHOKAMA

Results and discussion

Tajiribalarda asosan moshning navlari va tizmalari hamda ulardan diallel chatishtirish usulida olingan F1 duragay

kombinatsiyalardagi morfologik belgilar ota-ona namunalari bilan bilan solishtirib tahlil qilindi. Tadqiqotlarda o'simlik bo'yi, hosil shoxlari soni va dukkak uzunligi kabi belgilar bo'yicha biometrik o'lchovlar amalga oshirildi. Olib borilgan tajribalarda Durdona navi andoza nav sipatida tanlab olindi. Tadqiqot natijalari ko'rsatgan ma'lumotlarga ko'ra, o'rganilayotgan nav va tizmalar ichida o'simlik bo'yicha Osiyo navi 41,8 sm bilan yuqori natijani qayd etgan bo'lsa, eng past ko'rsatkish Durdona navida 38,3 sm namoyon bo'ldi. Qolgan tizmalarda sezilarli farq kuzatilmadi va mos ravishda VI-062909 hamda VI-060020 A-G liniyalarida esa poya balandligi 39,7 va 39,4 sm ni tashkil qildi. A.T Aleuovanning [2; 171-174-b.] ma'lumotlariga ko'ra, moshning Durdona navinining Qoraqalpog'iston sharoitida hosildorligiga ekish muddatlarini ta'siri o'rganilganda, aprel oyining III-dekadasi eng optimal muddat ekanligi va bu paytda o'sishi rivojlanishi barqaror bo'lishi kuzatilgan. Shuningdek vegetativ massaning yaqshi shakllanishi aniqlangan. Bu muddatda ekinlarda morfologik kuzatuvlarda ham ijobiy natijalar qayd etilgan asosan o'simlik balandligi 55-60 sm, bir tup o'simlikdagi dukkaklar soni 28-30 dona bo'lishi kuzatilgan.

F1 duragay kombinatsiyalarda o'simlik bo'yi belgisi bo'yicha ota-ona nav va tizmalariga solishtirganda yuqori, ortacha va past natijalar qayd etildi. Jumladan Osiyo x VI-062909 duragay kombinatsiyasida poya balandligi 43, 7 sm bilan eng yuqori ko'rsatkishni namoyon qilgan bo'lsa, eng past ko'rsatkish esa Osiyo x Durdona kombinatsiyasida aniqlandi. VI-062909 x Osiyo, VI-060020 A-G x VI-062909 hamda Osiyo x VI-060020 A-G duragaylarida esa ortacha 40,1-41,1 sm oralig'ida mosh poyalari rivojlanganligi qayd etildi. Qolgan duragay kombinatsiyalarida esa bu morfologik belgi oraliq ko'rinishda namoyon bo'lgan. O'rganilayotgan ota-ona namunalarga nisbatan duragay kombinatsiyalarning dominantlik darajasi tahlil qilinganda 3 duragayda ijobiy geterozis hodisasi aniqlangan bolsa (1,18, 2,8 va 4,3), qolgan duragay kombinatsiyalarda oraliq va salbiy geterozis hodisasi kuzatilgan.

1-jadval

Moshning nav va F1 duragay kombinatsiyalarda morfologik belgilarining irsiylanishi / **Table 1.** Inheritance of morphological traits in mungbean cultivars and F1 hybrid combinations

№	Navlar F1 duragaylar	O'simlik bo'yi	hp	Hosil shoxlari	hp	Dukkak uzunligi	hp
1	St. Durdona	38,3	-	3,6	-	7,52	-
2	Osiyo	41,8	-	4	-	8,7	-
3	VI-062909	39,7	-	4,2	-	8,8	-
4	VI-060020 A-G	39,4	-	3,4	-	9,1	-
5	F1 Durdona x Osiyo	38,8	-0,71	3,7	-0,5	8,5	0,66
6	F1 Osiyo x Durdona	30,8	-5,2	3,5	-1,5	8,8	1,16
7	F1 Durdona x VI-060929	35,4	-5,1	4,3	1,4	7,7	-0,7
8	F1 VI-062909 x Durdona	32,2	-9,7	4	0,33	7,15	-1,5
9	F1 Durdona x VI060020 A-G	36,7	-3,9	4,08	5,8	7,44	-1,1
10	F1 VI-060020 A-G x Durdona	39,5	1,18	3,8	3	7,72	-0,7
11	F1 Osiyo x VI-062909	43,7	2,8	4,25	1,5	9,06	6,2
12	F1 VI-062909 x Osiyo	41,1	0,3	3,8	-3	8,5	-0,5
13	F1 Osiyo x VI-060020 A-G	40,1	0,41	3,1	-2	7,8	-5,5
14	F1 VI-060020 A-G x Osiyo	33,2	-6,1	5,1	4,6	9,4	2,5

Morfologik belgilardan hosil shoxlari soni bo'yicha ilimiy tadqiqotlar olib borilganda nav tizmalar ichida eng ko'p 4,2 va 4 hosil shoxlar mos ravishda VI-062909 tizmasi va Osiyo navlarida aniqlansa, Durdona va VI-060020 A-G namunalari esa mos ravishda 3,6 va 3,4 hosil shoxlari rivojlandi. F1 duragay kombinatsiyalarda esa eng yuqori hosil shoxlar Durdona x VI-062909, VI-062909 x Durdona, Durdona x VI-060020 A-G, Osiyo x VI062909 hamda VI-060020 A-G x VI-062909 namunalari mos ravishda 4,3, 4, 4,08, 4,25 va 4 ta hosil shoxlar aniqlandi. Eng past ko'rsatkish esa Osiyo x VI-060020 A-G duragay kombinatsiyasida 3,1 hosil shoxlar bilan aniqlandi. Tahlil qilinayotgan duragay kombinatsiyalar ichidan 5 ta namunada ijobiy geterozis hodisasi (1,4, 5,8, 3, 1,5 va 4,6) qayd etilgan bolsa qolgan kombinatsiyalarda esa oraliq va salbiy geterozis hodisasi qayd etildi.

Dukkak uzunligi bo'yicha olib borilgan tadqiqotlarga ko'ra, nav va liniyalar ichida eng yuqori na'tija VI-060020 A-G liniyasiga (9,1 sm) tegishli bo'lgan bo'lsa, eng past ko'rsatkish esa Durdona navida (7,52 sm) namoyon bo'ldi. Qolgan nav va tizmalarda bu belgi oraliq holda shakllangan. F1 duragay kombinatsiyalar ichida dukkak uzunligi belgisi har qil darajada irsiylangan bo'lib, VI-060020 A-G x VI-062909 (9,6 sm), VI-060020 A-G x Osiyo (9,4) hamda VI-062909 x Osiyo (9,06 sm) duragaylarida eng uzun dukkaklar aniqlandi. Qolgan duragay kombinatsiyalarda bu belgi oraliq holda 7,4-8,8 sm oralig'ida shakllandi. Eng past ko'rsatkish 7,15 sm bilan VI-062909 x Durdona kombinatsiyasiga tegishli bo'ldi. Ota-ona nav va tizmalariga nisbatan Osiyo x Durdona, Osiyo x VI-062909 hamda VI-060020 A-G x VI-062909 namunalari ijobiy geterozis mos ravishda 1,16, 6,2 va 4,3 qayd etildi. Qolgan duragay kombinatsiyalarda oraliq va salbiy geterozis hodisalari kuzatildi. Bunday farqlanishlar ota-ona nav va tizmalarining genetik xususiyatlari va ularning o'z-aro kombinatsion ta'siriga bog'liq. Shuningdek tashqi-muhit omillari ham fenotifik belgilarning namoyon bo'lishiga ma'lum darajada ta'sir ko'rsatadi (1-jadval).

№	Navlar F1 duragaylar	O'simlik bo'yi	hp	Hosil shoxlari	hp	Dukkak uzunligi	hp
15	F1 VI-062909 x VI-060020 A-G	38,2	0,9	3,3	-1,25	8,3	-4
16	F1 VI-060020 A-G x VI-062909	40,2	4,3	4	0,5	9,6	4,3

4. XULOSALAR VA TAVSIYALAR

Conclusions and recommendations

Tadqiqotlarda o'rganilayotgan mosh navlari va F1 duragaylarida morfologik belgilarining irsiylanishi tahlil qilinganda ular ortasida sezilarli farqlar mavjudligi aniqlandi. O'simlik bo'yi belgisi bo'yicha eng yuqori ko'rsatkish navlar orasida Osiyo navida qayd etilgan bo'lsa, bir tupdagi hosil shoxlar soni bo'yicha esa Osiyo navi va VI-062909 liniyasi hamda dukkak uzunligi bo'yicha esa VI-060020 A-G liniyasida ijobiy natijalar qayd etildi. F1 duragay kombinatsiyalardan esa Osiyo x VI-062909 hamda VI-060020 A-G x VI-062909 namunalari har bir belgi bo'yicha yuqori ko'rsatkishlar bilan ijobiy geterozis hodisasi kuzatildi. Morfologik belgilarni o'zida mujassamlashtirilgan ushbu nav va duragay kombinatsiyalar keyingi avlodlarda o'rganish hamda seleksiya tadqiqotlariga boshlang'ish ashyo sifatida foydalanish ushun tavsiya etiladi.

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.

Funding

This research received no external funding.

Ethics approval

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

Mungbean (*Phaseolus aureus* Piper) is one of the principal food legumes of Uzbekistan and of the Republic of Karakalpakstan: its grain is rich in protein, carbohydrates, vitamins and mineral elements, and as a legume it enriches the soil with biological nitrogen. Breeding progress in this crop depends on knowing how the morphological traits that determine plant architecture and yield are transmitted from the parental forms to the hybrid progeny. Although a number of studies have addressed sowing dates, seeding rates and nutrition of mungbean under the conditions of Uzbekistan, the mode of inheritance of plant height, number of productive branches and pod length in crosses between local and introduced accessions has received far less attention. The aim of the present study was therefore to determine the morphological traits and the inheritance characteristics of mungbean cultivars and of the F1 hybrids obtained from them, and on that basis to identify the combinations most promising for further selection work.

Materials and methods

The experiments were carried out on the training and experimental field of the Karakalpak Institute of Agriculture and Agrotechnologies. Two local and two introduced mungbean lines were used as parental forms and were crossed in a diallel scheme, from which the F1 hybrid combinations were obtained. Phenological differences between the parental forms and their F1 progeny were recorded for plant height, the number of productive branches and pod length. The degree of dominance in the F1 hybrids was calculated using the S. Wright formula as presented by G.M. Beil and R.E. Atkins (1965), where h_p is the coefficient of dominance, F_1 the arithmetic mean of the hybrid, MR the arithmetic mean of the trait in both parental forms and P the arithmetic mean of the better parent. The results were interpreted on the accepted scale: $h_p = 0$ indicates the absence of dominance, $0 < h_p < \pm 1.0$ intermediate inheritance, $h_p = \pm 1.0$ complete dominance and $h_p > \pm 1.0$ overdominance, that is heterosis.

Results and discussion

The parental cultivars and lines differed appreciably in all three morphological traits, and the F1 combinations obtained by diallel crossing expressed values that were higher than, intermediate between, or lower than those of the parents depending on the particular combination. For plant height, part of the hybrids exceeded both parental forms, which corresponds to overdominance and indicates a heterotic effect for this trait, while other combinations showed intermediate inheritance. For the number of productive branches the highest value among the parental accessions was 4.2, and the hybrid combinations again distributed themselves between intermediate inheritance and dominance of the better parent. For pod length the best result among the cultivars and lines was recorded in the line VI-060020 A-G, and the F1 progeny derived from it retained a high expression of the trait. The full set of trait means and dominance coefficients for all parental forms and hybrid combinations is presented in Table 1. Taken together, the data show that the three traits studied are not inherited in a uniform manner: the same cross may combine overdominance for one trait with intermediate inheritance for another, so that selection has to be based on the trait complex rather than on any single character.

Conclusion and contribution

Analysis of the inheritance of morphological traits in the mungbean cultivars and their F1 hybrids showed that plant height, the number of productive branches and pod length are inherited according to different patterns, ranging from intermediate inheritance to overdominance, and that the pattern is determined by the particular parental combination. Combinations expressing overdominance for

the yield-forming traits are of practical interest for further selection work and can be recommended for advancement to subsequent generations. The contribution of this work lies in providing, for the soil and climatic conditions of the Republic of Karakalpakstan, quantitative dominance coefficients for the main morphological traits of mungbean, which gives breeders an objective basis for choosing parental pairs in diallel crossing programmes.

ADABIYOTLAR RO‘YXATI

References (original language)

Adabiyotlar matnda birinchi keltirilish tartibida raqamlanadi. Oltitagacha muallif to‘liq ko‘rsatiladi; DOI mavjud bo‘lsa, albatta beriladi.

- [1] Atabayeva H.N., Idrisov X.A. Mosh (*Phaseolus aureus* Piper) navlarida barg yuzasi rivojlanishiga ekish me‘yori va muddatining ta’siri // Ta’limda yangicha yondashuv – innovatsiyaga qo‘yilgan qadam xalqaro ilmiy-amaliy konferensiya materiallari. – Toshkent, 2024. – B. 422–426
- [2] Aleuova A.T. Qoraqalpog‘iston sharoitida moshning “durdona” navining ekish muddatlari va oziqlantirishning hosildorlik hamda tuproq unumdorligiga ta’siri // Shimoliy mintaqalarda qishloq xo‘jaligini rivojlantirishning dolzarb masalalari va ularning innovatsion echimlari mavzusidagi Respublika ilmiy-amaliy anjumani.- 2026.- B. 171-174.
- [3] Beil G.M., Atkins R.E. Inheritance of quantitative characters sorghum // Iowa State Journal of science. 1965, Vol.39.№3.-pp.35-37.
- [4] Доспехов В. А. Методика полевого опыта.-Москва.: Kolos, 1985.- С. 317.
- [5] Idrisov X. Moshning “Navruz” navi biometrik ko‘rsatkichlariga ekish muddati va meyorlarining ta’siri. // O‘zbekiston qishloq xo‘jaligi jurnali ilmiy ilovasi.- 2019.-№4.-B. 30-31.
- [6] Idrisov X.A., Gaziyeu M.A., Eshpulatov Sh.Y., Mamatqulov O.O., Igamberdiyev D.X. Sug‘oriladigan tipik bo‘z tuproqlar sharoitida mosh (*Phaseolus aureus* piper) navlarini tadqiq etish natijalari // O‘zbekiston zamini.-Toshkent, 2022.-42-45 b.
- [7] Idrisov X.A., Dexqonov O.N. Moshning (*Phaseolus aureus* Piper) nav tanlov ko‘chatzoridagi namunalari qimmatli-xo‘jalik belgilarini o‘rganish// International scientific journal science and innovation special issue.- 2024.- B. 855-858

REFERENCES (ROMAN SCRIPT)

Transliterated list — required by Scopus and Web of Science

Mandatory whenever any reference is in a non-Latin script. Transliterate the author names and the original title, then give the English translation of the title in square brackets, followed by the language tag.

- [1] Atabayeva H.N., Idrisov X.A. Mosh (*Phaseolus aureus* Piper) navlarida barg yuzasi rivojlanishiga ekish me‘yori va muddatining ta’siri [Effect of seeding rate and sowing date on leaf area development in mungbean (*Phaseolus aureus* Piper) cultivars]. Ta’limda yangicha yondashuv – innovatsiyaga qo‘yilgan qadam, Toshkent, 2020, pp. 422–426. (in Uzbek)
- [2] Aleuova A.T. Qoraqalpog‘iston sharoitida moshning “Durdona” navining ekish muddatlari va oziqlantirishning hosildorlik hamda tuproq unumdorligiga ta’siri [Effect of sowing dates and fertilisation of the mungbean cultivar “Durdona” on yield and soil fertility under the conditions of Karakalpakstan]. Shimoliy mintaqalarda qishloq xo‘jaligini rivojlantirish, Nukus, 2021. (in Uzbek)
- [3] Beil G.M., Atkins R.E. Inheritance of quantitative characters in sorghum. Iowa State Journal of Science, 1965, vol. 39, no. 3, pp. 35–37.
- [4] Dospekhov V.A. Metodika polevogo opyta [Methods of field experiment]. Moscow, Kolos, 1985, p. 317. (in Russian)
- [5] Idrisov X. Moshning “Navruz” navi biometrik ko‘rsatkichlariga ekish muddati va me‘yorlarining ta’siri [Effect of sowing date and seeding rate on the biometric indicators of the mungbean cultivar “Navruz”]. O‘zbekiston qishloq xo‘jaligi jurnali ilmiy ilovasi, 2019, no. 4, pp. 30–31. (in Uzbek)
- [6] Idrisov X.A., Gaziyeu M.A., Eshpulatov Sh.Y., Mamatqulov O.O., Igamberdiyev D.X. Sug‘oriladigan tipik bo‘z tuproqlar sharoitida mosh (*Phaseolus aureus* Piper) navlarini tadqiq etish natijalari [Results of studying mungbean (*Phaseolus aureus* Piper) cultivars on

irrigated typical grey soils]. O‘zbekiston agrar fani xabarnomasi, pp. 42–45. (in Uzbek)

- [7] Idrisov X.A., Dexqonov O.N. Moshning (*Phaseolus aureus* Piper) nav tanlov ko‘chatzoridagi namunalari qimmatli-xo‘jalik belgilarini o‘rganish [Study of the valuable economic traits of mungbean (*Phaseolus aureus* Piper) accessions in a variety-selection nursery]. International Scientific Journal Science and Innovation, pp. 855–858. (in Uzbek)