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**G‘O‘ZANING MAS USULIDA YARATILGAN DURAGAY O‘SIMLIKLARINI
QIMMATLI XO‘JALIK BELGILARI.**

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Annotatsiya. Ushbu maqolada g‘o‘zaning MAS usulida yaratilgan duragay o‘simliklarini qimmatli xo‘jalik belgilari haqida malumotlar keltirilgan.

Kalit so‘zlar: g‘o‘za, zararkunanda, paxta, fermer, o‘simlik.

**VALUABLE ECONOMIC TRAITS OF HYBRID PLANTS CREATED BY MAS
METHOD OF COTTON.**

Abstract. This article provides information on valuable economic traits of cotton hybrids created by the MAS method.

Key words: cotton, pest, cotton, farmer, plant.

**ЦЕННЫЕ ХОЗЯЙСТВЕННЫЕ ПРИЗНАКИ ГИБРИДНЫХ РАСТЕНИЙ,
СОЗДАННЫХ МЕТОДОМ МАС НА ХЛОПЧАТНИКЕ.**

Аннотация. В статье представлены сведения о ценных хозяйственных признаках гибридов хлопчатника, созданных методом МАС.

Ключевые слова: хлопок, вредитель, хлопок, фермер, растение.

Dunyo bo‘ylab asosan tolasi uchun ekiladigan g‘o‘za ekini ayniqsa rivojlanayotgan davlatlarning iqtisodiyoti uchun muhim strategik ahamiyatga ega. G‘o‘za dunyoning 69 ta davlatida 30–35 million gektarda ekiladi va so‘nggi yillarda ishlab chiqarish 27 million tonnadan oshdi [2], [3], [4]. Yangi rivojlanayotgan mamlakatlarda g‘o‘za asosiy daromad manbai bo‘lib, strategik ekin hisoblanadi [147]. G‘o‘zadan birmuncha yuqori hosil olishga erishish uning turli zararkunandalariga qarshi himoya choralarini qo‘llash va unga sarflanadigan katta miqdordagi harajatlar evaziga amalga oshirilmoqda. Kimyoviy nazorat ko‘rsatkichlarining doimiy yaxshilanishiga qaramasdan, hosil yo‘qotishlari taxminan 30 % dan yuqori bo‘lib qolmoqda.

Shu sababli, uyg‘unlashgan kurash tizimi va ushbu yo‘nalishda turli uslublardan foydalanib paxta yetishtirish samaradorligini oshirishga qaratilgan tadqiqotlar dolzarb hisoblanadi. G‘o‘za *Gossypium* L. turkumining *Malvaceae* oilasiga tegishli. Bugungi kungacha *Gossypium* L. turkumining vatani Afrika, Avstraliya, Markaziy, Janubiy Amerika va Osiyo hisoblangan 50 dan ortiq turlari aniqlangan [5; 6; 7]. Faqat to‘rtta tur keng tarqalgan va tijorat maqsadlarida foydalaniladi [5]. Bu turlar g‘o‘zaning xromosomalar to‘plamiga ko‘ra diploid ($2n = 26$) bo‘lgan, qadimgi dunyo g‘o‘zasiga kiruvchi ikkita turi, ya‘ni *G. arboreum* L. va *G. herbaceum* L. va ikkita tetraploid ($2n = 52$), yangi dunyo g‘o‘zasi ya‘ni *G. barbadense* L. va *G. hirsutum* L. turlari hisoblanadi [6]. Dunyo bo‘yicha yetishtiriladigan umumiy paxta hosilining 4% ini *G. barbadense* L., qariyb 90% ini *G. hirsutum* L. turiga kiruvchi paxta navlari hosili tashkil qiladi [8; 9].

So'ngi davrlarda, so'ruvchi zararkunandalar majmuasi dunyo bo'ylab paxta yetishtiruvchi fermerlar uchun katta muommoga aylangan, chunki Bt paxta ham so'ruvchi zararkunandalardan ta'sirlanganligi kuzatilgan [10; 11.]. 2015 yilda Hindistonning Panjob viloyatining Bt paxta yetishtiriladigan hududlarida oq pashsha (*B. tabaci*) hujumi avj olgani va buning oqibatida paxta yetishtirishda 75 % dan ko'proq iqtisodiy zarar ko'rilgan [12]. Bt paxtaning qariyb 95 % o'simligi ushbu zararkunanda hasharot, *B. tabaci* hujumidan zarar ko'rgan, natijada taxminan 4500 million rupiy yo'qotilgan. Hisob-kitoblarga ko'ra, Pokistonda har yili kemiruvchi va so'ruvchi zararkunandalar majmuasi qishloq xo'jaligi ekinlari hosilining 20-40% ga yaqin miqdori yo'qotilishiga sabab bo'ladi [13].

Jassid (*A.devastans*) (O'zbekistonda karantin zararkunanda). Jassid Hindistonda eng xavfli qishloq xo'jaligi ekinlariga, xususan g'o'zaga zarar yetkazuvchi so'ruvchi zararkunandadir [13].

Jassid g'o'za o'simlikning hujayra shirasini so'radi [14], oziqlanish paytida g'o'za hujayrasi ichiga zaharli ajratma yuboradi. G'o'za ekini o'suv davrining erta bosqichida jassid bilan zaranlangan bo'lsa o'simlik o'sishi kamaygan, o'simlikka yetkazilgan stress tufayli birinchi hosil elementlarini yo'qotilish holatlari kuzatilgan. Stress tufayli fotosintezni jadallashishi shona va yosh ko'saklarni to'kilishini ko'payishiga olib kelgan. G'o'za ekini jassid bilan zaranlanishi paxta hosilining 23-67 % gacha kamayishiga olib kelishi ma'lum qilingan [15].

Oq pashsha *B. tabaci* (Genn.). Oq pashsha paxta hosiliga katta zarar yetkazadi, barglarning ostki tomonidan hujayra shirasini so'radi, oq pashshada ajralgan shiralar barg og'izchalarini berkitadi, buning natijasida mog'or paydo bo'ladi, bu esa barglarning fotosintez maydoni kamaytiradi, buning oqibatida paxta hosili kamayadi [16]. Bundan tashqari oq pashsha paxtada kasallik qo'zg'atuvchi paxtaning barg buralishi virusining tashuvchisi hisoblanadi. Paxtaning barg buralishi virusining paxta hosildorligiga kata zarar yetkazishi mumkin bo'lgan eng xavfli viruslardan biri hisoblanadi [17].

Trips (*Thrips tabaci*) g'o'za o'sish davrining erta fazalalarida g'o'za o'simliklariga hujum qiladi. Ammo tripsning g'o'za o'simliklaridagi yuqori zichligini sentyabr oyining ikkinchi ikki haftasida ko'rish mumkin [18]. Trips nimfa va yetuklik bosqichlarida g'o'zaning hujayra shirasini so'rib, to'qimalariga zarar yetkazadi va barglarni yo'q qiladi. Ushbu zararkunanda hujumi sodir bo'lganda kuchli hujum tufayli barglar burishadi, o'simliklar dastlabki bosqichda kam rivojlangan bo'lib qoladi [19]. Mo'l hosil olish uchun zararkunandalarga qarshi kurashning birgina usulidan foydalanish samara bermaydi. G'o'za zararkunandalariga qarshi samarali kurash olib borilganda g'o'za hosildorligini 200-300 kg ga oshirish mumkin [20].

G'o'za biti (shira) *Aphis gossypii* Glover butun dunyo bo'ylab yigirmadan ortiq ekinlarning halokatli zararkunandasidir [21]. Bu ekinlarning bir nechtasiga *A.gossypii* ning zarari to'g'ridan-to'g'ri oziqlanishi bilan bog'liq emas, balki bu ekinlarning ko'pchiligi uchun uning ta'siri virus vektori roli bilan bog'liq. *A. gossypii* o'simliklarga kasallik qo'zg'atuvchi viruslarni asosiy tashuvchisi ham hisoblanadi [22]. Kutilganidek, bu hasharotlarni nazorat qilish usullari bilan bog'liq, ko'plab tadqiqotlar olib borilgan [23]. Tadqiqotlar natijalariga ko'ra shira ko'plab pestitsidlarga chidamli bo'lish qobiliyatiga ega ekanligi ma'lum bo'lgan va bu esa pestitsidlardan foydalanishning atrof-muhitga tasiri haqida tashvishlanishni kuchayib borishiga sabab bo'lgan [24].

Natijada, agroekotizimning manipulyatsiyasini boshqarishda bu hasharotlarning roli tobora

ortib borgan [25].

O'rgimchakkana. O'rgimchakkanalar *Tetranychidae* oilasiga mansub bo'lib, ular 1200 ga yaqin turni o'z ichiga oladi [26]. Ular Acari (kanalar) kichik sinfiga kiradi [18].

O'rgimchakkanalar odatda o'simliklar barglarining pastki qismida yashaydilar, bu yerda ular tuxumlarini tashqi tasirlardan himoya qilish uchun ipak to'rlarini hosil qiladi va ular oziqlanish uchun o'simlik hujayralarini teshib zarar yetkazadi [28]. O'rgimchakkanalar bir necha yuz turdagi o'simliklar bilan oziqlanishi ma'lum. Bu oilaning xavfli vakillaridan biri *Tetranychus turkestanii* (Ugarov & Nikolskii) (Acari: *Tetranychidae*) ko'plab o'simliklar, shu jumladan qishloq xo'jaligi ekinlaridan, paxta (*Gossypium hirsutum* L.), makkajo'xori (*Zea mays* L.), jo'xori (*Sorghum bicolor* L.), pomidor (*Lycopersicon esculentum* Mill.), loviya (*Phaseolus vulgaris* L.) va boshqa sabzavotlar, mevali daraxtlar va o'rmon daraxtlari uchun jiddiy zararkunandadir [28]. *T. turkestanii* bo'yicha o'tkazilgan tadqiqotlarda uning biologiyasi va nazoratiga e'tibor qaratilgan [29] *T. turkestanii* osiyo hududida uchrovchi o'rgimchakkana turi bo'lib, *T. turkestanii* bilan zararlanganda yosh o'simliklar o'sishda orqada qolishi va gullash davrida shonalarning to'kilishi kuzatilgan. Ayrim g'o'za turlari iyun oyida *T. turkestanii* bilan zararlansa paxta hosilining 50-60%, iyulda 25-40%, avgustda 2-6% ini yo'qotilgani kuzatilgan [30]

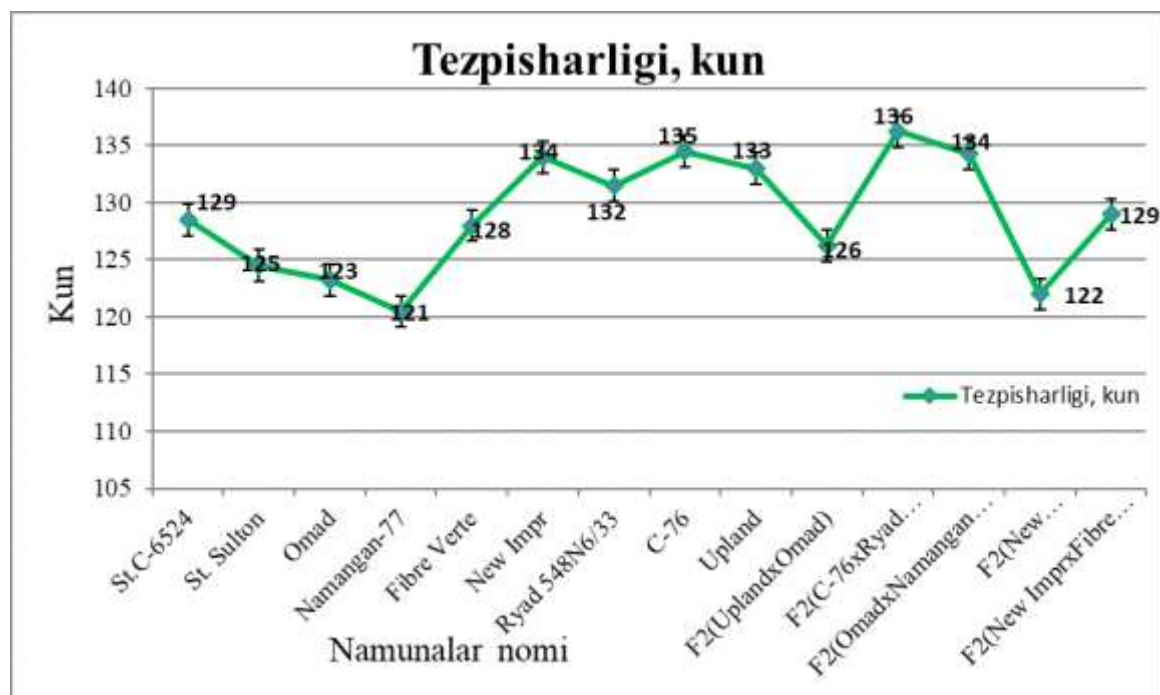
G'o'zaning kasalliklarga, hasharotlarga, biotik va abiotik stresslarga chidamliligini oshirish bo'yicha dunyo olimlari tomonidan ko'plab tadqiqotlar olib borilmoqda [30] G'o'zaning zararkunanda hasharotlariga chidamli transgen g'o'za olish bo'yicha ilk tadqiqotlar 1990 yilda boshlangan bo'lib, 1996 yilda g'o'zaning Cry 1A (b) va Cry 1A (s) genlari o'simlik to'qimalariga transformatsiya qilinib, ko'sak qurti (g'o'za tunlami) (*Helicoverpa* va *Pectinophora*) ga chidamlilik namoyon etgan birinchi avlod transgen g'o'zalar olinganligi haqida ilmiy nashrlarda xabar qilingan [31].

Ammo g'o'zaning so'ruvchi zararkunandalaridan biri o'rgimchakkananing Bt paxtaga munosabati o'rganilganda testlar shuni ko'rsatgandiki, agarda transgen va transgen bo'lmagan paxta yonma yon ekilganda o'rgimchakkanalar urg'ochilari transgen bo'lmagan paxtalarda oziqlanib, tuxum qo'yishni afzal ko'rishgan. O'rgimchakkanalar butun dunyo bo'ylab paxta dalalarida eng zararli o'txo'r zararkunandalar qatoriga kiradi [32].

2015 yilda M.F.Awan va boshqalar o'z tadqiqotlarida MIN-786 g'o'za naviga so'ruvchi hasharatlarga va gerbitsidlarga chidamliligini oshirish uchun turli kassetalarda klonlangan Cry1Ac + Cry2A va Glyphosate (GTG) genini 35S promotr asosida transformatsiya qilishgan va ko'sak qurti va gerbitsidlarga chidamli bo'lgan g'o'za namunasini yaratishgan [33].

Natijalar. Ilmiy tadqiqotlarimiz davomida MAS usulida yaratilgan o'rgimchakkana bilan zararlanishga bardoshli namunalarning xo'jalikka qimmatli belgilari o'rganilganda, tezpisharlik belgisi bo'yicha duragay kombinatsiyalarning tezpisharligi ularning otalik va onalik shakllari, hamda standart namunalar bilan solishtirilgan holda o'rganilganda, eng yaxshi natija Namangan-77 (121 kun) namunasi va F₂ (New Impr × Namangan-77) (122 kun) duragay kombinatsiyasida kuzatilgan (4.6-rasmga qarang). F₂ (New Impr × Namangan-77) duragay kombinatsiyasi New Impre namunasidan 10 kun, Standart C-6524 navidan 7 kunga ertapisharlikni namoyon qilgan.

Yana bir tezpishar namuna Omad 123 kunda pishib yetilgan bo'lsa, F₂ (Upland × Omad) (126 kun) duragay kombinatsiyasi Upland namunasidan 6 kun, standart C-6524 navidan 3 kunga ertapishar bo'lganligini ko'rish mumkin (1-rasmga qarang).



4.6-rasm. Otalik va onalik shakllari, hamda duragay kombinatsiyalarning tezpisharligi, 2023 yil.

F_2 (C-76 × Ryad 548 №6/33) (136 kun) duragay kombinatsiyasining otalik va onalik shakllari, C-76 (135 kun) va Ryad 548 №6/33 (132 kun) standart C-6524 naviga nisbatan 6-3 kunga kechpishar namunalar bo'lgan, F_2 (C-76 × Ryad 548 №6/33) duragay kombinatsiyasida ham standart C-6524 naviga nisbatan 7 kunga kechpisharlik kuzatilgan. F_2 (Omad × Namangan-77) (134 kun) duragay kombinatsiyasi onalik shakli Omad navidan 11 kun, otalik shakli Namangan-77 navidan 13 kun, standart C-6524 navidan 5 kunga kechpishar bo'lgan. F_2 (New Impr × Fibre Verte) (129 kun) duragay kombinatsiyasi New Impr namunasidan 5 kunga ertapishar, Fibre Verte namunasidan 1 kunga kechpishar bo'lgan. Standart C-6524 navi bilan esa bir xil ko'rsatkichga ega bo'lgan.

G'o'za tolasi uchun ekiladigan o'simlik, shuning uchun ham g'o'za tolasining sifati juda ahamiyatli hisoblanadi. Otalik va onalik shakllari, ularni chatishtirish orqali yaratilgan duragay kombinatsiyalarning tola sifati HVI uskunasi tekshirilganda, F_2 (Upland × Omad) duragay kombinatsiyasining tolasini yuqori o'rtacha uzunligi (UHML) 29.42 mm ni shtapel uzunligi (Stapel) esa 37 mm ga teng bo'lgan. F_2 (Upland × Omad) duragay kombinatsiyasining shtapel uzunligi ota ona shakli Upland (38 mm) dan 1 mm ga kalta, Omad (36 mm) 1 mm ga uzun, ya'ni oraliq shaklda bo'lgan. Mikroneyr ko'rsatkichi (Mik.) o'rta darajada bo'lib, ip yigiruvchanlik ko'rsatkichi (RiSi) juda yuqori (162,7) ekanligi ma'lum bo'lgan (4.7- jadvalga qarang). Tola elongatsiyasi (Elong. %) 8.2 % bo'lib, andoza C-6524 (8,1%) navidan, hamda ota-onalar shakllari Upland (6,1%), Omad (8,0%) dan yuqori, ekanligi ma'lum bo'lgan. F_2 (Ryad 548 №6/33 × C-76) duragay kombinatsiyasi tolasining sifat ko'rsatkichlari juda yaxshi natijalarni ko'rsatgan (1-jadvalga qarang).

Yuqori o'rtacha uzunli 32,51 mm ni, shtapel uzunligi 41 mm ni tashkil qilgan bo'lib, tola uzunligi onalik shakli Ryad 548 №6/33 dan 1 mm ga uzun, otalik shakli C-76 dan 3 mm ga kalta bo'lgan. Mikroneyr ko'rsatkichi (3.03) ga ko'ra tolasi ingichka, elongatsiyasi 8,2 % va ip yigirish

koeffisienti (162,2) juda yuqori bo'lganligini ko'rish mumkin. F_2 (Ryad 548 №6/33 × C-76) duragayining tola sifati juda yaxshi darajada ekanligini ko'rish mumkin.

F_2 (Omad × Namangan-77) duragay kombinatsiyasi tolasining sifat ko'rsatkichlari ota ona shakllari Omad va Namangan-77 navlarining tola sifati ko'rsatkichlaridan biroz kamroq, ammo ota onalik shakllarining ko'rsatkichlariga yaqin bo'lgan (4.7- jadvalga qarang).

1- jadval

Duragay kombinatsiyalarning tola sifati ko'rsatkichlari, 2023 yil

Sub ID	UHML (mm)	Stapel (mm)	Elong (%)	Mik (ug/inch)	RiSi
St. C-6524	28.0	35	8.1	3.86	148.0
St. Sulton	27.3	34	6.7	3.77	142.9
Omad	28.6	36	8.0	3.73	137.6
Namangan-77	28.4	36	7.3	3.78	136.9
New Impr	27.0	34	6.5	3.57	133.0
Fibre Verte	26.4	33	7.9	3.43	105.6
Ryad 548 №6/33	32.2	40	7.9	3.41	170.2
C-76	35.6	44	7.9	2.71	192.9
Upland	30.9	38	6.1	3.69	172.2
F_2 (Upland × Omad)	29.4	37	8.2	4.12	162.7
F_2 (Ryad 548 №6/33 × C-76)	32.5	41	8.2	3.03	162.2
F_2 (Omad × Namangan-77)	27.9	35	7.2	3.44	136.3
F_2 (New Impr × Namangan-77)	28.2	36	6.4	3.60	152.8
F_2 (New Impr × Fibre Verte)	29.3	37	7.9	4.46	156.8

F_2 (New Impr × Namangan-77) duragay kombinatsiyasi tolasining yuqori o'rtacha uzunligining 28,19 mm ni, shtapel uzunligi 36 mm ni tashkil qilgan. Tolasining shtapel uzunligi bo'yicha New Impr (34 mm) namunasi tola uzunligidan 2 mm ga uzun, Namangan-77 (36) navi tola uzunligi bilan bir xil bo'lgan. F_2 (New Impr × Namangan-77) duragay kombinatsiyasi tolasining mikroneyr ko'rsatkichi (3,60) ga ko'ra duragay kombinatsiya tolasini ingichka ekanligini ko'rish mumkin. Ip yigirish koeffisienti (152,8) juda yuqori ekanligini, ma'lum bo'lgan. Ota ona shakllari New Impr (133,0) va Namangan-77 (136,9) larning ip yigirish ko'rsatkichi o'rta darajada ekanligini ko'rish mumkin. F_2 (New Impr × Namangan-77) duragay kombinatsiyasi ip yigirish koeffisienti andoza nav C-6524 (148,0) navi tolasining ip yigirish koeffisientidan 4,8 ga yuqori ekanligini ko'rish mumkin (4.7-jadvalga qarang).

F_2 (New Impr × Fibre Verte) duragay kombinatsiya tolasining sifat ko'rsatkichlari ota ona shakllarining, hamda andoza navning sifat ko'rsatkichlaridan yuqori ekanligi ma'lum bo'lgan.

New Impr × Fibre Verte duragay kombinatsiyasi tolasining shtapel uzunligi 37 mm ni tashkil qilgan, New Impr (34 mm) namunasidan 3 mm ga, Fibre Verte (33 mm) namunasi tola uzunligidan 4 mm ga, andoza C-6524 (35 mm) tola uzunligidan 2 mm ga uzun ekanligi aniqlangan.

New Impr × Fibre Verte duragay kombinatsiyasining mikroneyr ko'rsatkichi 4,46 ga teng bo'lib o'rta darajada ekanligi ma'lum bo'lgan. New Impr × Fibre Verte duragay

kombinatsiyasining ip yigirish koeffisienti juda yuqori darajada (156,8) aniqlangan. Ip yigirish koeffisienti ham ota ona shakllari New Impr (133,0) va Fibre Verte (105,6) ning, hamda andoza nav C-6524 (148,0) ning sifat ko'rsatkichlaridan yuqori ekanligi ma'lum bo'lgan.

Xulosa. F₂ (Ryad 548 №6/33 × C-76), F₂ (New Impr × Fibre Verte) kombinatsiyalardan kelgusi tadqiqotlarda boshlang'ich manba sifatida foydalanish mumkin.

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