УДК: 677.21.021.152:66.047.76

CHGITLI PAXTANI HAVODAN AJRATISH JARAYONI SAMARADORLIGINI AERODINAMIK KO‘RSATKICHLARINI TAKOMINLISHTIRISH

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Annotatsiya

Separatsiya jarayonida chigitli paxta bo’lakchalarini separator devori bilan dinamik tasirini kamaytirish uni oqim yo’nalishini boshqarish va unga mos qurilmaga o’zgartirishlar kiritishdan iborat.

Kalit so‘zlar: Paxta, havo, separator,tezlik,xomashyo,chigit, tola to‘rli yuza,vakuum-klapan, ishchi kamera,qirg‘ich.

Аннотация

Снижение динамического воздействия семян хлопчатника на сепараторную стенку в процессе сепарации заключается в управлении направлением его потока и внесении изменений в соответствующее устройство.

Ключевые слова: Хлопок, воздух, сепаратор, сырье, семян, волокна, поверхность сетки, вакуумный клапан, рабочая камера, скребок.

Annotation

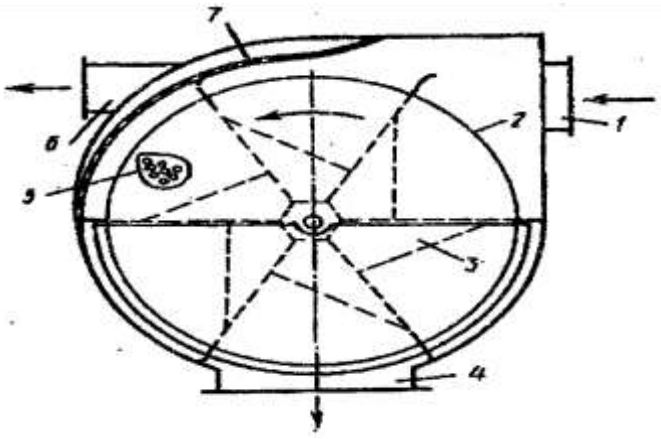
In process сепоратции bit cotton together with wall of the separator to reduce the dynamic influence to monage its approaching direction of the flow in carry the changes to its building

Key words: Cotton, weather, separator, speed, raw material, seed, fiber, mesh surface, vacuum-valve, working camera, scraper,

Respublikamizda paxta xomashyosini chuqur qayta ishlash asosida yuqori qo‘shimcha qiymatga ega bo‘lgan tayyor to‘qimachilik va yengil sanoat mahsulotlari ishlab chiqarishni rivojlantirish, paxta tozalash sanoatini modernizasiya qilish asosida ichki va tashqi bozor uchun chiqarilayotgan paxta mahsulotlari sifat va miqdor ko‘rsatkichlarini yaxshilash, ularning raqobatbardoshligini ta’minlashga alohida e’tibor qaratilmoqda. Jumladan, 2017-2021 yillarda O‘zbekiston Respublikasini yanada rivojlantirish bo‘yicha Harakatlar strategiyasida, « milliy iqtisodiyotning raqobatbardoshligini oshirish, iqtisodiyotda energiya va resurslar sarfini kamaytirish, ishlab chiqarishga energiya tejaydigan texnologiyalarni keng joriy etish» vazifalari belgilab berilgan [1]. Ushbu vazifalar ijrosini ta’minlashda paxta sanoati korxonalarida separator mashinasining ishchi qismlarini tasiri natijasida paxtani xavodan ajratish jarayonida chigitli paxtani tabiiy xususiyatlarini saqlab qolish orqali samarali

texnologiyasi va vositalarini yaratish va ishlab chiqarishga joriy etish muhim ahamiyatga ega. Ishlab chiqarishga taklif etilayotgan separator qurilmasi chigitli paxtani tabiiy xususiyatlarini saqlab qolish orqali iqtisodiy samaradorlikka erishiladi.

Aylanuvchi o`qlari umumlashtirilgan separator ishlaganda chigitli paxta havo oqimi bilan birga kirish quvuri orqali ajratish kamerasiga tushadi. Bunda ajratish kamerasida havo tezligi kamayadi, paxtaning asosiy qismi inertsiya kuchi ta`sirda kameraning egri chiziqli devoriga uriladi va vakuum-klapan qanotlari bilan ilib olinib, chiqarish quvuri orqali tashqariga chiqariladi. Paxtaning bir qismi havo oqimi tasirida to`rli disk yuzaga yopishadi. Bu disk vakuum-klapan bilan birga aylanganligi uchun uning yuzasida paxta o`z og'irligi xamda markazdan qochma kuch ta`sirida ajraladi. Havo mayda chiqindilar bilan birga chang chiqaruvchi quvur orqali so`rib olinadi va tsiklonga yuboriladi. Quvur shunday o`rnatilganki, unda faqat to`rli diskning pastki yarmida vakuum hosil bo`ladi. Natijada havoning ta`sir kuchidan ozod bo`lgan paxta to`r yuzasidan o`z og'irligi va markazdan qochma kuchlar ta`sirida ajratib olinadi. Bu separator tashayotgan paxtani xavodan to`la ajratib olish imkonini berib, chigitning shikastlanishini kamaytiradi, paxta sifatini buzmaydi.[2] Aylanuvchi o`qlari umumlashgan separator to`ri foydali ish yuzasining boshqa separatorlarga nisbatan kichikligi uning asosiy kamchiligadir. Bundan tashqari paxtaning ifloslik va namligi yuqori bo`lsa, u holda separatorning to`rli yuzasida to`la ajralmaydi. Natijada ajratish kamerasida tiqilishlar yuzaga kelishi mumkin. Shu sababli bu separatorni takomillashtirish uchun, uning ajratish kamerasiga qo`shimcha to`ro`rnatiladi.



(1-rasm). To‘r yuzali yoysimon separator

Vakuum-klapanning tezligi paxtaning ajratish kamerasidagi tezligidan katta bo`lganligi uchun uning qanotlari paxtani kirish quvuri qarshisida joylashgan to`r yuzasiga urilishiga yo‘l qo`ymasdan so`rib tushuradi. Vakuum-klapanning aylanishi natijasida qanotlariga o`rnatilgan rezinalar yon tomonidagi to`r va parabola shakldagi to'rlarni tozalab turadi. Separatorning egri chiziqli to`g'ri parabola shaklida tayyorlanganligi uchun paxtani vakuum klapan qanotlari to`r o`rtasiga tushub

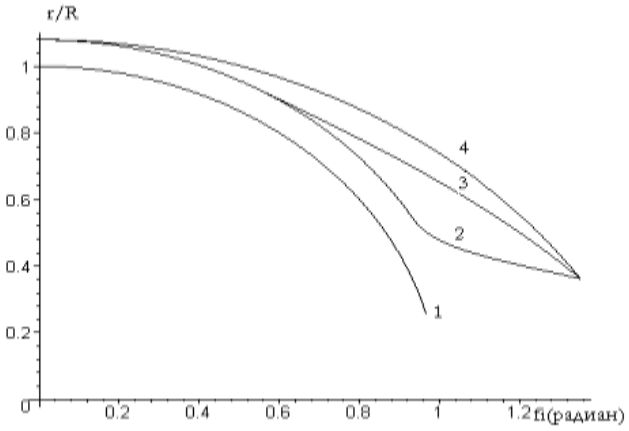
qolishiga yo`l qo`ymaydi.[3] Natijada chigitni sinishi kamayadi,paxta tolasining sifati deyarli buzilmaydi. To'rli yuza konturini polyar koordinatlariga ushbu tenglama ko'rinishida olamiz

$$r = r(\varphi) = R_0 - \frac{(R_0 - R_1)(\varphi - \varphi_0)\{2(\varphi_1 - \varphi_0) - \varphi + \varphi_1)}{(\varphi_1 - \varphi_0)^2} \qquad (1)$$

Bu erda R_0, R_1- to'rli yuza konturining eng katta va eng kichik radiuslari. φ_0, φ_1 - turli yuzaning kameradagi boshlanish va tugash burchaklari.

Endi bo`lakchaga radius buylab ta`sir qiladigan kuchlarni aniqlaymiz. Bo`lakchaga markazdan qochma $m\omega^2 r(\varphi)$, og'irlik $mg$ kuchlaridan tashqari elastik kuchi $c[R + \delta - r(\varphi)]$ (buerda $c$ - bikirlik koeffitsienti, $\delta$ - vakuum-klapan sidirg'ichining uzunligi). Shunday qilib bo`lakchaga ta`sir qiladigan kuchlar yig'indisini yo`nalishlarini e`tiborga olib aniqlaymiz

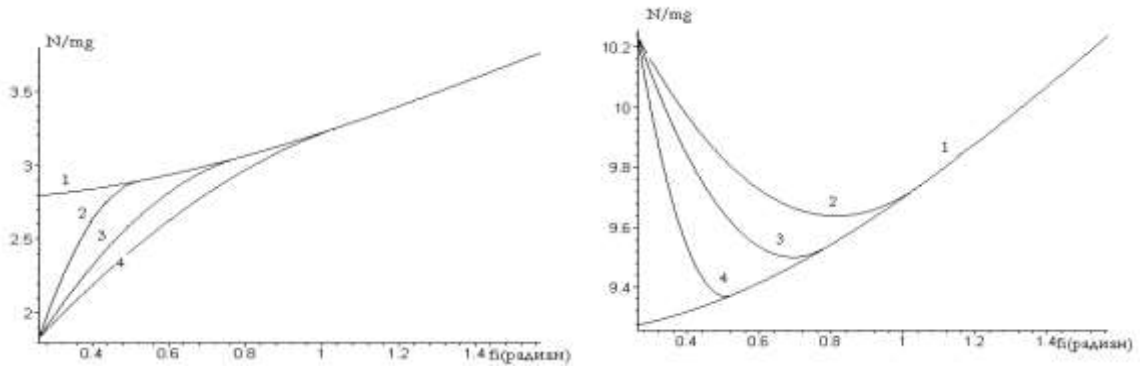
$$N = m\omega^2 r(\varphi) + c[R + \delta - r(\varphi)] - mg\cos\varphi \qquad (2)$$



(2- rasm).Turli yuza konturi radiusi r ning polyar burchak $fi = \varphi$ bilan xar-xil burchak φ_1 dagi bog'lanish grafiklari. $1 - r/R = 1$ (vakuum klapan), $2 - \varphi_1 = 30^0$, $3 - \varphi_1 = 60^0$, $4 - \varphi_1 = 90^0$

Grafiklar tahlilidan kelib chiqadigan xulosa, bo`lakchaga ta`sir qiladigan radial kuch k va n parametrlarga talay bog'lik ekanligi. $k > n$ bo`lsa, bu kuchning konturning o`zgaruvchan qismida kamayishi, $k < n$ bo`lganda uning oshishi va $k = n$ bo`lganda esa grafiklar φ_1 burchakka bog'lik bo`lmasligini ko`rsatadi.

$k = 5,\ n = 2$ $\qquad\qquad$ $k = 5,\ n = 8$

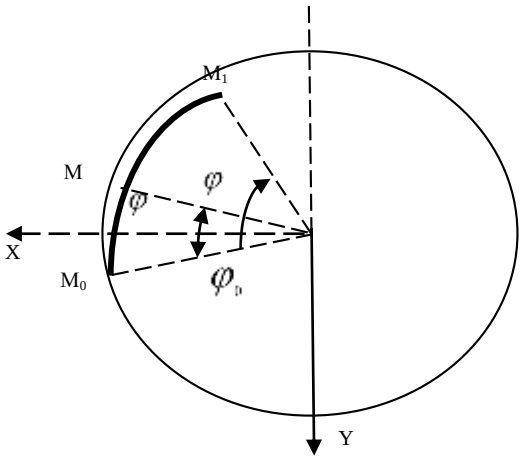


(3-rasm). Paxta bo`lakchasiga ta`sir qiladigan normal va og'irlik kuchlar nisbati N/mg ning parametrlar $k = cR/mg$, $n = R\omega^2/g$ va burchak φ_1 ning xar-xil qiymatlarida polyar burchak $fi = \varphi$ bilan bog'lanish grafiklari. $1 - r/R = 1$, $2 - \varphi_1 = 30^0$, $3 - \varphi_1 = 60^0$, $4 - \varphi_1 = 90^0$.

Separator konstruktsiyasini yanada takomillashtirishdagi izlanishlar tadqiqotchilar tomonidan turli yo`nalishlar bo`yicha ishlar olib borilmoqda [4].

$x = r(\varphi)\sin\varphi$, $y = -r(\varphi)\cos\varphi$ (3)

formulalar yordamida aniqlanadi



(4-rasm). Paxta bo`lakchasining yoysimon sirt yuzasidagi xarakati sxemasi.

Yoysimon chiziqning tenglamasini olingan o'qlar uchun polyar koordinat sistemasida quyidagicha olamiz

$$r = r(\varphi) = R_0 - \frac{(R_0 - R_1)[2\Delta\varphi(\varphi - \varphi_0) - (\varphi - \varphi_0)^2)}{\Delta\varphi^2} \qquad (\Delta\varphi = \varphi_1 - \varphi_0) \quad (4)$$

Bo`lakchaga faqat og'irlik va ishqalanish kuchlari ta`sir etsin. Bo`lakchaning chiziq bo'ylab o'tgan masofasini $s = s(t)$ deb olinsa uning chiziq ustidagi xarakat tenglamasi quyidagicha yoziladi

$$m\frac{d^2s}{dt^2} = mg(\sin\psi - f\cos\psi) \qquad (5)$$

Bu yerda m - bo`lakchaning massasi, $\psi$ - chiziqqa o`tkazilgan urinmaning $0x$ - o`qi bilan tashkil qilgan burchagi, f - ishqalanish koeffitsienti. Quyidagi bog'lanishlardan foydalanib

$$tg\psi = \frac{dy}{dx} = \frac{\frac{dy}{d\varphi}}{\frac{dx}{d\varphi}} = \frac{r(\varphi)\sin\varphi - r'(\varphi)\cos\varphi}{r(\varphi)\cos\varphi + r'(\varphi)\sin\varphi}, \sin\psi = \frac{r(\varphi)\sin\varphi - r'(\varphi)\cos\varphi}{\sqrt{r^2(\varphi) + r'^2(\varphi)}} \quad (6)$$

$$\cos\psi = \frac{r(\varphi)\cos\varphi + r'(\varphi)\sin\varphi}{\sqrt{r^2(\varphi) + r'^2(\varphi)}}, \qquad \frac{ds}{dt} = \dot{\varphi}\frac{ds}{d\varphi} = \dot{\varphi}\sqrt{r^2(\varphi) + r'^2(\varphi)} \quad (7)$$

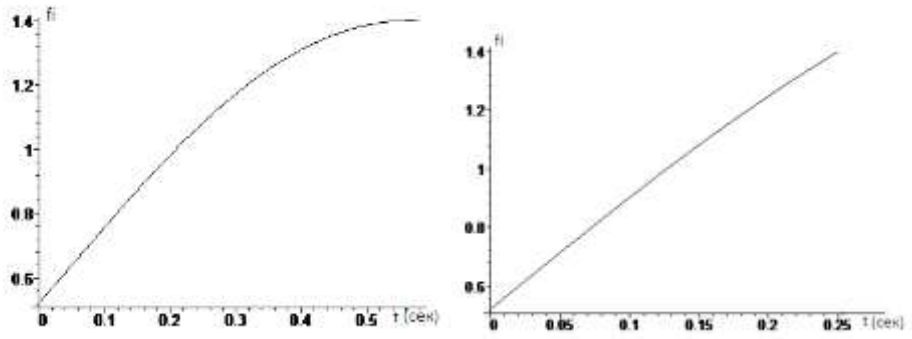
$$\frac{d^2s}{dt^2} = \dot{\varphi}^2\frac{d^2s}{d\varphi^2} + \ddot{\varphi}\frac{ds}{d\varphi} = \ddot{\varphi}\sqrt{r^2(\varphi) + r'^2(\varphi)} + \dot{\varphi}^2\frac{r(\varphi)r'(\varphi) + r'(\varphi)r''(\varphi)}{\sqrt{r^2(\varphi) + r'^2(\varphi)}},$$

(7) tenglamani quyidagi ko`rinishga keltiramiz ($v_0$ - bo`lakchaning to`rli yuza bilan uchrashish tezligi)

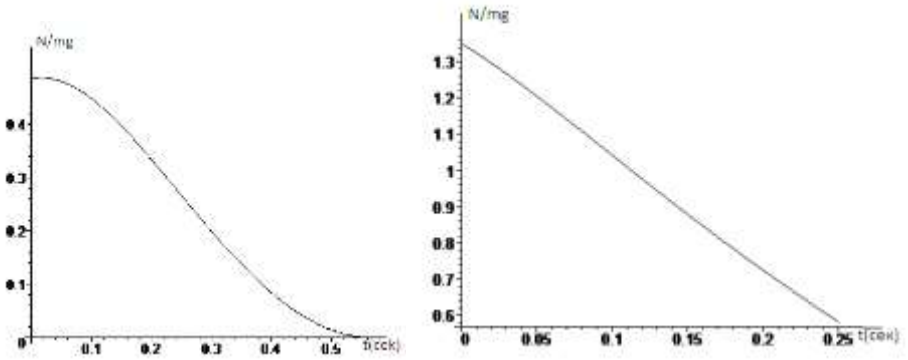
$$\ddot{\varphi} + \dot{\varphi}^2\frac{r(\varphi)r'(\varphi) + r'(\varphi)r''(\varphi)}{r^2(\varphi) + r'^2(\varphi)} = g\frac{r(\varphi)\sin\varphi - r'(\varphi)\cos\varphi - f[r(\varphi)\cos\varphi + r'(\varphi)\sin\varphi]}{r^2(\varphi) + r'^2(\varphi)} \quad (8)$$

Bu tenglama boshlang'ich $\varphi = \varphi_0$, $\dot{\varphi} = v_0\cos\psi_0 = \frac{r(\varphi_0)\cos\varphi_0 + r'(\varphi_0)\sin\varphi_0}{\sqrt{r^2(\varphi_0) + r'^2(\varphi_0)}}$ $t = 0$ bo`lgandagi sharti bilan EVM da sonli usulda yechiladi. 2 va 3 rasmlarda burchak $\varphi = \varphi(t)$ va to`rli yuzaga ta`sir etayotgan normal kuchning vaqt bo`yicha o`zgarish grafiklari uchrashish tezligi $v_0$ ning ikkita qiymatida keltirilgan. Xisoblarda $R_0 / R = 1.4$, $R_1 / R = 1.08$, $\varphi_0 = 30^0$, $\varphi_1 = 80^0$ deb qabul qilingan. Grafiklar taxlilidan agar bo`lakchaning to`rli yuza bilan uchrashish tezligi $v_0 \le 3м/c$ bo`lsa, bo`lakcha to`rli yuzadan ajralishi mumkinligi kuzatilgan.

$v_0 = 3м/c$ $v_0 = 5м/c$



(5-rasm). To`rli yuza bo'ylab polyar burchak $\varphi$ (radian) ning vaqt t(sek) bo`yicha o`zgarishi.



(6-rasm). To`rli yuza bo`ylab o`lchamsiz normal kuch $N/mg$ ning vaqt $t(сек)$ bo`yicha o`zgarishi.

To'rli sirt kesimini egri chiziqdan iborat deb,uni polyar kordinat sistemasida quydagi parabolalar bilan ifodalaymiz

$r = r_1(\varphi) = R + a_1(\varphi - \varphi_0)^2$ $\varphi_0 \le \varphi \le \varphi_1$ bo'lganda ,

$r = r_2(\varphi) = R + a_2(\varphi - \varphi_2)^2 + b(\varphi - \varphi_2)$ $\varphi_1 \le \varphi \le \varphi_2$ bo'lganda. (9)

Bu yerda: R - kamera radiusi bo'lib, a_1, a_2 va b o'zgarmas sonlar quydagi shartlardan aniqlanadi

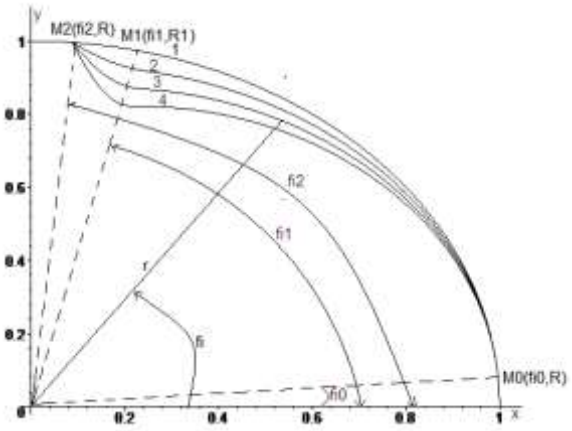
$r_1(\varphi_1) = r_2(\varphi_1) = R_1,\ r_1'(\varphi_1) = r_2'(\varphi_1)$ (10)

Bu yerda: $\varphi_0, \varphi_1, \varphi_2$ - burchaklar ($\varphi_0 < \varphi_1 < \varphi_2$), hamda $R_1 < R_Z$ masofa berilgan bo'ladi.

Yuqoridagi shartlardan foydalanib topamiz:

$$a_1 = -\frac{R - R_1}{(\varphi_1 - \varphi_0)^2}, \qquad b = -2a_2(\varphi_1 - \varphi_2) - 2(R - R_1)(\varphi_1 - \varphi_0),$$

$$a_2 = -\frac{(R - R_1)[2(\varphi_1 - \varphi_2) - \varphi_1 + \varphi_0]}{(\varphi_1 - \varphi_0)(\varphi_1 - \varphi_2)^2} \qquad (11)$$



(7 rasm). To'rli yuza kesimi ko'nturi $r(\varphi)/R$ ning $k = R_1/R$ nisbatdagi xar xil qiymatlaridagi shakillari (ko'rinishlari) : $1-k=1$, $2-k=0.95$, $3-k=0.9$, $4-k=.85$

(7-rasm)da to'rli yuza kesimining keltirilgan egri chizig'i $r(\varphi)/R$ ning $k = R_1/R$

nisbatning xar hil qiymatlaridagi ko'rinishlari keltirilgan.

Bu yerda $k=1$ kamera konturiga mos keladi.

(1-jadval)

Bo 'lakchaning quvurdan chiqishdagi boshlang'ich tezlik	Normal kuch no'lga aylanadigan qutib burchagi
$v_0 = 8м/с$	$\varphi_* = 8^0$
$v_0 = 10м/с$	$\varphi_* = 5^0$
$v_0 = 6м/с$	$\varphi_* = 13.7^0$
$v_0 = 4м/с$	$\varphi_* = 30^0$
$v_0 = 3м/с$	$\varphi_* = 66.4^0$
$v_0 = 2.5м/с$	$\varphi_* = 75^0$

Normal kuch vaqt bo'yicha monoton o'suvchi funksiya bo'lib, maksimal qiymatini konturning oxirgi nuqtasida qabul qiladi. Uning maksimal qiymati boshlang'ich burchak $\varphi_н$, tezlik v_0 va oqimning tezligi v_c oshgan sari oshib boradi.

UMUMIY XULOSALAR

Paxtani xavodan ajratish jarayonida uning tabiiy xususiyatlarini saqlash masalasi dolzarb bo'lib, ushbu muammo hal etish va bu borada nazariy o'rganib chiqilgan masalalar bo'yicha quydagi xulosalar qilindi:

Olib borilgan ilmiy tadqiqotlar natijasi shuni ko'rsatadiki taklif etilayotgan yangi variantdagi SS-15A separator yana bir bor chuqur o'rganilib ishlab chiqarishga joriy etilsa qayta ishlanayotgan chigitli paxtani tabiiy xususiyatlarini saqlab qolish va tayyorlanayotgan yarim tayyor mahsulot sifati yuqori bo'lishi ta'minlanadi.

FOYDALANILGAN ADABIYOTLAR

1. Ubaydullayev, M., & Kurbanova, U. (2023). THE INFLUENCE OF DEFOLIANTS ON THE TECHNOLOGICAL QUALITY INDICATORS AND CHEMICAL COMPOSITION OF SEED. Science and innovation, 2(D4), 26-30.

2. Убайдуллаев, М. М., & Саетбековна, Қ. У. (2023). ДЕФОЛИАЦИЯ ЎТКАЗИШ УЧУН ДАЛАЛАРНИ ТАНЛАШ ВА ТАЙЁРЛАШ. Journal of Science-Innovative Research in Uzbekistan, 1(9), 322-328.

3. Mo'minjonovich, U. M., & Saetbekovna, Q. U. (2023). EFFECT OF DEFOLIANTS ON COTTON WEIGHT. Journal of Science-Innovative Research in Uzbekistan, 1(9), 316-321.

4. Ubaydullayev, M. M. (2022). YANGI DEFOLIANTLAR HOSILDORLIK GAROVI. Архив научных исследований, 2(1).

5.Mo'minjonovich, U. M. (2022). Effectiveness Of Defoliants. Eurasian Research Bulletin, 8, 9-12.

6. Mominjonovich, U. M., & Ogli, M. I. V. (2022). STUDY AND ANALYSIS OF TECHNOLOGICAL PROCESSES OF COTTON DRYING IN A CLUSTER SYSTEM. International Journal of Advance Scientific Research, 2(11), 6-10.

7. Ubaydullaev, M. M., & UT, T. (2022). DETERMINATION OF APPROPRIATE NORMS AND TERMS OF DEFOLIANTS. American Journal Of Applied Science And Technology, 2(05), 18-22.

8. Ubaydullaev, M. M., & Makhmudova, G. O. (2022). MEDIUM FIBER S-8290 AND S-6775 COTTON AGROTECHNICS OF SOWING VARIETIES. European International Journal of Multidisciplinary Research and Management Studies, 2(05), 49-54.

9. Ubaydullaev, M. M., & Komilov, J. N. (2022). EFFECT OF DEFOLIANTS FOR MEDIUM FIBER COTTON. International Journal of Advance Scientific Research, 2(05), 1-5.

10. Ubaydullaev, M. M., & Mahmutaliyev, I. V. (2022). EFFECTIVENESS OF FOREIGN AND LOCAL DEFOLIANTS ON THE OPENING OF CUPS. International Journal of Advance Scientific Research, 2(05), 6-12.

11. Ubaydullaev, M. M., & Sultonov, S. T. (2022). DEFOLIATION IS AN IMPORTANT MEASURE. European International Journal of Multidisciplinary Research and Management Studies, 2(05), 44-48.

12. Ubaydullaev, M. M., & Nishonov, I. A. (2022). The Benefits of Defoliation. Eurasian Journal of Engineering and Technology, 6, 102-105.

13. Ubaydullayev Madaminjon Mo'minjon o'g'li, & Ma'rufjonov Abdurahmon Mo'sinjon o'g'li. (2022). BIOLOGICAL EFFICIENCY OF FOREIGN AND LOCAL DEFOLIANTS. "science and innovation" international scientific journal, 1(2). https://doi.org/10.5281/zenodo.6569808

14. Ubaydullayev, M. M. (2021). G ‘o ‘zada defoliatsiya o ‘tkazishning maqbul me'yor va muddatlari. Monografiya.-Corresponding standards and terms of defliation of cotton. Monograph.-. Соответствующие нормы и сроки дефолиации хлопка. Монография. Zenodo.

15. Ubaydullaev, M. M. (2020). The importance of sowing and handling of c-8290 and c-6775 seeds in the conditions of the meadow soils of the Fergana area. In International conference on multidisciplinary research (p. 11).

16. Ubaydullayev, M. M., & Ne’matova, F. J. (2021). The importance of planting and processing of medium-fiedl cotton varieties between cotton rows in Fergana region. The American jurnal of agriculture and biomedical engineering. USA, 3(09).

17. Тешаев, Ф. Ж., & Убайдуллаев, М. М. (2020). Определение эффективных норм новых дефолиантов в условиях лугово-солончаковых почв Ферганской области при раскрытии коробочек 50-60% сортов хлопчатника с8290

и с6775. Актуальные проблемы современной науки, (5), 62-64.

18. Mo'minovich, U. M. (2021). The Importance Of Planting And Processing Of Medium-Field Cotton Varieties Between Cotton Rows In Fergana Region. The American Journal of Agriculture and Biomedical Engineering, 3(09), 26-29.

19. Ubaydullayev, M. M., Ne'matova, F. J., & Marufjonov, A. (2021). Determination of efficiency of defoliation in medium-fiber cotton varieties. Galaxy International Interdisciplinary Research Journal, 9(11), 95-98.

20. Ubaydullaev, M. M. U., Askarov, K. K., & Mirzaikromov, M. A. U. (2021). Effectiveness of new defoliants. Theoretical & applied science Учредители: Теоретическая и прикладная наука,(12), 789-792.

21. Madaminjon Ubaydullaev,Sultanbek Allanazarov, Jasurbek Komilov. Effect of Weeding on Cotton Weight Per Boll and Cotton Yield Depending on Seedling Thickness of Medium Fiber Cotton Varieties BIO Web of Conferences 78, 03012 (2023)https://www.bioconferences.org/articles/bioconf/abs/2023/23/bioconf_mtsitvw2023_03012/bioconf_mtsitvw2023_03012.html

22. Ubaidullaev Madaminjan Muminjanovich, M. M. Холмуротов. Theoretical Study of the Factors Affecting Raw Materials in the Process of Breaking Cotton Wool. AMERICAN Journal of Engineering, Mechanics and Architecture. **Volume 01, Issue 10, 2023 ISSN (E): 2993-2637** https://scholar.google.ru/citations?view_op=view_citation&hl=ru&user=3UOVPu0AAAAJ&cstart=20&pagesize=80&citation_for_view=3UOVPu0AAAAJ:qUcmZB5y_30C

23. UM Mo'minjonovich, K Iqboljon. General Information on the Effectiveness and Disadvantages of Cotton Ginsing Machines American Journal of Engineering, Mechanics and Architecture (2993-2637). 2023/12/8.