

# Bench Study \_ Elastic Supports of the Chisel Cultivator

Akhmadjon Nasritdinov  
 Ismailkhoja Djourayev

Namangan Institute of Engineering and Technology  
 E-mail:ismoil5009@mail.ru

**Abstract .** The article discusses a comparative study of the choice of the type of racks of the working parts of a chisel-cultivator. In bench tests, each rack was fixed to a special frame; a static load was applied to them, simulating the resultant force of soil resistance. At each loading stage , movements of the toe of the paw were measured. In addition, the agro -energy performance indicators of the chisel-cultivator with various stands were studied. By results research selected spiral elastic stand .

**Key words:** working body, stand, chisel cultivator, spring-safety suspension, spiral elastic strut, static load, kinematics of the toe of the working body, stiffness of the struts, movement of the toe

**Introduction.** One of the ways to increase the efficiency and productivity, as well as the reliability of chisel implements in pre-sowing tillage, is to improve the design of their working parts. It should be noted that in the last period there have been significant changes in the energy base of agriculture, energy-rich high-speed tractors have been created and are increasingly being used . At the same time, individual agricultural implements and their working parts remained the same, this also applies to the chisel cultivator. In the cotton-growing zone, chisel cultivators are the main tools for loosening the soil after leaching and reserve irrigation. Recently, both in our country and abroad , the working parts of chisel-cultivators and other soil-cultivating machines have been equipped with spring-safety or elastic struts. According to many researchers, the use of such racks leads to a decrease in the traction resistance of the implement, provides better quality indicators of its operation, and eliminates breakdowns of the working parts [1-7].

Despite this, the working parts of cotton chisel cultivators ChKU-4 and ChKU-4A still have rigid stands. In this regard, we conducted a scientific, technical and patent review of the leading countries producing chisel guns, and based on its results, we selected the most promising options for elastic struts and suspensions (Fig. 1 and Table 1)

Table 1  
 Parameters of elastic struts and spring-safety suspension

№	Options	Name	Weight G, kg	Dimensions , mm _			
				H	E	a x c	from x to
1	1	Spring-safety suspension of the KPE-3.8 cultivator	27.5	560	180	55*25	-
2	2	Spiral elastic strut of the KChP-5.4 cultivator	16.4	660	400	30*30	-
3	3	Spiral elastic strut "VISHOM"	15.4	630	270	30*30	-
4	4	Spring C-shaped stand of the KPS-4 cultivator	4.6	460	50	40*8	-
5	5	Spring S -shaped cultivator stand NZ - 9.7	4.1	300	260	23*9	45*9

- I. Spring-safety suspension of the cultivator KPE- 3, 8;
- II. Spiral elastic strut of the KChP-5, 4 cultivator;
- III. Spiral elastic strut of the VISKHOM design;
- IV. C-shaped stand of the KPS-4 cultivator
- V. S - shaped stand of the spring cultivator NZ - 97 from the company Vader tad (Sweden).

**Materials and methods.** These stands have undergone comparative bench and laboratory field tests in order to select the most rational of them for the working parts of cotton chisel cultivators.

In bench tests, each rack was fixed to a special frame; a static load was applied to them, simulating the resultant force of soil resistance. At each loading stage, the movements of the toe of the paw (working body) were measured horizontally “e” and vertically “h” (Fig. 2).

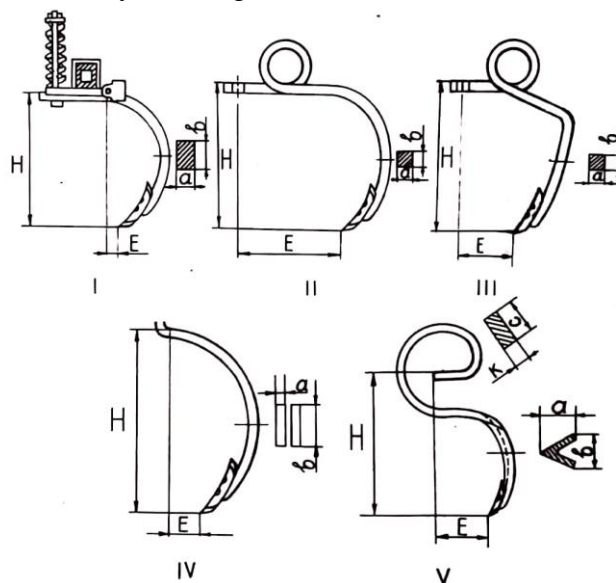


Fig. 1. Types of studied struts of the working parts of the chisel-cultivator

Based on the data obtained, the rigidity of the struts was determined and their elastic characteristics were plotted in the form of graphs expressing the horizontal dependence of the toe of the paw on the load (Fig. 3.a). For clarity, these graphs are combined with diagrams showing the kinematics of the toe of the working element (Fig. 3.b ). It should be noted that in order to ensure the oscillatory process of the working body and the uniformity of the tillage depth, the rigidity of the stand should be in the range of 15-20 N/mm, and the movement of the toe of the working body in the vertical direction under the influence of the working load, which is equal to 0.8.. 1.2kN [1], should not exceed +2cm.

**Research results.** Analysis of the bench test results showed the following. Spring-safety suspension (in Fig. 3, curve I ) has a two-stage characteristic. In the load range up to 1.2 kN, its rigidity decreases from 67 to 21 N/mm, and with a further increase in load to 1.6 kN, it increases to 24 N/mm. In the operating load range, the rigidity of this rack is 20-25 N/mm. With increasing paw load deepens, i.e. her toe moves up. At the maximum working load, the deepening of the paw was 15 mm, which is acceptable according to agro technical requirements [8-11].

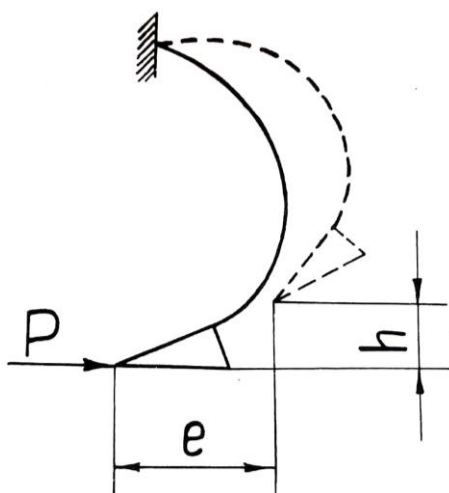


Fig. 2. Diagram for determining the movement of the toe of the working body

The spiral elastic struts of the KChP-5.4 cultivator (curve II in Fig. 3 ) and “VISKHOM” (curve III in Fig. 3 ) have a rectilinear elastic characteristic. Their longitudinal stiffness is almost the same and amounts to

15.2...17.4 and 14.3...16.7 N/mm, respectively. As the load increases, the paw deepens on both racks. However, the cultivator stand KChP-5.4 has a tine recess that is twice as large as that of the VISKHOM stand, and already at a working load of 0.8 kN it exceeds the permissible limit. At the "VISHOM" rack in the operating load range (0.8...1.2kN), the paw protrusion is 10...16 mm, which is within acceptable limits. The C-shaped rack also has a curved characteristic (curve IV in Fig. 3). In the load range up to 1 kN, its rigidity decreases from 22 to 17 N/mm. As the load increases, the paw deepens, i.e. under the influence of the working load; its toe moved downwards, this entail uneven processing depth and an increase in traction resistance.

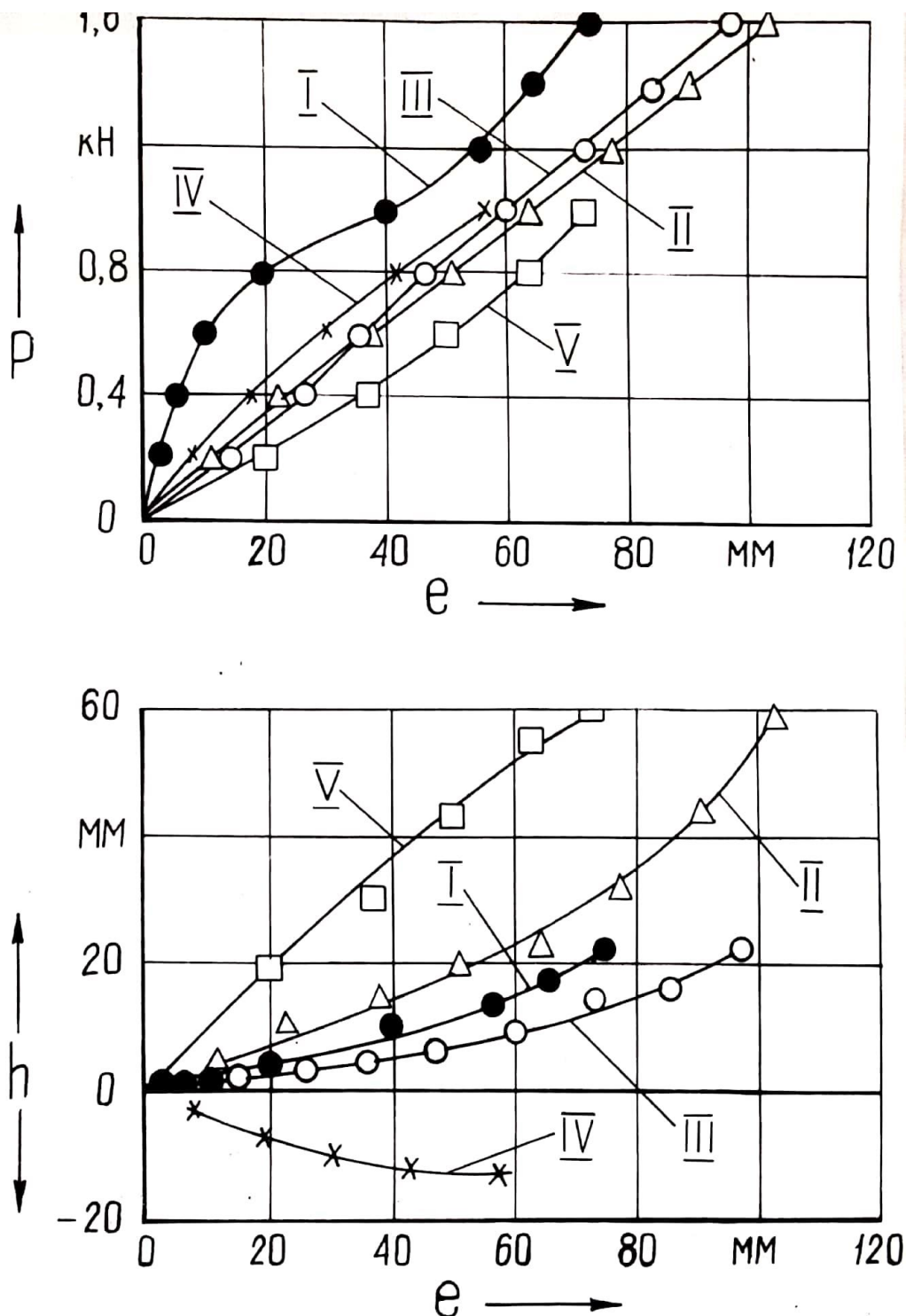


Fig. 3. Elastic characteristics of the racks (a) and kinematics of the working element (b): to the curves I ; II ; III ; IV ; V correspond to the types of racks in Fig. I

Based on this, the stand in question can also be considered unacceptable for ripening chisel cultivator paws. The S - shaped strut has a faintly expressed curvilinear characteristic (curve V in Fig. 3) and low rigidity (10...13N/mm). With increasing load, the paw intensively deepens and, throughout the entire working load range, its deepening significantly exceeds the permissible limit. Therefore, this chisel cultivator stand is not acceptable.

**Conclusions.** Thus, the research results show that the most suitable for cotton chisel-cultivator are the VISKHOM spiral elastic stand and the spring-safety suspension.

#### List of references used

- 1) Misirova, S. A. "Systematic types of fungi of allocated and determined types from decorative flowers in conditions region Tashkent." *Agricultural sciences* 6.11 (2015): 1387.
- 2) Misirova, S. A. "Determining of the measure disease control ornamental crops during the growing season in the conditions Tashkent region." *Global Journal of Bio-Sciences and Biotechnology* 5.1 (2016): 119-124.
- 3) Abdumutalovna, Misirova Surayyo, and Sarimsaqova Nilufar Sobirjonovna. "Bioecology of Fungi-Pathogens of Flower Crops and the System to Combat Them." *Agricultural sciences* 7.08 (2016): 539.
- 4) MISIROVA, SA, and NN ERNAZAROVA. "FIGHTING MEASURES THE DISEASE CAUSES A VERY DANGEROUS FUNGAL SPECIES WIDESPREAD IN TASHKENT REGION." *International Journal of Botany and Research (IJBR)* 6 (2016): 5-12.
- 5) Misirova, Surayyo. "Technology of growing orchid flowers from seeds." *E3S Web of Conferences*. Vol. 390. EDP Sciences, 2023.
- 6) MISIROVA, SA. "TECHNOLOGY OF CULTIVATION AND REPRODUCTION OF ORNAMENTAL AND UNIQUE ORCHID FLOWER IN NAMANGAN CONDITIONS." *World Bulletin of Social Sciences* 17 (2022): 156-164.
- 7) Urmonovich, Numonov Otabek. "MANGOSTEEN NUTRITIONAL PRICE AND FUNCTIONAL PROPERTIES." *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ* 14.5 (2023): 3-5.
- 8) Misirova, S. A. "BIOLOGICAL CHARACTERISTICS OF FUNGAL SPECIES THAT CAUSE DISEASES OF ONION FLOWERS AND MEASURES TO COMBAT THEM." (2022).
- 9) Misirova, S., and M. Haydarova. "Flowers from Nederland are Considered to Develop in the Climatic Conditions of Uzbekistan and Are Identified the types of Fungus." *Annals of the Romanian Society for Cell Biology* (2021): 5922-5929.
- 10) Misirova, S. A., et al. "Determination types of fungi-pathogens of ornamental flower crops in conditions region Namangan." *ISJ Theoretical & Applied Science*, 10 (66) (2018): 185-189.
- 11) Misirova, S. A., M. U. Davlatova, and Sh O. Tuhtaboeva. "Biological Characteristics of Fungal Pathogens of Bulb Flowers and Control Measures." *JournalNX*: 207-214.
- 12) Misirova, S., et al. "Growing Dutch tulips in Namangan region." *Bulletin of Agrarian Science of Uzbekistan* 1 (2021).
- 13) Sabirov, Ravshan Z., et al. "Volume-sensitive anion channels mediate osmosensitive glutathione release from rat thymocytes." *PLoS One* 8.1 (2013): e55646.
- 14) Rashidovna, Melanova Nazira, and Numonov Otabek Urmonovich. "Comparative Characteristics of the Leaving of Glutathione From Cells of Different Types." *International Journal on Orange Technologies* 2.10: 79-82.
- 15) Melanova, N. R., M. U. Davlatova, and O. Numanov. "The Effect of Extracellular Glutathione on the Regulation of Thymocyte Volume in Rats under Conditions of Hypoosmotic Stress." *Annals of the Romanian Society for Cell Biology* (2021): 7032-7038.
- 16) Sabirov, R.Z., Kurbannazarova, R.S., Melanova, N.R. and Okada, Y., 2010, January. Swelling-induced release of glutathione from rat thymocytes. In *JOURNAL OF PHYSIOLOGICAL SCIENCES* (Vol. 60, pp. S13-S13). 1-11-11 KUDAN-KITA, CHIYODA-KU, TOKYO, 102-0073, JAPAN: SPRINGER TOKYO.

- 17) Melanova, Nazira Rashidovna, and Sayyora Abduqahharovna Yulchiyeva. "EFFECT OF EXTRACELLULAR GLUTATHIONE ON COLLOID-OSMOTIC LYSIS OF HUMAN RED BLOOD CELLS." *Scientific and Technical Journal of Namangan Institute of Engineering and Technology* 2.2 (2020): 144-149.
- 18) Choriyeva, Nargiza Mamarajabovna, and Nazira Rashidovna Melanova. "STUDY OF LYSIS OF HUMAN ERYTHROCYTES UPON ADMINISTRATION OF GOSSYPOL, MEGOSIN AND VATRIDEN." *Scientific and Technical Journal of Namangan Institute of Engineering and Technology* 1.9 (2019): 55-58.
- 19) Меланова, Назира Рашидовна. "Сравнительная характеристика выхода глутатиона из различных типов клеток." *Universum: химия и биология* 5 (59) (2019): 9-12.
- 20) Насритдинов, Ахмаджон Абдухамидович, and Хусниддин Тургунбоевич Киргизов. "Агрегат для полосной обработки почвы." *Современные научные исследования и инновации* 12 (2015): 412-416.
- 21) Байбобоев, Набижон Гуломович, et al. "Энергоресурсосберегающий комбинированный агрегат для обработки почвы." *Вестник Рязанского государственного агротехнологического университета им. П.А. Костычева* 3 (23) (2014): 42-44.
- 22) Насритдинов, А. А., and А. В. Рязанов. "Оптимальные условия установки углоснима." *Техника в сельском хозяйстве* 6 (2003): 34-35.
- 23) Насритдинов, Ахмаджон Абдухамидович. "Результаты исследования формы лобовой поверхности стойки чизеля-культиватора." *Universum: технические науки* 1 (58) (2019): 18-20.
- 24) Байбобоев, Набижон Гуломович, and Ахмаджон Насритдинов. "Теоретическое определение перемещение частиц почвы по поверхности углоснима." *Science Time* 6 (18) (2015): 84-89.
- 25) Misirova, S. A., M. U. Davlatova, and Sh O. Tuhtaboeva. "Biological Characteristics of Fungal Pathogens of Bulb Flowers and Control Measures." *JournalNX*: 207-214.
- 26) Шамситдинов, Ф. "Результаты опыта." *Защита и карантин растений* 5 (2003): 27-27.
- 27) Абдуалимов, Ш. Х., and Ф. Р. Шамситдинов. "Влияние применения стимуляторов роста на всхожесть семян, рост, развитие и урожайность хлопчатника в условиях светлых сероземных каменистых почв Наманганской области Республики Узбекистан." *Актуальные проблемы современной науки* 5 (2019): 47-51.
- 28) Абдуалимов, Шухрат Хамадуллаевич, and Фазлиддин Расулович Шамситдинов. "НАМАНГАН ВИЛОЯТИНИНГ ҚИР АДІРЛИ ТОШЛОҚ ЕРЛАРИДА ЯНГИ СТИМУЛЯТОРЛАРНИНГ ҒЎЗА БАҒГ ЮЗАСИ ВА ҲОСИЛДОРЛИГИГА ТАЪСИРИ." *Журнал Биологии и Экологии* 1 (2019).
- 29) Urmonovich N. O. MANGOSTEEN NUTRITIONAL PRICE AND FUNCTIONAL PROPERTIES //ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ. – 2023. – Т. 14. – №. 5. – С. 3-5.
- 30) Rashidovna, Melanova Nazira, and Numonov Otabek Urmonovich. "Comparative Characteristics of the Leaving of Glutathione From Cells of Different Types." *International Journal on Orange Technologies* 2.10: 79-82.
- 31) Abdukhmidovich, Nasritdinov Akhmadzhon, and Numonov Otagak Urmonovich. "The Results of Theoretical Studies of the Chisel Cultivator Rack Frontal Surface Shape." *Annals of the Romanian Society for Cell Biology* (2021): 5930-5938.
- 32) Abdukhmidovich, Nasritdinov Akhmadzhon, Muhabbat Davlatova Urmanovna, and Numonov Otabek Urmonovich. "Strip Till Age of Soil for Deuteric Sowing (Second Crop)." *International Journal on Orange Technologies* 3.4 (2021): 71-74.
- 33) Abduhamidovich N. A. et al. MANGOSTIN DARAXTI VA MEVASINI TIBBIYOTDA FOYDALANISH //Journal of new century innovations. – 2023. – Т. 28. – №. 2. – С. 12-14.
- 34) Melanova, N. R., M. U. Davlatova, and O. Numanov. "The Effect of Extracellular Glutathione on the Regulation of Thymocyte Volume in Rats under Conditions of Hypoosmotic Stress." *Annals of the Romanian Society for Cell Biology* (2021): 7032-7038.
- 35) Рахманов, Дилшод Ортикбаевич, and Муҳаббат Ўрмоновна Давлатова. "ОРГАНОЛЕПТИЧЕСКИХ ОЦЕНКА СВОЙСТВ РЫБ И РЫБНЫХ

- ПРОДУКТОВ." *O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI* 2.14 (2022): 583-585.
- 36) Юсупова, Махпуза Нумановна. "БИОЛОГИЧЕСКИЙ МЕТОД ЗАЩИТЫ РАСТЕНИЙ." *Scientific Impulse* 1.9 (2023): 1460-1464.
- 37) Юсупова, Махпуза Нумановна. "АНОРНИ ЗАРАРКУНАНДАЛАРДАН ҲИМОЯЛАШ." *PEDAGOG* 6.4 (2023): 562-567.
- 38) Юсупова, Махпуза Нумановна. "САБЗАВОТ ЭКИНЛАРИГА БИОЛОГИК КУРАШ ҲАҚИДА МУЛОҲАЗАЛАР." *Scientific Impulse* 1.9 (2023): 1469-1473.
- 39) Юсупова, Махпуза Нумановна. "ФАРҒОНА ВОДИЙСИ ШАРОИТИДА ИГНА БАРГЛИ ДАРАХТЛАРНИ ЗАРАРКУНАНДАЛАРДАН ҲИМОЯЛАШ." *SO 'NGI ILMIY TADQIQOTLAR NAZARIYASI* 6.4 (2023): 316-320.
- 40) O'rmonovna, Davlatova Muhabbat. "MANGOSTIN DARAXTI VA UNING KIMYOVIY XUSUSIYATLARI." *INNOVATION IN THE MODERN EDUCATION SYSTEM* 3.25 (2022): 1-4.
- 41) Юсупова, Махпуза Нумановна. "УФТ: 635 САБЗАВОТ ЭКИНЛАРИГА БИОЛОГИК КУРАШ ҲАҚИДА МУЛОҲАЗАЛАР." *Научный импульс*: 355.
- 42) Qurbonov, I. "Tulip varieties imported from the netherlands technology of cultivation of namangan region. galaxy international interdisciplinary research journal (giirj) issn (E): 2347-6915 Vol. 9." (2021).
- 43) Kurbanov, I. G. "CARE OF TULIP VARIETIES OF THE NETHERLANDS IN THE CLIMATIC CONDITIONS OF THE NAMANGAN REGION." *American Journal of Interdisciplinary Research and Development* 6 (2022): 117-120.
- 44) Qurbonov I. E-RECRUITMENT: SOCIAL MEDIA AND RECRUITING //InterConf. – 2021.
- 45) Qurbonov, Ibragim Sharifjonovich. "CLONELY MICRO-CULTIVATION OF PLANTS AND ITS APPLICATION TO AGRICULTURE." *Scientific and Technical Journal of Namangan Institute of Engineering and Technology* 1.4 (2019): 74-78.
- 46) Юсупова М. Н., Ахмедова М. М. МЕВАЛИ ДАРАХТЛАРНИ ЗАРАРКУНАНДАЛАРИГА УЙҒУНЛАШГАН КУРАШ ЧОРАЛАРИ //ЖУРНАЛ АГРО ПРОЦЕССИНГ. – 2020. – Т. 2. – №. 8.
- 47) Ходжаев, Ш. Т., Сагдуллаев, А. У., Исаев, О. Б., & Юсупова, М. Н. (2011). Проблемы защиты растений в Узбекистане. *Защита и карантин растений*, (8), 23-24. Юсупова М. Особенности защиты хлопчатника посеянного под пленки от вредных организмов //Автореф. канд. дисс./М. Юсупова–Ташкент. – 2001.
- 48) Ходжаев, Ш. Т., Юсупова, М. Н., Курязов, Ш., & Саттаров, Н. (2008). Перспективы биологической защиты хлопчатника от хлопковой совки. *Сб. трудов.-Ташкент: Таллин*, 44-49.
- 49) Yusupova M. N., Nosirov B. Z. Pests of cotton and straw control at collection //EPRA International Journal of Multidisciplinary Research (IJMR)-Peer Reviewed Journal. – 2020. – Т. 6. – №. 12. – С. 57-61.
- 50) Yusupova M. N., Axmedova M. M. Mevali daraxtlarni zararkunandalariga uygunlashgan kurash choralari //Jurnal JURNAL AGRO PROTSESSING. Data publikatsii. – 2020. – №. 8. – С. 12.
- 51) Yusupova M. N. Biological method of crop protection in the fergana valley //Agrarian science. – 2018. – №. 6. – С. 68-70.
- 52) Urmonovich, Numonov Otabek. "MANGOSTEEN NUTRITIONAL PRICE AND FUNCTIONAL PROPERTIES." *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ* 14.5 (2023): 3-5.
- 53) MN, Yusupova, and B. Z. Nosirov. "Control Of Cotton Pests On Stubble Lands." *International Journal of Applied* 10.2 (2015): 99-108.
- 54) Юсупова М. Н., Тургунова А. Н., Очилов С. Н. Система интегрированной защиты растений //Российский электронный научный журнал. – 2015. – №. 1. – С. 169-174.
- 55) Alimzhanova Z. I., Kadyrova D. S., Yusupova M. N. Ceramic pigments based on raw materials from Uzbekistan //Glass and Ceramics. – 2014. – Т. 70. – №. 11-12. – С. 441-443.
- 56) Yusupova M. N., Gapparov A. M. Biological Method Of Plant Protection In Uzbekistan //The American Journal of Agriculture and Biomedical Engineering. – 2020. – Т. 2. – №. 11. – С. 29-32.

- 
- 57) Rashidovna M. N., Urmonovich N. O. Comparative Characteristics of the Leaving of Glutathione From Cells of Different Types //International Journal on Orange Technologies. – Т. 2. – №. 10. – С. 79-82.
- 58) Юсупова М. Н., Носиров Б. З. БИОЛОГИЧЕСКИЙ МЕТОД ЗАЩИТЫ РАСТЕНИЙ В УЗБЕКИСТАНЕ //Научно-практические пути повышения экологической устойчивости и социально-экономическое обеспечение сельскохозяйственного производства. – 2017. – С. 498-501.
- 59) Urmonovich, N. O. (2023). MANGOSTEEN NUTRITIONAL PRICE AND FUNCTIONAL PROPERTIES. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 14(5), 3-5.
- 60) Yusupova M. et al. Protection of after harvest cultures-as a reservetors of cotton pests //Agriculture and Biology Journal of North America. – 2013. – Т. 4. – №. 5. – С. 576-582.
- 61) Ходжаев, Ш. Т., Юсупова, М. Н., Юлдашев, Ф., Исаев, О. Б., & Шокирова, Г. (2011). Борьба с вредителями хлопчатника на пожнивных культурах в севообороте. *Вестник защиты растений*, (2), 46-52.
- 62) Yusupova M. N. et al. Possibilities of the biological method of cotton plant protection //Agriculture and Biology Journal of North America. – 2011. – Т. 2. – №. 5. – С. 742-744.
- 63) Ходжаев, Ш. Т., Юсупова, М. Н., Юлдашев, Ф., & Жамалов, А. Г. (2010). Хлопковая совка на пожнивных культурах. *Защита и карантин растений*, (12), 22-23.
- 64) Хайдарова, Х. А., Юсупова, М. Н., Ихтиярова, Г. А., & Хайдаров, А. А. ПОЛУЧЕНИЕ ХИТОЗАНА ИЗ ПОДМОРА ПЧЕЛ APIS MILLIFERA. *Сучасний рух науки: тези доп. XI міжнародної науково-практичної інтернет-конференції, 8-9 жовтня 2020 р.–Дніпро, 2020.–Т. 2.–426 с.*, 352.
- 65) Yusupova M., Turgunova A., Ochilov S. INTERGRATED PLANT PROTECTION SYSTEMS.