O‘ZBEKISTON RESPUBLIKASI
OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI
MIRZO ULUG‘BEK NOMIDAGI O‘ZBEKISTON MILLIY UNIVERSITETI

GEOGRAFIYA VA GEOAXBOROT TIZIMLARI FAKULTETI
GEODEZIYA VA GEOINFORMATIKA KAFEDRASI

O‘zbekistonda

GEODEZIYA KARTOGRAFIYA VA KADASTR

SOHALARINING HOZIRGI HOLATI VA RIVOJLANISH ISTIQBOLLARI

MAVZUSIDAGI XALQARO
ILMIY-AMALIY KONFERENSIYA

SOHA IFTIXORI KO‘KRAK NISHONI SOHIBI
TEXNIKA FANLARI NOMZODI, DOTSENT
HAMIDXON MUBORAKOVNING 85 YOSHLIK
YUBILEYIGA BAG‘ISHLANADI

Toshkent-2024

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xalqaro ilmiy-amaliy konferensiya

MATERIALLARI

(*Toshkent, 6-7 dekabr 2024 yil*)

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международной научно-практической конференции

СОВРЕМЕННОЕ СОСТОЯНИЕ И ПЕРСПЕКТИВЫ РАЗВИТИЯ СФЕРЫ ГЕОДЕЗИИ, КАРТОГРАФИИ И КАДАСТРА В УЗБЕКИСТАНЕ

(*Ташкент, 6-7 декабря 2024 г.*)

MATERIALS

of the international scientific and practical conference

CURRENT STATE AND DEVELOPMENT PROSPECTS OF THE FIELD OF GEODESY, CARTOGRAPHY AND CADASTRE IN UZBEKISTAN

(*Tashkent, December 6-7, 2024*)

Soha iftixori ko‘krak nishoni sohibi,
texnika fanlari nomzodi, dotsent **Xamidxon Muborakov**ning
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Mazkur Xalqaro ilmiy-amaliy konferensiya O‘zbekiston Respublikasi Prezidentining “Ma’muriy islohotlar doirasida oliy ta’lim, fan va innovatsiyalar sohasida davlat boshqaruvini samarali tashkil qilish chora-tadbirlari to‘g‘risida” 2023-yil 4-iyuldagi PQ-200 qarori 9-bandida belgilangan topshiriq ijrosini o‘z vaqtida va samaralari bajarilishini ta’minlash va O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirining 2024-yil 18-yanvardagi 16-son buyrug‘i ijrosini ta’minlash maqsadida hamda Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti rektorining 2024-yil 8-fevraldagi № 01-43 sonli buyrug‘iga asosan tashkil etildi.

To‘plamda 2024 yil 6-7 dekabr kunlari Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universitetida bo‘lib o‘tgan “O‘zbekistonda geodeziya, kartografiya va kadastr sohalarining hozirgi holati va rivojlanish istiqbollari” mavzusidagi Xalqaro ilmiy-amaliy konferensiya ishtirokchilarining ilmiy maqolalari chop etilgan. Ma’ruzalar mavzulari Geodeziya fani va sohasining muammolari va rivojlanish istiqbollari; Zamonaviy kartografiya va undan samarali foydalanish istiqbollari; GAT va Yerni masofadan zondlash texnologiyalarining imkoniyatlari; Davlat kadastrlari va ularni geodezik-kartografik ta’minlash; Zamonaviy geografiya va geoekologiyaning nazariy-amaliy jihatlari; Gidrologiya va iqlimshunoslikning nazariy-amaliy jihatlarini qamrab olgan.

Konferensiya materiallaridan geodeziya, kartografiya, kadastr, geoinformatika, yer tuzish, geografiya, geoekologiya, gidrologiya, meteorologiya va geologiya sohalaridagi mutaxassislar, ilmiy xodimlar, doktorantlar, mustaqil izlanuvchilar, magistratura va bakalavriatura talabalari, shuningdek, umumta’lim muassasalarining o‘qituvchilari ham foydalanishlari mumkin.

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Raxmonov Dilshod Nurboboyevich – g.f.f.d., (PhD) dotsent, Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi mudiri.

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Bekanov Kuatbay Koshkarbaevich – g.f.f.d. (PhD), Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Kartografiya kafedrasi mudiri

Xakimov Kamoliddin Abdukarimovich – g.f.f.d., (PhD), Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Tabiiy geografiya kafedrasi mudiri.

Oxunov Ziyo Dadojonovich – t.f.n. dotsent, Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi dotsenti

Mirmaxmudov Erkin Raximjanovich – g.f.d. (DSc), Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi v.b. professori

Abdullayev Ilxomjon O‘ktamovich – Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi katta o‘qituvchisi.

Ro‘ziyev Azizjon Savriddinovich – g.f.f.d., (PhD), Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi katta o‘qituvchisi.

Yusupjonov Otabek G‘ayibjonovich – Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geodeziya va geoinformatika kafedrasi doktoranti

Sobirjonov Muhammadkarim Mahmudjon o‘g‘li – Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti Geografiya va geoaxborot tizimlari fakulteti Yoshlar masalalari va ma’naviy ma’rifiy ishlar bo‘yicha dekan muovini.

Khamidjonov Sarvar Kahhor ugli
National Research University "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers",
Assistant at the EcoGIS Center,
Tashkent, Uzbekistan. E-mail: khamidjonov.sarvar@gmail.com
Pulatov Alim Salimovich
National Research University "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers",
Head of the EcoGIS Center,
Tashkent, Uzbekistan. E-mail: alimpulatov@mail.ru
Qi Jiaguo
Michigan State University,
Professor at the Department of Geography, Environment, and Spatial Sciences,
Michigan, USA. E-mail: qi@msu.edu

CONSERVATION AGRICULTURE IN ARID REGIONS: CASE STUDY OF URTACHIRCHIK DISTRICT, UZBEKISTAN

Abstract: *Accurate measurement of crop residue cover is essential for understanding its role in soil conservation and sustainable agriculture. This study focuses on quantifying the percentage of crop residue cover on agricultural fields in Urtachirchik district using field-based methods. A systematic sampling approach was employed to collect data across diverse field conditions. Results revealed that crop residue cover ranged from 3% to 97%, highlighting variations due to differences in crop type, management practices, and field conditions. The findings provide a reliable baseline for evaluating residue management practices and their contribution to conservation agriculture. This study underscores the importance of field-based measurements in monitoring and enhancing soil conservation efforts, particularly in regions adopting conservation agriculture practices.*

Keywords: *conservation agriculture, traditional agriculture, soil, crop residue cover, winter wheat, field-based measurement, a line-transect approach.*

Introduction. Agriculture in the 21st century confronts a myriad of diverse and complex challenges, ranging from urban sprawl to the necessity of sustainable nutrient management, all demanding immediate and innovative responses [1][2]. With the global population expected to surge to 10 billion by 2050 [3], there is an escalating demand for a substantial increase in food production [4]. In addressing the multifaceted agricultural challenges, conservation agriculture (CA) emerges as a strategic approach, advocating for sustainable land management practices that not only safeguard the environment but also support climate change adaptation and mitigation [5][6].

According to the Food and Agriculture Organization [6], CA operates on three core principles that are tailored to meet the specific conditions and requirements of local areas. The principles include minimal mechanical disturbance of the soil, maintaining a permanent organic cover on the soil, and promoting species diversification.

Studies in Uzbekistan's irrigated agricultural lands demonstrate the effectiveness

of CA practices. Research shows that CA techniques such as reduced tillage and residue retention can improve soil health in several ways. They link to decreased soil salinity, increased soil moisture retention [7][8][9], and reduced soil erosion and compaction [10][11].

Crop residue cover (CRC) is the primary physical variable that directly indicates the application of CA practices [12]. Crop residue, encompassing standing dead vegetation, surface plant litter, and residues left after crop harvest, such as corn stalks or soybean stubble, refers to non-photosynthetic vegetation that accumulates on the soil surface of farmlands following harvest completion and crop senescence [12][13][14]. The percentage of CRC on the soil surface is frequently utilized as an indicator of tillage intensity [14].

The amount of residue cover on agricultural fields is mostly assessed using a line-transect method. In the line-transect method, a long cord marked with evenly spaced intervals is stretched diagonally across a field, and observers visually count the instances where the markers touch pieces of crop residue on the ground, providing data for estimating the overall percentage of CRC [15].

The objective of the study is to accurately measure and quantify the percentage of crop residue cover on agricultural fields using field-based method.

Materials and methods

The study area is situated within the fields of the Research Education Center at the “Tashkent Institute of Irrigation and Agricultural Mechanization Engineers” National Research University, located in the Urtachirchik District of Tashkent Province, Uzbekistan, covering 0.05 km² with dimensions of 500 m in length and 100 m in width (Figure 1). The fields are positioned on the right bank of the Karasu River, a tributary of the Akhangaran River. The starting point of the experimental field is positioned at coordinates 41°02'16"N latitude and 69°01'15"E longitude, at an altitude of 355 meters.

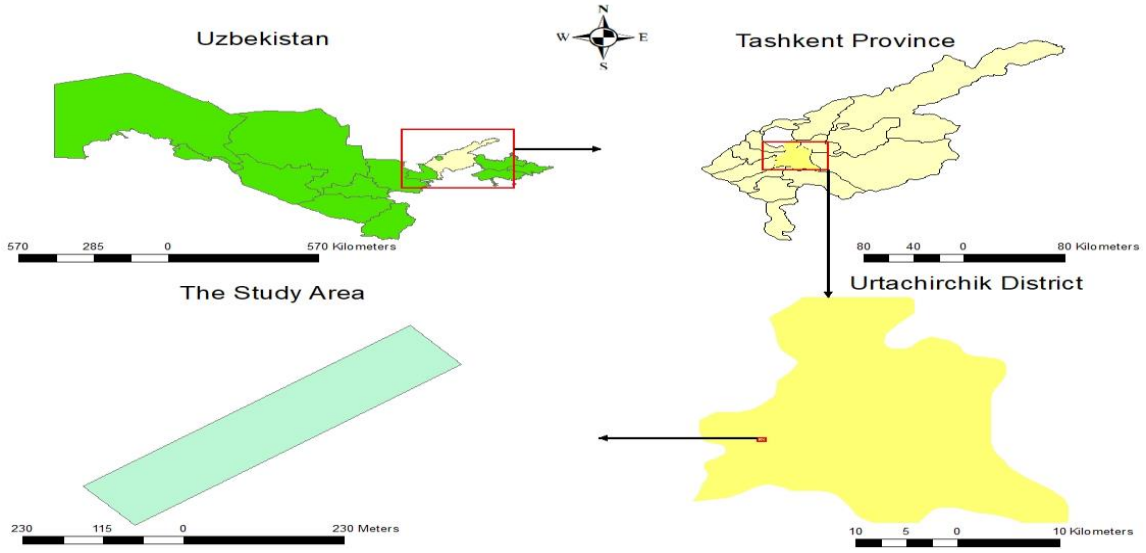

Figure 1. Nested maps illustrating the geographic context of the study area within the Urtachirchik District, Tashkent Province, Uzbekistan

In alignment with national agricultural practices, winter wheat was planted

in the study area in December 2021 using traditional methods, which include tillage. Subsequently, the winter wheat harvest was completed by July 2022, and in August 2022, one month later, the field was replanted with mung bean (Vigna radiata), demonstrating a rapid shift to secondary cropping.

After the winter wheat harvest, the study area was artificially segmented into 72 sub-fields, each measuring 55 m long and 12.5 m wide. Afterwards, winter wheat residue from specific sub-fields was manually cleared and relocated to other sub-fields. Consequently, two distinct groups emerged: one consisting of 40 sub-fields almost completely covered with winter wheat residue and another comprising 32 sub-fields with minimal or no residue, prepared for CA and TA practices, respectively. Mung bean was then sown in the residue-rich sub-fields using CA techniques (i.e., no-tillage), whereas TA methods (i.e., with tillage) were applied to the sub-fields lacking residue.

On 10 August 2022, two days after planting the mung bean in the study area, on-site measurements were taken from 20 sample locations (Figure 2), with management practices ranging from tillage to no-till.

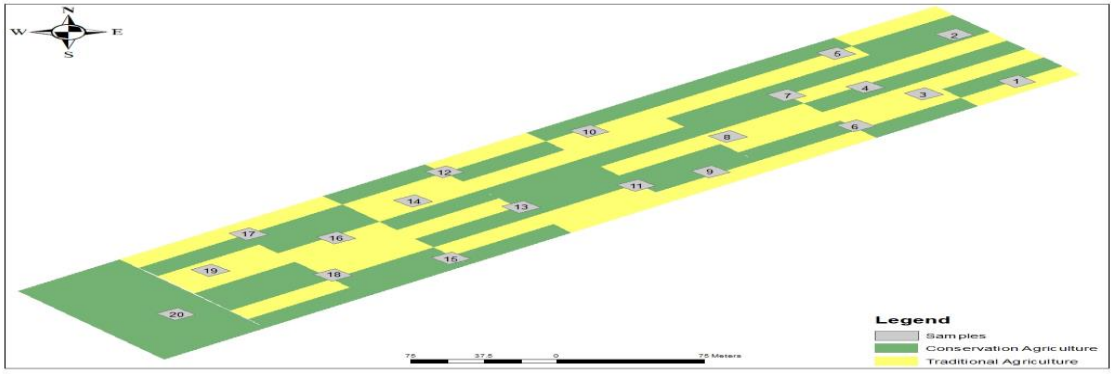

Figure 2. Map of the research field showing 20 sample locations with conservation and traditional sub-fields (Note: Numbering of the sample locations begins corresponding to the starting point of the field)

For each sampling location, CRC was quantified employing the line-transect method as described by [15]. A 15-meter tape marked at 0.3-meter intervals, dividing it into 50 sections, was utilized for measurements. At every sampling site, the tape was laid diagonally across the rows [16], and intersections of crop residue with the marked sections were tallied. The process was repeated on an adjacent diagonal, and the percentage of CRC was determined by averaging the two intersection counts. The central location of the pair of line-transects was recorded using a Garmin global positioning system (GPS) 72 device with a positional accuracy of 5.2 meters.

Results and Discussions

The percentage of residue cover at the selected locations (n=20) varied between 3% and 97% (Figure 3 and Figure 4), predominantly consisting of winter wheat residue, with rice residue present in smaller amounts. The results at sample locations 6 and 17 were identical (both at 6%), while diverse outcomes were observed at the remaining observation sites. Despite endeavors to gather

specimens from diverse sections of the study area, the findings were largely concentrated in two brackets, with seven samples falling within the 0-25% range and eight samples in the 75-100% range. It should be noted that the field experiment was conducted just two days after planting mung bean, resulting in virtually zero green vegetation cover in the research field.

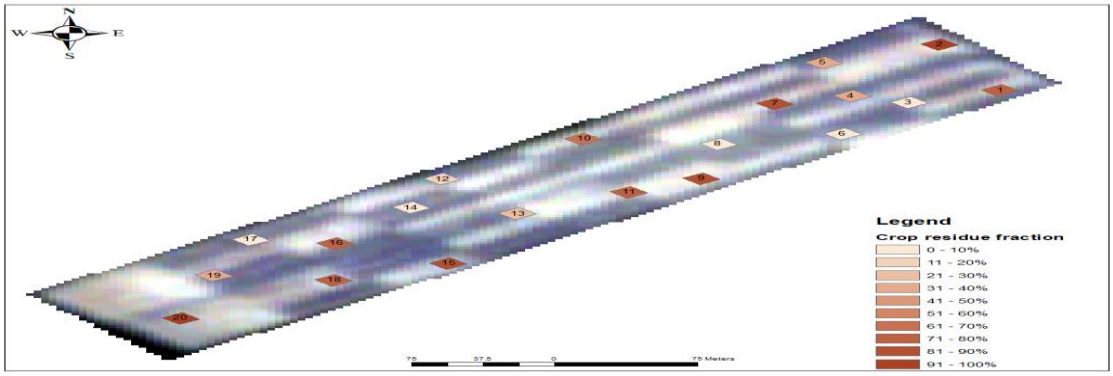

Figure 3. Percentage of residue cover at 20 sample locations in the research area, in the image dated August 10, 2022 (Note: Numbering of the sample locations begins corresponding to the starting point of the field)

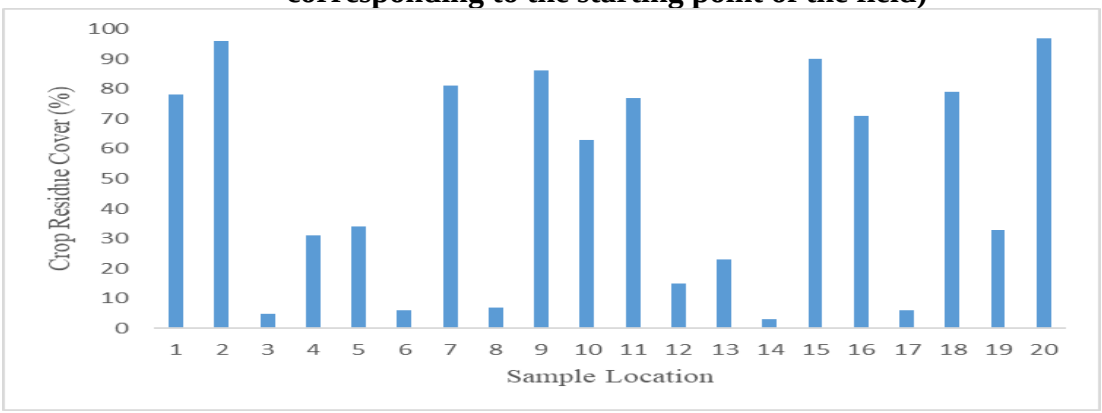

Figure 4. Percentage of residue cover at 20 sample locations in the research area, in the image dated August 10, 2022

Conclusion

This study successfully measured and quantified the percentage of crop residue cover on agricultural fields using field-based methods. The results confirmed that the selected methods were effective and provided reliable data on residue distribution. The study found that crop residue cover ranged between **3%** and **97%** across the sampled fields. These measurements offer a valuable baseline for assessing the implementation of residue management practices and their alignment with conservation agriculture principles. This work highlights the importance of accurate field-based residue cover measurements as a fundamental step in evaluating agricultural management strategies and their impact on soil conservation.

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MUNDARIJA

1-SEKSIYA
GEODEZIYA FANI VA SOHASINING MUAMMOLARI VA RIVOJLANISH ISTIQBOLLARI
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2-SEKSIYA
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