УДК 631.3

EFFECTIVENESS OF IMPLEMENTATION OF PRECISION FARMING SYSTEMS

master's student D. Prykhodko, head by the laboratory of L. Batiuk supervisor Ph.D., associate professor T. Khvorost

Sumy National Agrarian University, Sumy, Ukraine

The integration of precision agriculture systems into machine-tractor units (MTA) and its significant impact on agricultural efficiency, resource use, yield outcomes and sustainability, as well as benefits such as minimization of waste, improved soil health and increased yields, are examined for a wide range of implementation and effective implementation of the necessary challenges, including initial investment costs, interoperability issues, and data security issues.

The integration of precision farming systems into machine-tractor units significantly increases agricultural efficiency by optimizing resource utilization, improving yield outcomes, and fostering sustainable farming practices.

Precision farming systems represent a transformative approach to agricultural management that uses technology to improve efficiency and productivity. In the context of machine-tractor units (MTUs), the introduction of precision farming methods has enormous potential to revolutionize traditional farming methods. It investigates how the integration of precision agriculture systems into MTU can lead to significant improvements in agricultural efficiency, resource use, yield outcomes and sustainability [1].

Understanding Precision Farming Systems Precision farming systems encompass a suite of technologies and practices aimed at optimizing various aspects of agricultural production. These systems typically involve the use of global navigation satellite systems (GNSS), geographic information systems (GIS), remote sensing, and variable rate technology (VRT). By collecting and analyzing data on soil properties, moisture levels, crop health, and other relevant factors, precision farming systems enable farmers to make informed decisions and tailor their actions to specific field conditions.

Integration of Precision Farming Systems into Machine-Tractor Units The integration of precision farming systems into MTUs involves equipping agricultural machinery with advanced sensors, controllers, and actuators. These components enable MTUs to perform tasks with unprecedented accuracy and precision, thereby optimizing the use of inputs such as seeds, fertilizers, and pesticides. Furthermore, by incorporating real-time data monitoring and feedback mechanisms, precision farming systems empower operators to adjust their operations on the fly, responding promptly to changing environmental conditions and optimizing resource allocation [2].

Benefits of Precision Farming in Enhancing Agricultural Efficiency The adoption of precision farming techniques in MTUs offers several key benefits in terms of enhancing agricultural efficiency. Firstly, by precisely targeting inputs based on site-specific conditions, farmers can minimize waste and reduce production costs.

Additionally, precision farming systems facilitate the implementation of conservation practices such as reduced tillage and controlled traffic farming, leading to improvements in soil health and long-term productivity. Moreover, by optimizing planting patterns and crop management strategies, precision farming systems can increase overall yield outcomes, maximizing the potential of agricultural land while minimizing environmental impact.

To illustrate the effectiveness of precision agriculture systems at MTU, we analyzed case studies and examples of successful implementation in different agricultural contexts. These examples highlight the variety of applications for precision agriculture technology, from optimizing irrigation scheduling to improving weed control practices. By demonstrating real-world experiences and results, this chapter aims to demonstrate the tangible benefits that farmers can gain from implementing precision farming systems at MTU.

In summary, the integration of precision agriculture systems into machine-tractor units represents a paradigm shift in modern agriculture, offering unprecedented opportunities for increased efficiency, productivity and sustainability. By leveraging data-driven decision-making capabilities and advanced technology, farmers can optimize their operations and achieve better results while minimizing environmental impact. As the agricultural sector continues to evolve, the widespread adoption of precision agriculture systems at MTU will play a critical role in shaping the future of agriculture around the world.

Challenges and Considerations in Implementing Precision Farming Systems [3].

Despite the numerous benefits associated with precision farming systems in MTUs, there are several challenges and considerations that farmers must address during implementation. Firstly, the initial investment costs associated with acquiring and installing precision farming technology can be significant, particularly for small-scale or resource-constrained operations. Additionally, farmers may require training and technical support to effectively utilize these systems, highlighting the importance of knowledge transfer and capacity-building initiatives.

Moreover, interoperability and data management present significant challenges in the integration of precision farming systems into MTUs. Different manufacturers may use proprietary technologies and data formats, complicating the seamless exchange of information between equipment and software platforms. Standardization efforts and data sharing agreements are essential to overcome these interoperability barriers and maximize the utility of precision farming systems across diverse agricultural settings.

Furthermore, concerns regarding data privacy and cybersecurity must be addressed to ensure the integrity and confidentiality of sensitive agricultural information. As precision farming systems collect and analyze vast amounts of data, including geospatial data and crop performance metrics, safeguarding against unauthorized access and data breaches is paramount. Robust cybersecurity protocols and data protection measures are necessary to instill confidence among farmers and stakeholders in the reliability and security of precision farming systems.

Conclusion:

In conclusion, the integration of precision farming systems into machine-tractor units offers a pathway towards achieving greater efficiency, productivity, and sustainability in agriculture. While challenges such as cost, interoperability, and data security remain, ongoing advancements in technology and concerted efforts in research and development are paving the way for broader adoption and impact. By embracing precision farming techniques and leveraging the power of data-driven decision-making, farmers can unlock new opportunities to optimize resource utilization, improve yield outcomes, and mitigate environmental impact in the face of evolving agricultural challenges.

Список використаних джерел

1. Система точного землеробства: Навч. Посібник / [Л.В. Аніскевич, М.О. Свірень, М.М. Коваленко та ін.]. Кропивницький: Лисенко В.Ф. 2016. 104 с.

2. Smart Farming: Internet of Things (IoT)-Based Sustainable Agriculture/ Muthumanickam Dhanaraju, Poongodi Chenniappan, Kumaraperumal Ramalingam/Agriculture 2022, 12, 1745. https://doi.org/10.3390/agriculture12101745

3. Internet of Things Applications in Precision Agriculture: A Review/N. S. Abu, W. M. Bukhari, C. H. Ong, A. M. Kassim, T. A. Izzuddin, M. N. Sukhaimie, M. A. Norasikin, A. F. A. Rasid//Journal of Robotics and Control (JRC) Volume 3, Issue 3, May 2022 ISSN: 2715-5072, DOI: 10.18196/jrc.v3i3.14159.

УДК 631.331

ДО ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ВИКОРИСТАННЯ МЕХАНІЗМУ ПРИВОДУ ВИСІВНИХ АПАРАТІВ ЗЕРНОТУКОВОЇ СІВАЛКИ СЗ

Кириченко Р.В. к.т.н., доцент, Лубченко Є.В. Лубченко О.В. здобувачі ВО ступеня доктора філософії, Кириченко О.А. інженер

Державний біотехнологічний університет
Харківський державний професійно-педагогічний фаховий
коледж імені В.І. Вернадського

У роботі наведено модернізація механізму привода котушкових висівних апаратів зернотукової сівалки СЗ, що забезпечить більш стійку та надійну сівбу насіння у широкому діапазоні норм висіву.

У загальному комплексі технологічних операцій та прийомів при вирощуванні зернових культур дуже важливе значення має посів. Наукою та практикою встановлено, що врожай сільськогосподарських культур на 25...30 % залежить від якості виконання посіву.

Основною метою посіву є створення оптимальних умов для проростання насіння та подальшого розвитку рослин, що визначається оптимальним поєднанням трьох факторів: водного, повітряного та теплового. Найбільш сприятливі умови для цього виникають, коли насіння рівномірно розподілене на площі поля на оптимальну глибину, покладене на щільний шар ґрунту і прикрите пухким шаром ґрунту дрібнокомкуватої структури. Будь-яке відхилення від цих