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PLANTING EQUIPMENT OF PLANTING MACHINES

Abstract. The technological evolution of planting machines has significantly improved agricultural productivity by enhancing planting precision and efficiency. This paper explores the components and mechanisms of planting equipment used in planting machines, focusing on their design, functionality, and applications. Key findings include advancements in metering devices, seed placement technologies, and automation, which collectively address challenges such as soil variation and crop-specific requirements.

Keywords: Planting machines, seed metering, soil interaction tools, automation, precision agriculture, GPS-based guidance, variable rate technology (VRT).

EKIN EKISH MASHINALARINING EKISH APPARATLARI

Abstrakt. Ekish mashinalarining texnologik evolyutsiyasi ekish aniqligi va samaradorligini oshirish orqali qishloq xo'jaligi samaradorligini sezilarli darajada oshirdi. Ushbu maqolada ekish mashinalarida ishlatiladigan ekish uskunalarning tarkibiy qismlari va mexanizmlari o'rganilib, ularning dizayni, funktsionalligi va qo'llanilishiga e'tibor qaratiladi. Asosiy topilmalar tuproqning o'zgarishi va ekinlarga xos talablar kabi muammolarni birgalikda hal qiladigan o'lchash asboblari, urug'larni joylashtirish texnologiyalari va avtomatlashtirish sohasidagi yutuqlarni o'z ichiga oladi.

Kalit so'zlar: Ekish mashinalari, urug'larni o'lchash, tuproqning o'zaro ta'siri, avtomatlashtirish, aniq qishloq xo'jaligi, GPS-ga asoslangan yo'riqnoma, o'zgaruvchan tezlik texnologiyasi (VRT).

ПОСАДОЧНЫЙ АППАРАТ РАСТИТЕЛЬНЫХ МАШИН

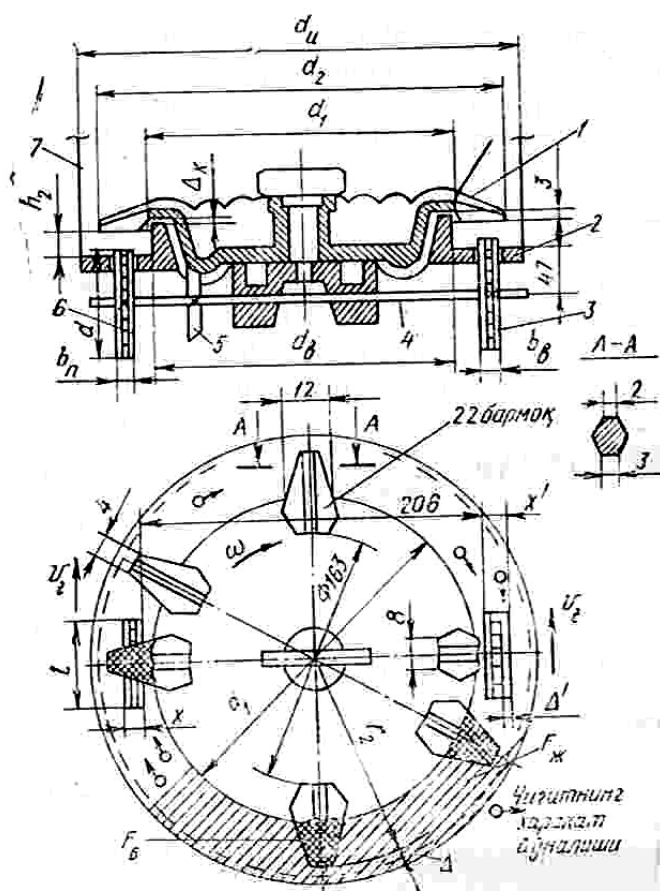
Абстрактный. Технологическая эволюция сеялок значительно увеличила производительность сельского хозяйства за счет повышения точности и эффективности посева. В данной статье рассматриваются компоненты и механизмы посадочного оборудования, используемого в сеялках, с акцентом на их конструкцию, функциональность и применение. Ключевые выводы включают достижения в области измерительных приборов, технологий посева семян и автоматизации, которые совместно решают такие проблемы, как изменчивость почвы и требования к конкретным культурам.

Ключевые слова: сеялки, дозирование семян, взаимодействие с почвой, автоматизация, точное земледелие, наведение на основе GPS, технология переменной нормы внесения (VRT).

Introduction. Planting machines have transformed modern agriculture by automating seed sowing processes. These machines are integral to achieving uniform seed placement, optimal depth, and consistent spacing, factors critical to maximizing crop yields. The development of planting equipment involves integrating mechanical, hydraulic, and electronic systems to cater to diverse agricultural needs. This study aims to investigate the key components of planting equipment, their functions, and recent technological advancements.

Methods. A comprehensive review of the literature and technical specifications was conducted to analyze the components of planting equipment. The study focused on three primary areas: (1) seed metering mechanisms, (2) soil interaction tools, and (3) advanced control systems. Data were collected from academic journals, manufacturer documentation, and field case studies. Analytical methods included comparative assessments of different designs and evaluation of performance metrics such as seed placement accuracy and machine adaptability.

Results. The study identified three core components critical to planting equipment:



1. Seed Metering Mechanisms: Metering devices, such as plate, vacuum, and pneumatic systems, are crucial for precise seed delivery. Among these, vacuum metering has gained popularity due to its high accuracy in handling seeds of varying sizes.

2. Soil Interaction Tools: These include furrow openers, seed tubes, and press wheels. Furrow openers are categorized into disc, chisel, and hoe types, each suited for specific soil

conditions. Seed tubes ensure gentle seed delivery, while press wheels maintain seed-to-soil contact.

3. Control and Automation Systems: Modern planting machines incorporate GPS-based guidance, variable rate technology (VRT), and sensors to optimize planting operations. These systems enhance efficiency by adjusting planting parameters in real-time based on soil and environmental conditions.

Discussion. Advancements in planting equipment address several challenges in agriculture. For example, the adoption of pneumatic metering systems minimizes seed wastage and improves uniformity. Soil-specific furrow openers enhance adaptability, enabling machines to function effectively across varying soil types. Additionally, automation technologies reduce labor dependency and allow for precision farming practices, thus improving productivity and sustainability.

However, challenges remain, including high equipment costs and the need for operator training. Future research should focus on cost-effective solutions, integrating artificial intelligence for predictive maintenance, and developing universal planting equipment adaptable to multiple crops and soil conditions.

Conclusion. Planting equipment forms the backbone of planting machines, driving agricultural efficiency and productivity. Continuous innovations in metering systems, soil interaction tools, and automation technologies are essential for meeting the growing demands of modern agriculture. The integration of these technologies holds the potential to revolutionize farming practices, ensuring food security and sustainable resource use.

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