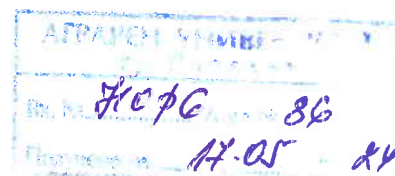


REVIEW



on a dissertation paper for acquiring PhD educational and scientific degree in: field of higher education 5. Technical sciences, professional area 5.13 General engineering.

Author of the dissertation: eng. Ilian Bozhidarov Bozhkov, PhD student of individual training at the "Mechanization of Agriculture" department at the Agricultural University – Plovdiv.

Dissertation topic: STEPLESS ADJUSTMENT OF THE SOWING RATE IN A SAXONIA A200 ROW DRILL

Reviewer: Assoc. prof. Eng. Manol Angelov Dallev, PhD, Agricultural University - Plovdiv, higher education area 5. Technical sciences, professional direction 5.13 General engineering.

Appointed as a member on the scientific jury by order No. RD-16-366/12.03.2024 by the Rector of AU-Plovdiv.

1. Brief introduction of the candidate.

M.Sc Eng. Ilian Bozhidarov Bozhkov was born on April 28, 1980. He completed his higher education at the Agricultural University - Plovdiv - in 2007 with a bachelor's degree in Agronomy (Viticulture and Horticulture), in 2008 with a master's degree in Viticulture and Winery, in 2011 with a master's degree in Agricultural Technology. He has 23 years of work experience in the field of technical inspections of motor vehicles and control and registration of motor vehicles. He speaks Russian and French.

2. Relevance of the problem.

Cereal production is a major industry in our country. For this reason, new production technologies aimed at achieving higher yields with minimal labor inputs are increasingly appearing and being implemented. A basic technological operation in all production technologies is sowing. The quality of sowing has an impact, both on the development of plants, and directly on the economic evaluation of the technology. The implementation in practice of new technological solutions and the adaptation of existing machines, to increase their quality of work, I believe is an actual problem.

3. Purpose, tasks, hypotheses and research methods.

The aim of the research is to develop a system for stepless regulation of the sowing rate for seeders for crops with "fused surface"

In order to achieve the set goal, it is necessary to solve the following tasks:

1. Determination of the theoretical bases for stepless regulation and

- maintenance of the sowing rate for wheat under variable working conditions;
2. Determining the necessary power to drive the sowing devices of the Saxonia A200 seeder;
 3. Determination of the sown quantity of wheat seeds for one revolution of a toothed (pin) sowing device;
 4. Determination of the functional relationship between the transmission number in the transmission mechanism, the density of seeds and the quantity of sown seeds;
 5. Development of a version of an electronic system for managing the sowing rate for the Saxonia A200 row drill;
 6. Determining the reduced operating costs depending on the transmission mechanism (mechanical or electronic) used in the row drill when sowing cereals with a "fused surface".

The object of the research is the design features of the different types of sowing devices, their technological indicators, transmission and regulation mechanisms in the row drills, which have an impact on the sowing rate and the quality of sowing.

The subject of the study are:

1. Relationship between the rotation speed of the sowing device and the amount of seeds sown;
2. Influence of the physic-mechanical parameters of the seeds (in particular, their density) on the amount sown for one revolution of a toothed seeder;
3. The components for building an electronic system for monitoring and managing the sowing rate when row drills work;
4. Economic indicators when working with an electronic control system and comparison with those for classical regulation of the sowing rate.

4. Transparency and presentation of the obtained results.

The dissertation is located on 115 typewritten pages and contains the necessary chapters and sections for such a thesis, as well as 6 nos. applications. It is illustrated with 11 figures and 15 tables.

5. Discussion of results and used literature.

In the fourth chapter of the dissertation, the doctoral student presented the results obtained from the experimental studies. He determined the power required to drive the sowing devices of the Saxonia A200 planter, the amount (volume) of seeds sown in one revolution of a toothed (pin) sowing device, the functional relationship between the transmission ratio in the transmission mechanism, the density of the seeds and the amount of seeds sown, the reduced operating costs depending on the transmission mechanism used in the row drill (mechanical or electronic) when sowing cereals with a "fused surface"

The data were processed with a software product - Statistica. 112 pcs were used. literary sources, of which 80 nos. are in Cyrillic, 17 pcs. in Latin and 15 pcs. electronic sites.

6. Contributions of the dissertation work.

The most significant contributions achieved in the dissertation work are the following:

Scientific and theoretical contributions

1. The transmission function in a mechatronic system controlling and supporting the process of sowing seeds in the Saxonía A200 planter was theoretically determined.
2. The functional relationship between seed density, transmission ratio and the amount of sown seeds was established.

Scientific and applied contributions

1. 2 versions of a mechatronic system for controlling the sowing rate have been developed - with a DC and an AC motor.
2. The amount of wheat seeds sown in 1 revolution of the toothed (pin) sowing device of the Saxonía A200 seeder was determined – 30.067 g.

7. Critical Notes and Questions.

Regarding the dissertation, I have the following remarks:

1. In my opinion, the introduction should be more targeted.
2. The distribution in percentages is as follows - 44.6% overview, 31.5% methodology, and experimental studies are only 20.7%. In your future scientific activity, it is good to change these %, reducing the overview to 25% at the expense of the results.
3. It would be good to have research done with the proposed variants of mechatronic systems.
4. Both in the abstract and in the dissertation there are quite a few spelling mistakes, and not everywhere the SI system of units of measurement is used.
5. It is proper to cite the photos and figures that are not the personal work of the doctoral student, as otherwise it may be considered plagiarism.

I have the following questions for the PhD student:

1. How does the quality of work of the tested planter improve?
2. Since the motor is coupled directly to the shaft of the seeder, what is the point of examining the transmission ratios of the reducer?
8. Published articles and citations.
5 pcs are presented. publications, with which the doctoral student meets and even exceeds the minimum requirements. Citations not provided.
The presented abstract reflects objectively the structure and content of the dissertation work.

CONCLUSION:

Based on the various research methods learned and applied by the doctoral

student, the summaries and conclusions made, I believe that the presented dissertation meets the requirements of the Law on Development of the Academic Staff in the Regulations of the Agricultural University on its implementation, which gives me grounds to assess it POSITIVELY.

I allow myself to propose to the honorable Scientific Jury to vote according to conscience and according to the presentation of the doctoral student!

17.05.2024
Plovdiv

REVIEWER:
(Assoc. prof. Eng. Manol Dallev, PhD)