

Operational studies of a machine-tractor unit for spring pre-seeding soil tillage

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GOAL OF THE STUDY

The purpose of this study is to present the methodology for conducting an operational assessment of the newly assembled machine-tractor unit comprising the John Deere 8R280 tractor and the System-Korund 900 L MARA pre-sowing cultivator, model Korund 8 and to analyze the results obtained for its key operational indicators under specific soil and terrain conditions..

METHODOLOGY OF THE INVESTIGATION

The study used a method of timed observations and control shifts, approved by standard methodology in the Republic of Bulgaria.

MAIN RESULTS FROM THE STUDY

The data presented in Table 1 demonstrate that the tested soil protection machine-tractor unit, comprising the John Deere 8R280 tractor and the Lemken combined tillage cultivator, model Korund 8.900 Fig.2., performs effectively under specified agrotechnical conditions and typical soil, climatic, and terrain parameters. During spring pre-sowing soil cultivation at a working depth of 0.12–0.15 m and an operational speed of 9.0 km.h⁻¹, the unit achieves a satisfactory productivity of 60.70 da.h⁻¹ for one hour of total operational time.



Fig. 1. Cultivator "Lemken", model "Korund 8.900"

Fig. 2. John Deere 8R280 machine-tractor unit and "Lemken" cultivator, model "Korund 8.900"

Table 1. PERFORMANCE INDICATORS OF THE MACHINE-TRACTOR UNIT FOR CHECKERBOARD SOWING USING THE "DELTA ROW" TECHNOLOGY, WITH A MACHINE-TRACTOR UNIT – A "NEW HOLLAND T6.165" TRACTOR AND AN "AZURIT 10.8K" STAGGERED SOWING SEEDER

No	Indicators	Designations	Values
1	Technological reliability coefficient	K ₄₁	1.0
2	Technical reliability coefficient	K ₄₂	0.99
3	Productivity for 1 hour of operating time, da.h ⁻¹	W ₀₂	67.50
4	Productivity for 1 hour of operating time, da.h ⁻¹	W ₀₇	60.70
5	Fuel consumption, kg da ⁻¹	Hr	0.790

PLACE OF THE EXPERIMENTS

The operational studies were carried out using a standardized and approved methodology developed in Bulgaria. They were conducted during the period April 10-12, 2024, in the land of the town of Kubrat, Razgrad district, on flat areas - on plowed fields designated for the sowing of trench crops. The soil in the study area is classified as carbonate chernozem, characterized by high natural fertility, good structure, and moisture-retaining capacity. The location of the work area is indicated in the image (Fig 3), with coordinates 43.806902° N, 26.458568° E.

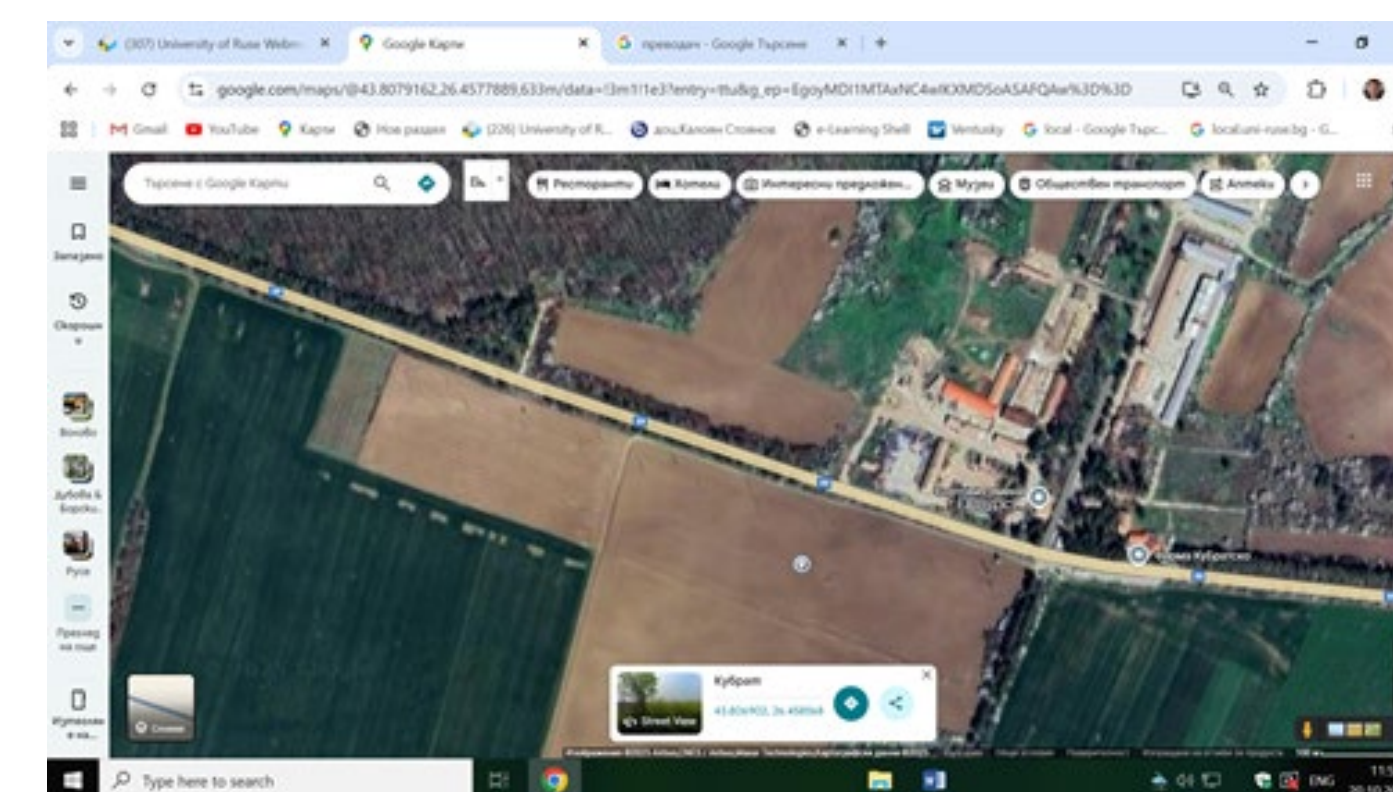


Fig. 3. Image of the working area of the experiment

CONCLUSIONS

Based on the conducted operational studies, it can be concluded that the machine-tractor unit used in the Republic of Bulgaria—consisting of the "John Deere 8R280" tractor and the System-Korund 900 L MARA pre-sowing soil cultivator, model "Korund 8" performs integrated soil cultivation before sowing trench crops reliably and ensures the timely completion of the relevant technological operation. The unit achieves a normal operational productivity of 60.70 da.h⁻¹ at a working speed of 9.0 km.h⁻¹. The coefficients of technological and technical reliability range from 1.0 to 0.99, with a fuel consumption of 0.790 kg.da⁻¹ under carbonate chernozem soil conditions.

The results obtained from this study, their analysis and the conclusion made in the conclusion can be used in future comparative experiments with similar machine-tractor units for tillage in fused cultivation.

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