# DETERMINING THE POWER REQUIRED FOR THE NORMAL OPERATION OF THE MACHINE-TRACTOR AGGREGATE FOR SOIL PROCESSING BEFORE SOWING

***Sobirov Rasulbek Vokhobovich - Senior Lecturer***
*Andijan State Technical Institute, Andijan, Republic of Uzbekistan*

***Kasimov Karimjon Zukhriddinovich - Doctor of Technical Sciences***
*Andijan State Technical Institute, Andijan, Republic of Uzbekistan*

***Abstract****. This article examines the determination of the power required for the normal operation of a machine-tractor unit for pre-sowing soil cultivation. The relationship between the traction capabilities of a tractor, the traction resistance of agricultural machinery, the operating speed range, and the coverage width during the formation of a machine-tractor unit has been analyzed. When selecting the unit composition, special attention is paid to the efficient use of tractor power, increasing productivity, and reducing fuel consumption. Methods for determining the maximum coverage width and the number of machines in the unit for non-plowing units are presented. The research results serve to substantiate the optimal composition of machine and tractor units and to increase their operational efficiency.*

***Key words:*** *machine-tractor unit, tractor power, traction force, range, specific traction resistance, operating speed, unit composition, productivity, fuel consumption, operational efficiency, soil cultivation, agrotechnical requirements.*

Creating an MTA means determining how many and what kind of machines and tools should be attached to a given tractor, and if necessary, what type of coupling should be used and what gear should be used. A correctly constructed unit must meet agrotechnical requirements and ensure high quality of the work performed; it must be convenient for maintenance and safe in operation. The tractor must be loaded in such a way as to ensure maximum productivity and minimum fuel consumption, which can be fully achieved by loading the engine.

The most optimal values for the utilization of tractor traction power are the nominal values of 0.92–0.96 specified in the average traction characteristics and technical specifications. This achieves maximum performance and minimum fuel consumption,

If the composition of the unit depends only on the traction force of the tractor (in the given soil conditions), then optimal loading of the tractor can be achieved by selecting an appropriate number of machine tools.

The selection of types and grades of agricultural machinery for the unit is carried out based on agrotechnical requirements, which depend on the convenience of maintaining the unit, as well as the conditions for ensuring maximum productivity with minimal labor and financial costs.

It is very important to establish the correct relationship between the tractor's traction capabilities, on the one hand, the unit's coverage width, and its movement speed, and on the other hand, to utilize the tractor's power more fully to achieve maximum unit productivity.

Reference literature on agricultural machinery provides technical data and design characteristics of the machines, as well as recommended operating speeds and tractor makes for which it is advisable to aggregate this machine.

According to available sources, permissible technological limits for movement speed are established when performing a given task. At the same time, it is necessary to take into account the speed limits that arise in accordance with the design of agricultural machinery and tools.

$N_1 = N_{1max}$Based on traction characteristics and within operating speed limits, the tractor's working gears and their corresponding traction forces $P_t$ are determined.

The calculation of the machine-tractor unit composition is performed in the following sequence.

The maximum allowable coverage width for non-plowing units is determined by the formula:

$$B_{max} = \frac{P_T - P_a}{k + g_m \cdot \sin\alpha + g_{ss} \cdot (f_{ss} + \sin\alpha)}, \quad (1)$$

$P_a = G \cdot sin\alpha$where $k$ is the specific tractive resistance of the machines, *kN/m; gm, gss* - weight of the machine and trailer per meter of grip width, kN/m, $\alpha$ - field slope angle, degrees; *fss*- is the rolling resistance coefficient of the trailer, *Pt* is the traction resistance force by, which is selected based on the traction properties of the tractor and takes into account the operating speed range. </20><21>P</21><22>α </22><23>- the resistance force caused by the field slope angle, determined by the formula.</23>

The type and make of the machine are selected. Then, the maximum possible number of machines in the unit is determined:

$$n_{kmax} = \frac{B_{max}}{b_k}, \quad (2)$$

where $b_k$ is the design width of the machine, m.

$n_m \leq n_{m\,max}$, The actual number of machines in a machine-tractor unit $\boldsymbol{n_m}$ is selected from the following condition.

To prevent the tractor from operating in overload mode, fractional quantities are rounded to the nearest whole number.

**Conclusion.** The effective operation of a machine-tractor unit for pre-sowing soil cultivation depends on the correct selection of the unit composition and the rational use of tractor power. Research indicates that when forming the unit composition, it is crucial to consider the correlation between the traction force of the tractor, the working speed, the specific traction resistance of the machines, and the coverage width. Using the proposed calculation methods, it is possible to determine the maximum coverage width of the unit and the number of machines, optimize the tractor load, and prevent overloading. As a result, productivity increases, fuel consumption decreases, and high-quality fulfillment of agrotechnical requirements is ensured. Therefore, the scientifically grounded selection of machine and tractor unit parameters is one of the important factors in increasing the technical and economic efficiency of agricultural production.

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