

Chapter 1

Improvement of Traction and Coupling Properties of the Small Class Tractor for Grain Crop Sowing by Means of the Hydropneumatic Damping Device

Sergey Evgenevich Senkevich

 <https://orcid.org/0000-0001-6354-7220>

*Federal Scientific Agroengineering Center VIM,
Russia*

Pavel Vladimirovich Lavrukhin

Don State Agrarian University, Russia

Anna Aleksandrovna Senkevich

Don State Agrarian University, Russia

Pavel Aleksandrovich Ivanov

Don State Agrarian University, Russia

Nikolay Viktorovich Sergeev

Don State Agrarian University, Russia

ABSTRACT

Sowing is one of the main operations in the technological complex of cultivation of cereals. Only with high quality seed distribution along the length and depth of the row can the maximum productivity and yield be achieved. A tractor with a seeding machine is subjected to continuously changing external influences that have a negative impact on the performance indicators of the technological operation. Based on the cereal cultivation technology, it is necessary to use tractors with transmissions that can absorb the oscillations and increase the stability of the coulter group of the seeding machine. Since this improves the quality of the operation, reduces the consumption of spent seed and fuel and increases environmental component of the process.

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INTRODUCTION

The growth of the world population and the related increase in demand for food poses new challenges for agricultural production. One of these challenges is the intensification of agricultural production worldwide. The solution to this problem requires the use of new techniques and new technologies for the cultivation of crops.

Sowing is one of the main operations in the technological complex of measures for the cultivation of grain. Only at high quality of distribution of seeds on length and depth of a row the maximum productivity can be received. The tractor with the seeder (sowing machine-tractor unit) is exposed to continuously changing external influences, which have a negative impact on the performance of the technological operation.

Based on the technology of grain cultivation, for sowing it is necessary to use a tractor with transmissions that can absorb fluctuations and increase the stability of the coulters group. This improves the quality of the operation, reduces the consumption of spent seed, and fuel, improves the environmental component of the process.

The efficient functioning of the sowing machine and tractor unit you can improve due to installation in the transmission of the tractor is a hydro-pneumatic damping device with a variable moment of inertia. This device reduces the fluctuations of the external traction load transmitted to the engine, stabilizes the work of the coulters group of the trailed seeder, and reduces the vibration load of the power transmission.

Studies conducted on an experimental sample of the tractor showed that to improve the efficiency of the technological operation-sowing, it is possible by increasing the efficiency of the sowing machine-tractor unit on the basis of a tractor of class 1.4, by introducing a hydro-pneumatic damper into the transmission. The analysis shows that the use of a hydro-pneumatic damping device in the transmission of a tractor of small traction class is an effective constructive measure that improves the output of the unit and improves the sowing operation.

BACKGROUND

Effect of Transmission Elasticity on the Functioning of Machine-Tractor Units (MTU)

In mobile agricultural units, the variability of external factors in the interaction of working bodies of machines with the processed environment (soil, plants) and movers with the field surface determines the complex nature of the movement of individual points, which characterizes to a large extent the quality of a number of operations (plowing, sowing, etc.) (Lurie, 1981).).

The continuous and random nature of changes in external influences causes fluctuations in the load regime, both by tractor traction and torque on the motor shaft (Ageev, 1978). As noted by L. E. Ageev, due to the random nature of the effects, the output parameters and performance of the units can be considered as random functions or random sequences. As a result, it is necessary to apply empirical models based on the theory of experiment planning. The author gives the model and laws of distribution of operational and technological input parameters of various agricultural units. However, we are only interested in the sowing unit.

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