

COMPARATIVE EXPERIMENTAL RESEARCH ON THE QUALITY OF THE WORK OF THE COMBINED EQUIPMENT FOR SHREDDING AND INCORPORATING VEGETABLE RESIDUES COMPARED TO THE AGGREGATE SHREDDER OF VEGETABLE RESIDUES WITH THE U650 TRACTOR

Florin STOIAN¹, Paul MITRACHE¹

*(1) University of Craiova, 19 Libertății street, Craiova, Romania
author email: florin.stoian2018@yahoo.com*

Corresponding author email: florin.stoian2018@yahoo.com

Abstract

In practice, the operation of destroying plant residues is carried out separately, in general the equipment is mounted on the back of the tractor. Equipment for destroying plant residues such as cutters, platforms with rotors, shredders, etc. is known. which works in aggregate with the tractor. The disadvantages of these equipments consist in the fact that they work independently and only carry out the operation of destroying plant remains and leaving them on the ground, in the technology being the additional passage on the same land for incorporation, which involves fuel consumption, pollution. ground subsidence etc.

The combined equipment for shredding and incorporating plant residues eliminates these disadvantages, mainly because the operations are performed in a single pass.

The advantage of using this mechanism consists in facilitating operations and increasing productivity with reduced time and fuel costs, at the same time meeting environmental protection requirements by reducing land subsidence and noxes produced by double tillage.

Another advantage consists in avoiding the accumulation of plant debris in front of the active organs of the plow and removing it from the furrow, in case the unshredded material would remain on the ground.

Key words: *plant residues, equipment, tractor*

INTRODUCTION

With each harvest, important quantities of nutrients are extracted from the soil, which should be compensated by the application of fertilizers. Recently, less and less fertilizers have been applied, which is why a good part of the country's arable land has come to have a humus content below 2%.

The productive capacity of the soil depreciates continuously as a result of the reduction and depletion of its support represented by organic matter. Through it, the nutrients necessary for the plants are supplied and the humus synthesis is mediated.

Maintaining and increasing soil fertility is conditioned, first of all, by the quantity and

quality of organic matter existing in the soil. This can come from the application of organic fertilizers (manure, compost, etc.), but the most accessible to the farmer and at the lowest cost are plant residues. Apart from roots and stubble, which total about 1.5-2 t/ha of dry matter, another 2-3 t of straw, 2 t of sunflower stalks, 5-6 t of corn stalks, etc. are added.

Therefore, it would be ideal to give up the idea of collecting plant residues and freeing the land and especially removing them by burning.

A part of the well-shredded and homogenized plant residues with the soil can remain on the thickness of the germinal bed, having a beneficial production role both on the soil and on the young plants.

The combined equipment for shredding and incorporating vegetable residues refers to a combined equipment consisting of a drum with elements for shredding vegetable residues mounted in front of a plow arranged normally on the lifter at the back of the tractor, intended for the respective shredding/crushing of the total incorporation of plant material into the soil through the operation of plowing in a single pass.

In the state of the art, the operation of destroying plant remains is carried out separately, in general the equipment is mounted on the back of the tractor. We know equipment for destroying plant residues such as cutters, platforms with rotors, etc., which work together with the tractor.

The disadvantages of these equipments consist in the fact that they work independently and perform only the operation of destroying plant remains and leaving them on the ground, in the technology being necessary the additional passage on the same land for incorporation, which involves fuel consumption, pollution, soil settlement, etc. .

The technical problem that the combined equipment for shredding and incorporating plant residues solves is the coupling or combination of two pieces of equipment, one to shred and the other to be incorporated by ploughing, mounted on the rear hydraulic lift of a tractor with which in a single pass more easier and more efficient operations of shredding and incorporation of plant residues,

The combined equipment for shredding and incorporating plant residues eliminates the disadvantages in that the operations are performed in a single pass. The advantage of using this mechanism consists in facilitating the operations and increasing the productivity with reduced costs of time, fuel and also fulfilling the environmental protection requirements by reducing land subsidence and damages.

MATERIALS AND METHODS

In the following, an example of the realization of the combined equipment for small things and incorporated vegetable remains is given in connection with figures 1 and 2 which represent:

Fig. 1. The combined equipment for shredding and incorporating plant residues - general assembly in aggregate with the tractor

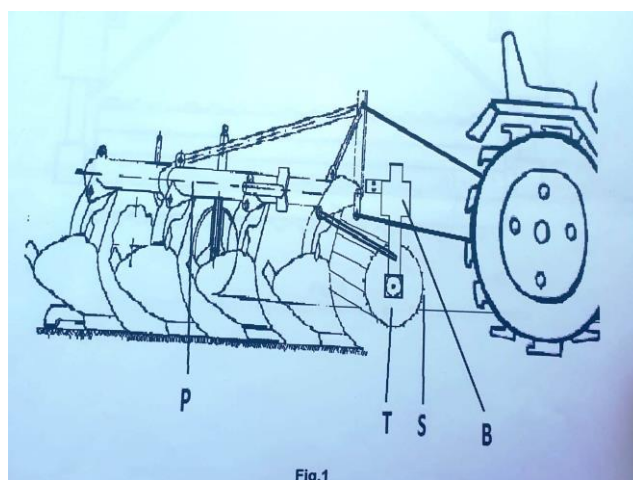
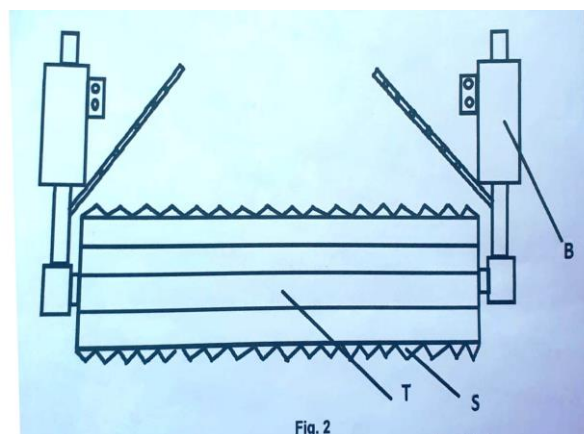


Fig. 2. The combined equipment for shredding and incorporating plant residues - shredding drum.



The combined equipment consists of the T drum with crushing elements and shredder mounted in front of a P plow normally mounted on the rear hydraulic lift the tractor, the drum having a rotor-type metallic construction with a number of rails S having the active part in the shape of a

saw and being radially welded along its length, the drum having the possibility of elastic adjustment with a helical spring for following the unevenness of the ground during work through the elastic system with the two clamping arms B on the plow frame.

For the incorporation of shredded plant residues, a conventional plow is used on which the B arms are mounted with an elastic system for tracking the soil unevenness of the shredding drum, during work the combined equipment performs crushing and/or cutting/shredding operations of the residues in a single pass plants existing on the land from the culture previous easing the operation of incorporating them into the soil.



RESULTS AND DISCUSSIONS

Plant residues bring a low amount of nitrogen and other nutrients to the soil, but they have a decisive role in maintaining the proportion of organic matter and in the synthesis of the compounds that make up the humus

In practice, the operation of destroying plant remains is performed separately, generally the equipment is mounted

behind the tractor. We know equipment for destroying plant residues such as cutters, platforms with rotors, etc., which work together with the tractor.

The disadvantages of these equipments consist in the fact that they work independently and only carry out the operation of destroying plant remains and leaving them on the ground, in the technology being necessary the additional passage on the same land for incorporation, which involves fuel consumption, pollution, soil settlement, etc. .

The combined equipment for shredding and incorporating vegetable residues is a combined equipment consisting of a drum with elements for shredding vegetable residues mounted in front of a plow arranged normally on the lifter behind the tractor, intended for the respective shredding/crushing for the total incorporation of plant material into the soil through the operation to plow in one pass. The technical problem that the combined equipment for shredding and incorporating plant residues solves is the coupling or combination of two pieces of equipment, one for shredding and the other for incorporating by plowing, mounted on the rear hydraulic lift of a tractor with which, in a single pass, more easier and more efficient operations of shredding and incorporation of plant residues,

The combined equipment for shredding and incorporating plant residues eliminates the disadvantages in that the operations are performed in a single pass. The advantage of using this mechanism consists in facilitating the operations and increasing the productivity with reduced costs of time, fuel and also fulfilling the requirements of environmental protection by reducing the subsidence of the land and the noxes produced by double tillage. Another advantage consists in avoiding the accumulation of plant debris in front of the active organs of the plow and removing it from the furrow, in case the unshredded material would remain on the ground.

CONCLUSIONS

After testing the equipment in a field with vegetation, it was found that it achieves a 90-95% degree of shredding of plant remains. The equipment can also be used for other types of vegetable residues (corn, sunflower, vegetable residues appearing on wheat stubble).

The advantages of using the shredding equipment consist in the fact that the degree of incorporation is achieved in proportion to 100%. This is an advantage when establishing the germinal bed.

Another advantage is the fact that when sowing, a work is carried out in the optimal parameters regarding the depth and settlement, the seed thus entering into a good contact with the soil, a fact that leads to a uniform emergence.

ACKNOWLEDGEMENTS

Using the equipment eliminates chopping work with other agricultural machines, reducing fuel consumption, pollution and working time. The equipment was proposed for patenting at OSIM.

REFERENCES

- Constantin, N., Cojocaru, I., Morosanu, V., Jercaleanu, C, Marin Eugen, 2003, Combinator pentru pregătit patul germinativ C3,9P, Oferta cercetării pentru transfer tehnologic in agricultura si industrie alimentara, Vol VII, 436, ISBN 973-31-2203-3.
- Constantin, N., Cojocaru, I., Morosanu, V., Jercaleanu, C, Marin Eugen, 2003, Combinator pentru pregătit patul germinativ C6,5P, Oferta cercetării pentru transfer tehnologic in agricultura si industrie alimentara, Vol VII, 437, ISBN 973-31-2203-3.
- Gangu, V., Cojocaru, I., Mateescu, M., Marin Eugen s.a., 2004, Cercetări privind funcționarea mașinilor de semănat cereale păioase in teren nearat, INMATEH 2004 I, București, 33-41, ISSN 1583-1019.
- Morosanu, V., Gangu, V., Cojocaru, I., Marin Eugen, 2000, Sistem de mașini pentru implementarea tehnologiilor cu inputuri reduse la culturi de camp, INMATEH 2000 II, București, 21-35, ISBN -0-023 76-X.