

## STUDIES REGARDING THE MECANIZATION TECHNOLOGY OF MINIMAL TILLAGE IN WHEAT CULTURE

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**Abstract:** *A primary goal of modern agriculture is intensive development of agricultural production, as an essential condition for achieving the greatest productions at the surface and with as low costs per unit produced. Development of sustainable agriculture in Romania through the promotion of conservation technologies and, in particular, those with minimal tillage and sowing should be directly with the necessity for achieving yields of high quality, low cost and respecting the requirements relating to the preservation of soil fertility. In view of the current requirements for the development of a sustainable eco-agriculture, these technologies will require more and more in Europe, including in our country. The sowing of cereals is a particularly important work to be carried out at a time and with minimum expenses. This paper shows the optimal technology mechanization work of cizel ploughing, harrows tillage and sowing in the growing of grain straw. The paper is based on the experience gained in the area of mechanization by the agriculture of our country and other countries. In result of studies carried out are presented the findings concerning the consumption of fuel, and indices of the mechanized works in wheat culture.*

**Key words:** *tractor, fuel, minimal tillage, economic indexes*

### INTRODUCTION

The classic (conventional) tillage system which was generalized in growing plants, including a large number of achievements in order to create living conditions more favourable for the development of crop plants. The declared goal of conventional agriculture (dominant and currently) is to ensure the food security of each country and a surplus for export, contributing this way to the positive economic results. Thus, the 20<sup>th</sup> century has as indicator of intensification of agricultural production by increasing production per hectare by means of mechanization, chemistry, irrigation, use of varieties and hybrids with a great capacity.

Starting from the need to eliminate the disadvantages of the conventional tillage system development of alternative technologies for soil processing, ensuring the preservation and maintenance of productive capacity, as well as reducing energy consumption, represents today the basic requirements for developing and building sustainable agriculture.

The new technologies of mechanization of work the soil in conservative tillage system comprise more than one processing systems: minimum tillage, mulch tillage, ridge tillage and no-tillage or direct drill.

The development of a sustainable agriculture by promoting the practice of conservation technologies and specifically those with minimum tillage and direct drill is subject to necessity, in order to obtain high-quality crops with low costs and while respecting requirements relating to the preservation of soil fertility.

Taking into account the current requirements concerning the development of an eco-sustainable agriculture, these technologies will require more and more in Europe, including in our country.

### MATERIAL AND METHODS

The results comprised in this paper are founded on the experiments carried out on the fields from Silagiu - Timiș County in the autumn of 2013 year. Mechanized works were performed by SC S.C. Alsace Farm SRL Buziaș. The agricultural mechanized works were carried out with the following agricultural machines:

- chisel plows depth Horsch Tiger 8 AS with Challenger MT-765B tractor (figure 1);
- disc harrows Gregoire Besson XXL 7300 with Challenger MT-765B tractor (figure 2);
- sowing machine Horsch Pronto 6AS with Fendt-820 Vario tractor (figure 3).



Figure 1:  
Tractor Challenger MT-765B with  
chisel plows depth Horsch Tiger 8 AS



Figure 2:  
Disc harrows Gregoire Besson XXL 7300



Figure 3: Sowing machine Horsch Pronto 6AS

In the experimental setting we tested the following parameters, for each agricultural mechanized works: power of tractor engine, fuel consumption, working width, working depth, hourly productivity, daily productivity, payroll value, fuel value, repay value, maintenance value, direct expenditure, ancillary expenditure, total expenditure.

### RESULTS AND DISCUSSIONS

The technology of plant cultivation with minimal tillage or with the total exclusion of tillage including plough-land has appeared not like a fashion, but like a necessity in order to solve a series of problems of technical or economic nature to which the contemporary agriculture is confronted.

The results of the determinations are presented in table 1.

Table 1

Results obtained at minimal tillage in wheat culture

No. crt	Parameter	Aggregate			TOTAL (lei)
		Tractor Challenger MT-765B & Chisel plows depth Tiger 8AS	Tractor Challenger MT-765B & Disc harrow GB XXL	Tractor Fendt-820 & Sowing machine Pronto 6AS	
1	Power of engine tractor [HP]	320	320	190	-
2	Fuel consumption [liters/hour]	54	54	32	-
3	Working width [m]	7,5	7,3	6	-
4	Working depth [cm]	20	15	5	-
5	Hourly productivity [ha/h]	4,4	6	3,5	-
6	Daily productivity [ha/day]	35	48	28	-
7	Fuel consumption [liters/ha]	10	18	6	34
8	Payroll value [lei/ha]	2,5	4,8	4,0	11,3
9	Fuel value [lei/ha]	65,0	116	39,0	220
10	Repay value [lei/ha]	9,0	13,2	7,0	29,2
11	Maintenance value [lei/ha]	8,5	16	7,0	31,5
12	Direct expenditure [lei/ha]	85	150	57	292
13	Ancillary expenditure [lei/ha]	17	30	11	58
14	<b>Total expenditure [lei /ha]</b>	<b>102</b>	<b>180</b>	<b>68</b>	<b>350</b>

### CONCLUSIONS

The technology of plant cultivation with minimal tillage or with the total exclusion of tillage including plough-land has appeared not like a fashion, but like a necessity in order to solve a series of problems of technical or economic nature to which the contemporary agriculture is confronted.

The excessive mechanization of agricultural works tends to be replaced by minimum works (minimum tillage) exerted only in moments of maximum efficacy. Through combined technical interventions carried out in the proper moment we can avoid the lack of equilibrium that can appear in the agricultural systems caused by the excessive soil raming. Among these, we can mention: the degradation of soil structure, the reduction of fertility and the disturbance of the microbiological processes within soil.

The substantiation of the unconventional tillage system relies upon the achievement of some objectives and indicators, among which we remind the following:

- the reduction of work number, totally or partially;
- the maintenance of the vegetal rests on the soil surface (at least 30%);
- the avoidance of erosion and soil preservation through the creation of optimal conditions to grow and develop crop plants;
- the reduction of production cost and the increase of the net benefit through the reduction of fuel consumption, human and mechanic work.

Mechanized works in optimal conditions and quality is the key to obtaining high yields with minimum expenses.

#### **BIBLIOGRAFY**

1. GUŞ P., STĂNILĂ S., RUSU T., 2003, Sisteme convenţionale şi neconvenţionale de lucrare a solului, Ed. Risoprint, Cluj-Napoca.
2. GUŞ P., ROŞ V., STĂNILĂ S., 2003, Lucrările neconvenţionale ale solului şi sistema de maşini, Ed. Risoprint, Cluj-Napoca.
3. SCRIPNIC V, BABICIU P., 1981, Maşini agricole, Ed. Ceres, Bucureşti.
4. ŞANDRU A., CRISTEA I., 1983, Exploatarea utilajelor agricole, E.D.P., Bucureşti.