

# THE INFLUENCE OF TECHNOLOGY WITH A REDUCED NUMBER OF SOIL WORKS OVER PHYSICAL AND PHYSICAL-MECHANICAL CHARACTERISTICS OF SOIL AND TO WHEAT PRODUCTION

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**Abstract:** *In wheat growing, one may apply technologies with a reduced number of works without influencing significantly the yield level. Both the weight of 1000 grains and the hectolitic weight in wheat were not significantly influenced by the application of the technologies of reduced soil works, but it was remarked a decrease tendency of these values once with the decrease of the working depth and the diminution of the soil mobilization degree. Soil physical and physical-mechanical proprieties were modified under the influence of soil works. Soil aeration and structure total hydric stability decrease at the same time with the decrease of the working depth and the diminution of soil mobilization degree, while the apparent density and the soil penetration resistance increase. There were remarked significant and distinct significant correlations between elements of production and soil physical and physical-mechanical characteristics.*

**Keywords:** *technology with a reduced number of soil works.*

## INTRODUCTION

To approach the type on the system of soil work must have in consideration the conditions of soil, plant and the climate which can influenced or can be influenced by respective system. To profitable act the system of soil work on one culture factor is must to maintain the others factors to an acceptable level, so that increase the agriculture production, decrease the combustible consumption or increase the capacity of soil production of to can be possible through optimization solution the economic.

The soil work, besides novelty and direct effects, beneficial in the frame of the technologies to cultivate the plants, induce in soil the remanence effects, which reacts on the physical and physical-mechanical of the soil, changing. The present paper contains the results obtained in this direction on a period of four years.

## Material and research method

The experience has been placed during of rotations on three years: wheat-maize-soy, having the stationary character, in unirrigate condition, on the typical chernozem cambic, I.N. = 2,1,  $P_2O_5$  = 3,2 mg/100 g soil,  $K_2O$  = 21 mg/100 g soil, pH = 6,4  $H_2O$ , contain of humus = 2,49 %. The placement parcel was made after the method of the blocs, in flour repetition, containing a number of 17 variants, and wheat type is Falmura-85. In the present paper, dates concerning the physical and physical-mechanical proprieties of soil, as well regards of quantity and quality of wheat production obtained, are presented just for four variants from 17, consider the most representative, respective the variants were the basic soil work has been the same year to year:  $V_1$  - Ploughing on 30 cm;  $V_2$  - Ploughing on 20 cm;  $V_3$  - Loose on 20 cm,  $V_4$  - Discing on 12-15 cm.

The basic soil work was execute with a unit formed from tractor U-650 M and carried plough PP-3x33 M (variants  $V_1$  and  $V_2$ ), Cizel machine with rigid mechanisms MC-2,5 (variant  $V_3$ ), harrow with discing GD-4+LN with 160 kg ballast (variant  $V_4$ ). The works to prepare the germinate bed was executed differently, on variants and years, in purpose to realization a indexes of superior quality in all variants. The others technological elements are execute uniform on years and variants, in conform with technology of wheat culture.

Was determinates the aired porosity of soil (PA), the apparent density (DA), the penetration resistance (Rp), the hydric stability of the soil structure (S), the

wheat production (P), the mass of thousand beans (MMB) and hectoliter mass (MH). In this paper are presented the average values of three depths and four years of study with concerning the physical and physical-mechanical property of soil.

The production quantity and quality was presented like average of four years of study. For establish the connection between physical and physical-mechanical properties of soil and production elements was used correlation methods, making an packet of utilizable programmers on computer, with his help the measured and determinate values as part as the experience was model after a number of know functions.

Under aspect of climatic conditions, in the research period, was in order: droughty year, with a deficit of precipitations to 63,2 mm, extremely rainy year, with a surplus of precipitation to 267,3 mm, normally year, whit precipitations to 538,9 mm and droughty year, with a deficit of precipitation to 52,4 mm.

### Results obtained

Physical and physical-mechanical characteristically of soil, calculating like average of as three determination depths and a four years of study, was presented in table 1 for all variants of work of soil and elements of wheat production in table 2.

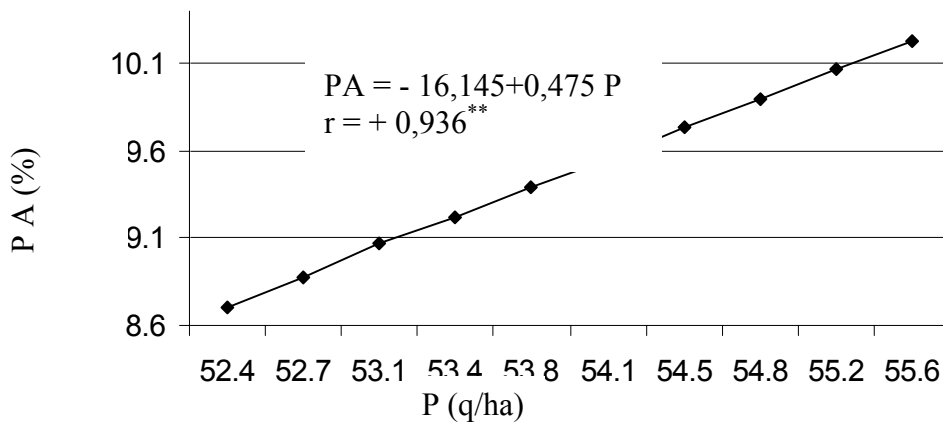
In figures 1÷12 are presented as mathematical equation (analytical and graph), which models the connection between soil characteristics and element of wheat production, and property correlation coefficient.

**Table 1.** Physical and physical-mechanical characteristics of soil.

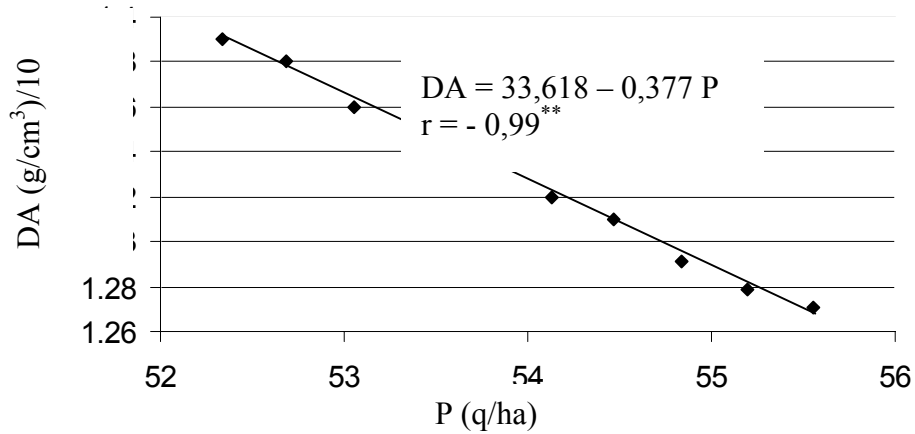
Variant	Permanent work	Aired porosity, PA (%)	Apparent density, DA (g/cm <sup>3</sup> )	Hydric stability, S (%)	Penetration resistance, Rp (daN/cm <sup>2</sup> )
V1	Ploughing on 30 cm	10,15	1,26	54,8	41,0
V2	Ploughing on 20 cm	9,77	1,32	54,0	48,0
V3	Loose on 20 cm	9,58	1,34	52,6	51,0
V4	Discing on 12-15 cm	8,48	1,39	47,2	52,0

**Table 2.** Element of wheat production.

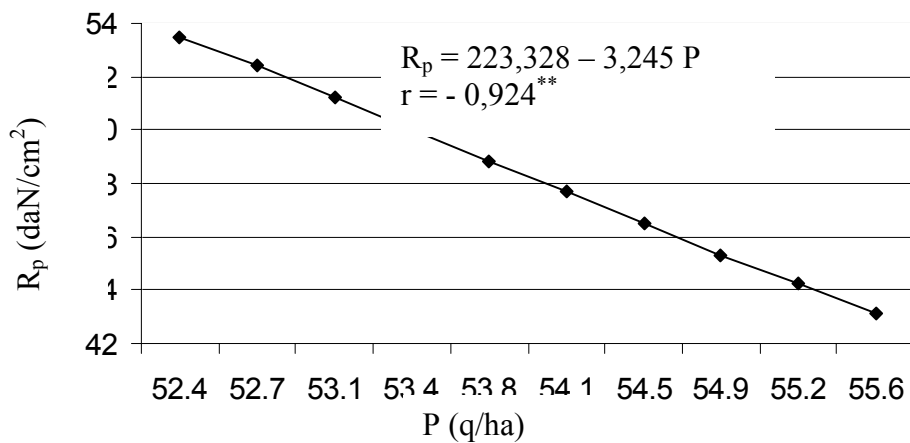
Variant	Permanent work	Production (q/ha)	M.M.B. (g)	M.H. (kg/hl)
V1	Ploughing on 30 cm	55,82	51,25	76,46
V2	Ploughing on 20 cm	53,99	51,2	76,35
V3	Loose on 20 cm	53,94	50,67	75,52
V4	Discing on 12-15 cm	52,36	49,2	74,94



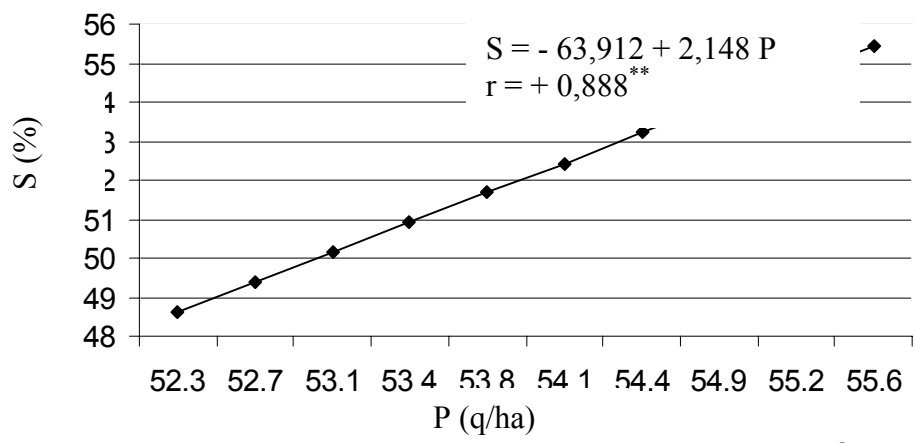
**Figure 1.** The mathematical connection between air-filled porosity of soil (PA, %) and wheat productivity on hectare (P, q/ha).



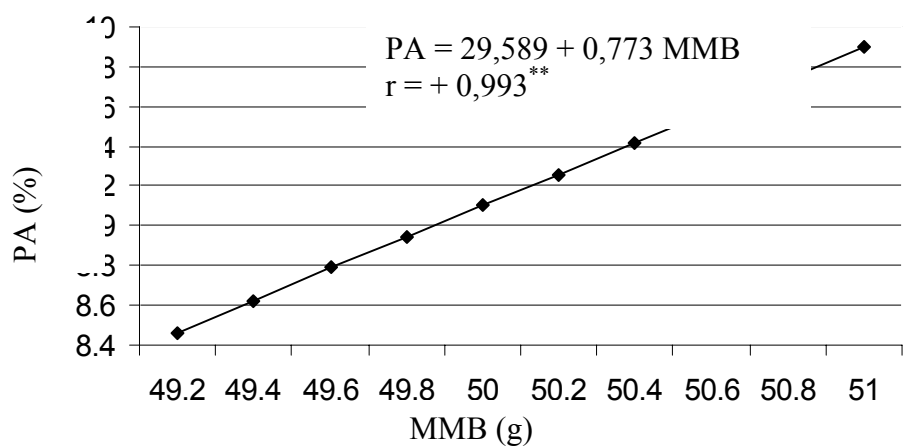
**Figure 2.** The mathematical connection between apparent density of soil (DA, g/cm³) and wheat production on hectare (P, q/ha).



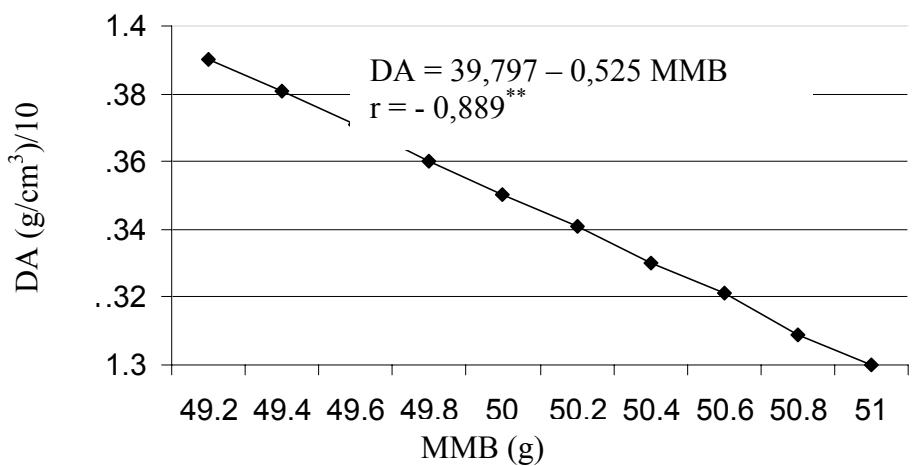
**Figure 3.** The mathematical connection between penetration resistances of soil (Rp, daN/cm²) and wheat production on hectare (P, q/ha).



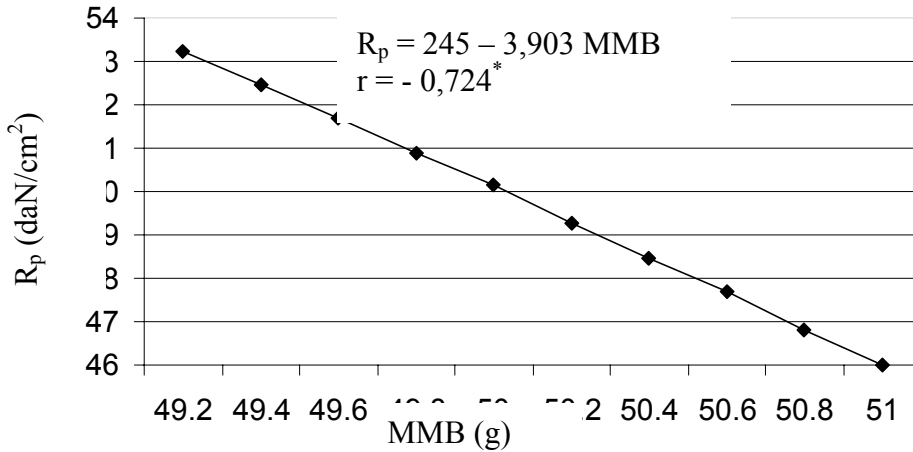
**Figure 4.** The mathematical connection between hydraulic stability of soil structure (S, %) and wheat production on hectare (P, q/ha).



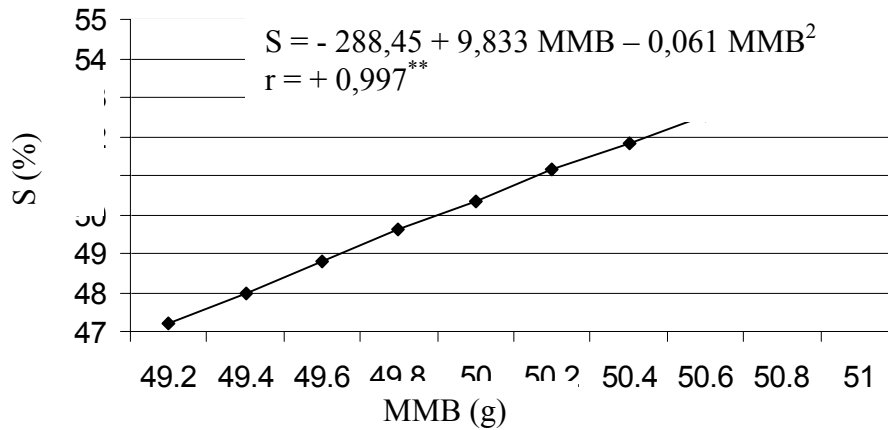
**Figure 5.** The mathematical connection between aered porosity of soil (PA, %) and mass of thousand wheat beans (M.M.B., g).



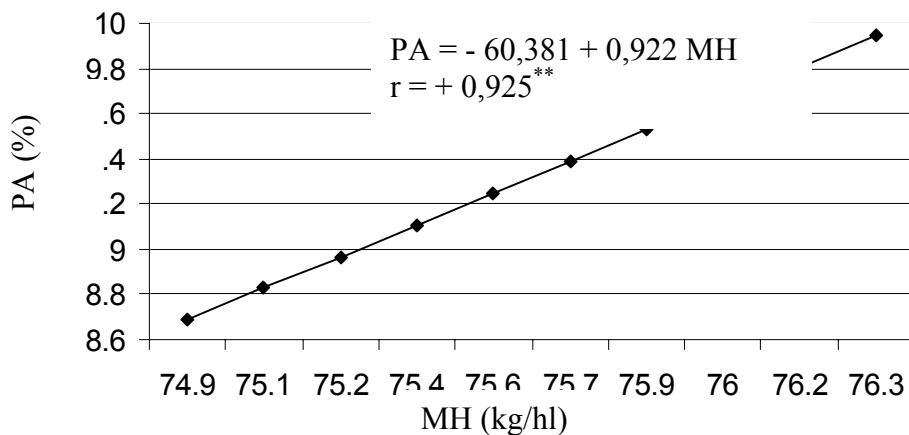
**Figure 6.** The mathematical connection between apparent density of soil (DA, g/cm<sup>3</sup>) and mass of thousand wheat beans (M.M.B., g).



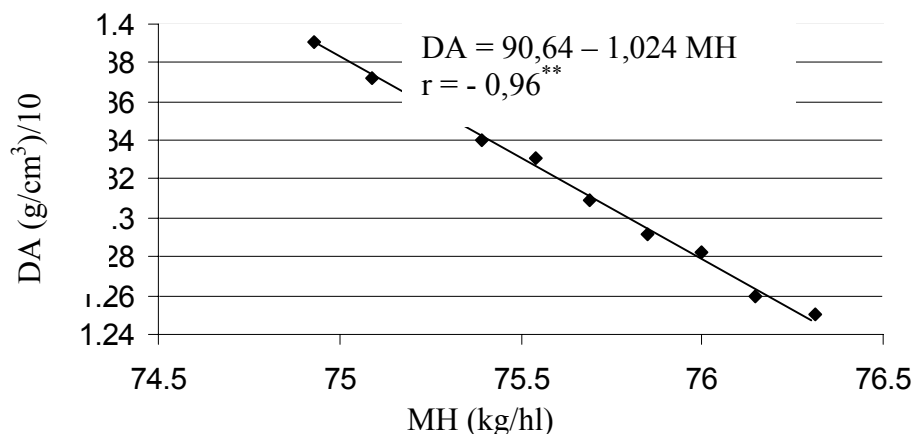
**Figure 7.** The mathematical connection between penetration resistances of soil ( $R_p$ , daN/cm<sup>3</sup>) and mass of thousand wheat beans (M.M.B., g).



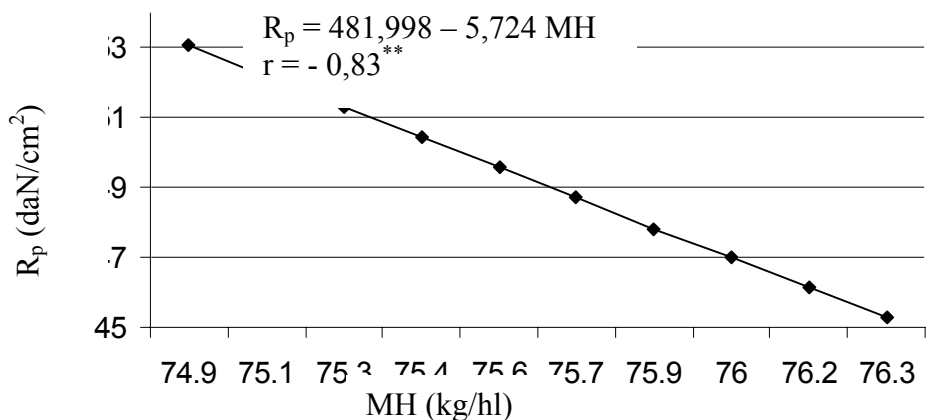
**Figure 8.** The mathematical connection between hydric stability of soil structure (S, %) and mass of thousand wheat beans (M.M.B., g).



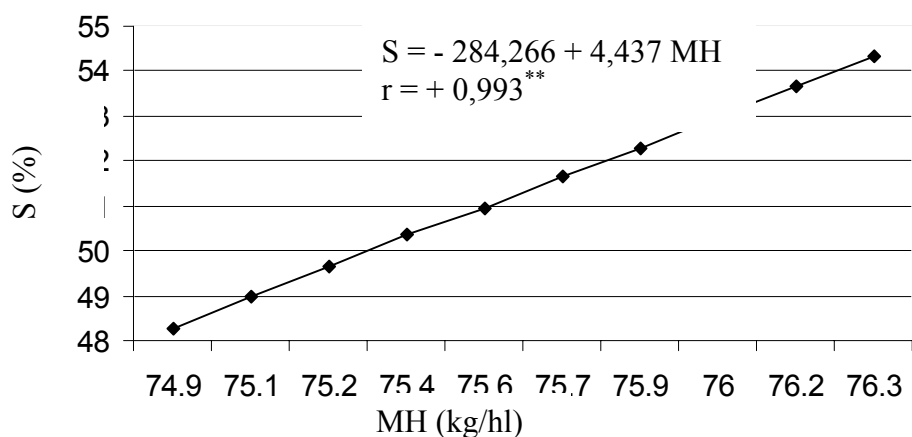
**Figure 9.** The mathematical connection between airtiness of soil (PA, %) and hectoliter mass of wheat beans (M.H., kg/hl).



**Figure 10.** The mathematical connection between apparent density of soil (DA, g/cm<sup>3</sup>) and hectoliter mass of wheat beans (M.H., kg/hl).



**Figure 11.** The mathematical connection between penetration resistances of soil (Rp, daN/cm<sup>3</sup>) and hectoliter mass of wheat beans (M.H., kg/hl).



**Figure 12.** The mathematical connection between hydric stability of soil structure (S, %) and hectoliter mass of wheat beans (M.H., kg/hl).

## CONCLUSIONS

1. The wheat culture is adapted very good to application the technologies with a reduced number of soil works. The average productions on four years, on all four studied variants, varied in a restrict intervals (55,82 – 52,36 q/ha);

2. Both MMB and MH on wheat was not significant influenced by application the technologies with reduced number of soil work, but was register a diminish tendency of these values with the decrease of the work depth and diminution of soil mobility degree;

3. Physical and physical-mechanical characteristics of soil have modified under the influence the soil work. The aired porosity of soil and hydric stability of soil structure was decrease in the same time with decrease of work depth and with diminish of soil mobility degree. The apparent density and penetration resistances of soil are increase with decrease of depth work and with diminish of soil mobility degree;

4. Between elements of production and physical and physical-mechanical characteristics of soil was remarked an significant and distinct significant correlations.

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