

THE INFLUENCE OF TILLAGE SYSTEM AND PRE-EMERGING PLANT ON ECONOMIC EFFICIENCY AND PRODUCTION AT WHEAT CULTURES IN THE SOMES PLATEAU

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Abstract

Analysis of economic efficiency of wheat crop depending on the tillage system highlights the influence of tillage, in terms of primary production, costs of production and the rate of profit. Economic efficiency indicators reveal wheat crop profits of 289-290 lei/ha recorded in versions made with paraplow and rotary harrow. In the case of conservative soil tillage at wheat crop that came after wheat, we recommed using tillage systems with paraplow and rotary harrow, systems that achieved the highest rate of profit with values between 14.94 and 14.96%. Economic efficiency of wheat crop grown after soybeans is much higher than wheat grown after wheat. So if the average profit is 274 lei/ha, for wheat after wheat version, in the one with prior soybean rotation, average profit reached 356 lei/ha. Significantly, in the case of wheat after soybean cultivation, the maximum profit is obtained when the soil was worked with rotary harrow or paraplow. Based on economic efficiency regardless of previous plant for wheat crop we can use unconventional soil tillage systems with paraplow and rotary harrow, so the chisel usage remains an alternative in case the first two mentioned systems can not be used. The wheat production in experiences was influenced by the tillage system and preceding plant. When the wheat followed soybean in rotation, yields exceeded 4000 kg/ ha, with values ranging from 4663-4800 kg/ha. Production levels due to the previous plant (soybeans) without tilling was able to lead to differences statistically ensured compared to the witness variant. We also notice that the predecessor soybean recorded higher yields compared to the classic variant in the plots where the soil was worked with paraplow (a3) and rotary rotary harrow (a4).

Keywords: economic efficiency, soil tillage, production, crop rotation.

INTRODUCTION

Economic analysis occupies a very important role within an agricultural unit by the growth of profit rate and profit margins. Economic efficiency can be defined as a research of a phenomenon, process or activity, as well as correcting certain factors that determine it.

In examining the economic efficiency of agriculture, it focuses on harnessing the productive potential of land with specific indicators such as average yield per hectare for each crop, the production value or net revenue per hectare etc..

In a great extent the relation between tillage system - production depends on the previous state of the soil and precipitation patterns. The classic tillage based on plowing with

moldboard plow generally provides the highest yields, but exploiting the natural fertility of the soil and draining reserves.

When elaborating the alternative soil tilling systems not only the immediate results (high productions) must be targeted, but also the long-term ones, which ensure the durability of the system in time.

Soil tillage manifests its superiority as the main economical means of lasting agricultural production through the use of mechanical means, of water, being the leverage of the agricultural production profitability, closely connected to the economic requirements.

The specialized literature from Romania - (Lăzureanu, 1999; Guş et al., 1998; Săndoiu, 2000; Jităreanu, 2006), offers enough examples concerning the Romanian researchers`

preoccupation for finding out the role that soil tillage has on production and profit with the cultivated plants.

MATERIALS AND METHODS

The results presented in this paper were obtained in the experimental fields of the Agrotechnics discipline from the Jucu region in Cluj, on an *argic-stagnic Faeoziom soil, with a humus content of 3.8% and 6.5 pH*. From a climatic point of view, the hilly area where the experiments took place is characterised by medium annual precipitations between 550-650 mm. The thermal regime of the area is characterised by annual average temperatures between 8.0-8.2⁰C.

The purpose of the study was to determine the influence of tillage systems on economic efficiency and production of wheat crop.

The experimental factors were as follows:

Factor A - Tillage system:

a₁ - worked with reversible plough

a₂ - worked with chisel

a₃ - worked with paraplow

a₄ - worked with rotary harrow

Factor B - Cultivated plants:

b₁ - corn

b₂ - soybean

b₃ - wheat

RESULTS AND DISCUSSIONS

ECONOMIC EFFICIENCY OF WHEAT CROP RELATED TO THE SOIL TILLAGE SYSTEM, AFTER WHEAT AS A PRE-EMERGENT PLANT

Economic efficiency indicators reveal wheat crop profits of 289-290 lei/ha (Table 1), recorded in versions made with paraplow and rotary harrow.

These profits exceed profits of 270 lei/ha recorded in the variant made with conventional plow.

Given the amount of profit and beneficial effects of conservative tillage systems at wheat crop that came after wheat, we recommended using tillage systems with paraplow and rotary harrow, systems that achieved the highest rate of profit with values between 14.94 and 14.96.

Table 1. Economic efficiency in wheat crop related to the soil tillage system, after wheat as a pre-emergent plant

Working variant	Main production (kg/ha)	Main production value (lei/ha)	Production increase value (lei/ha)	Production expenses (lei/ha)	Production cost (lei/kg)	Total Profit (lei/ha)	Rate of profit (%)
a ₁	3750	2250	(Mt)	1980	0.53	(Mt) 270	13.63
a ₂	3440	2064	-186	1816	0.53	-248	13.65
a ₃	3700	2220	-30	1931	0.52	+289	14.96
a ₄	3717	2230	-20	1940	0.52	+290	14.94

ECONOMIC EFFICIENCY OF WHEAT CROP RELATED TO THE SOIL TILLAGE SYSTEM, AFTER SOYBEAN AS A PRE-EMERGENT PLANT

Economic efficiency of wheat crop grown after soybeans is much better than wheat grown after wheat. So if the average profit is 274 lei/ha for wheat after wheat version, in the one with prior soybean rotation, average profit reached 356 lei/ha.

Significantly, in the case of wheat after soybean cultivation, the maximum profit is obtained when the soil was worked with rotary harrow or paraplow.

Maximum profit is due to the production cost of 0.52 lei/kg in the 2 ways of tillage which is lower than the classical tillage whose value is 0.53 lei/kg.

Higher profit after preceding soybean production is explained by the average of 4739 kg/ha compared to 3652 kg/ha, when wheat had been cultivated after wheat.

The rate of profit has values of 14.93% for variants using rotary harrow and paraplow tillage, respectively 13.65% for classical variant and of 13.64% for the variant tillage with chisel (Table 2).

Table 2. Economic efficiency in wheat crop related to the soil tillage system, after soybean as a pre-emergent plant

Working variant	Main production (kg/ha)	Main production value (lei/ha)	Production increase value (lei/ha)	Production expenses (lei/ha)	Production cost (lei/kg)	Total profit (lei/ha)	Rate of profit (%)
a ₁	4800	2880	(Mt)	2534	0.53	(Mt) 346	13.65
a ₂	4663	2798	-82	2462	0.53	-336	13.64
a ₃	4708	2825	-55	2458	0.52	+367	14.93
a ₄	4783	2870	-10	2497	0.52	+373	14.93

To conclude, based on economic efficiency regardless of previous plant for wheat crop we can use unconventional soil tillage systems with paraplow and rotary harrow. The use of chisel remains an alternative in case the first 2 mentioned systems can not be used.

The wheat production in experiences was influenced by the tillage system and preceding plant. When the wheat followed soybean in rotation, yields exceeded 4000 kg/ha, with values ranging from 4663-4800 kg/ha. Production levels due to the previous plant (soybeans) without tilling was able to lead to differences statistically ensured compared to the witness variant. We also notice that the predecessor soybean recorded higher yields compared to the classic variant in the plots where the soil was worked with paraplow (a₃) and rotary harrow (a₄).

The significance of differences in wheat production cultivated after preceding soybean in the four types of soil tillage confirms a broad range of processing of the soil for the cultivation of wheat after preceding soybean as compared to the variant when wheat had been cultivated after wheat.

CONCLUSIONS

Economic efficiency indicators reveal wheat crop profits of 289-290 lei/ha, recorded in versions made with paraplow and rotary harrow. These profits exceed profits of 270 lei/ha recorded in the variant made with conventional plow. Given the amount of profit and beneficial effects of conservative tillage systems at wheat crop that came after wheat, we recommed using tillage systems with paraplow and rotary harrow, systems that achieved the highest rate of profit with values between 14.94 and 14.96%. Economic efficiency of wheat crop grown after soybeans is much better than wheat grown after wheat. So if the average profit is 274 lei/ha for wheat

after wheat version, in the one with prior soybean rotation, average profit reached 356 lei/ha.

Recorded production of wheat crop varies depending on tillage system and preceding soybean plant so highest production was recorded in the variant worked conventional using the reversible plow, of 4800 kg/ha and the lowest production was recorded in the unconventional worked variant with chisel with a production of 4663 kg/ha.

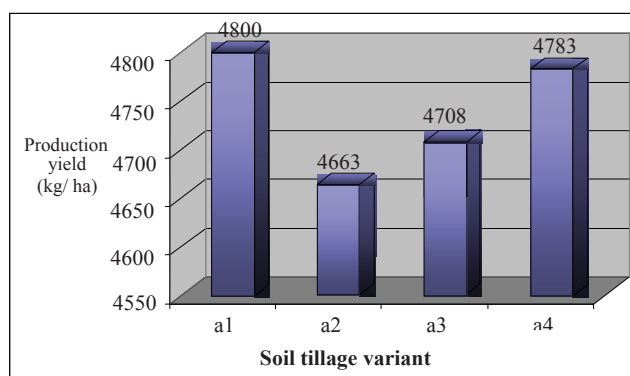


Figure 1. Wheat production related to soil tillage system and the pre-emergent plant, soybean

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