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THE ENERGETIC EFFICIENCY AT MAIZE IN CLASSIC AND NO-TILL SISTEM IN CONDITION OF ARAD AREA

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Abstract: *The study was performed in conditions of the year 2009 on a mollic preluvosoil (SRTS 2003) in maize culture cultivated in classic and no-till systems. The energetic efficiency is quantified using two indicators: the energetic efficiency and the energetic balance. Following the energetical transformations made on equivalent basis, there was a report calculation between invested and obtained energy in agrosistem. Having a report between energy found in the main agricultural product – output – and energy invested in the ecosistem – input – determine energetic cost of every calory witin this product or conversion efficiency of energy invested. The energetic efficiency must be one of the main directions of economical restructuration in agriculture because assures production competitivity, takes environment protection into account and diminishes dependence from imported energy, mostly regarding fossilized fuels. The analysis effectuated over some agricultural crops of economical remarkable importance shows that after the use of particular technology based on mechanisation and high fertiliyation; the best efficiency was obtained to maise. The solar energy is not the only energetic input at plant disposal of agricultural importance. It is considered to be the most important and by all means it is free. the others inputs categories (soil preparation, sowing, fertilisation, phytosanitary treatments, etc.) require expulse which grow faster, from year to year, than biological-alimentary energy obtained by agricultural crops. For energetic analysis an important indicator is the structure of energy consumption. This has direct actively energy consumption (fuel, thermic energy, electrical energy), indirect actively energy consumption (manure, pesticide, seed) and passive energy consumption (tractors and agricultural vehicles) as main elements of consumption. After the report accomplishment between energetic impust and output it has been shown that some energy units can be obtained for a consumed energy unit*

Key word: *no-till, energetic analysis, energetic efficiency, energetic balance*

INTRODUCTION

The solar energy is not the only energetic input at plant disposal of agricultural importance. It is considered to be the most important and by all means it is free. the others inputs categories (soil preparation, sowing, fertilisation, phytosanitary treatments, etc.) require expulse which grow faster, from year to year, than biological-alimentary energy obtained by agricultural crops. For energetic analysis an important indicator is the structure of energy consumption. This has direct actively energy consumption (fuel, thermic energy, electrical energy), indirect actively energy consumption (manure, pesticide, seed) and passive energy consumption (tractors and agricultural vehicles) as main elements of consumption.

The Introducing one sustainable systems in the agriculture, is necessary in order to reduce degradation phenomena of soil resources, maintain and even increase the agricultural productivity.

The Introduction of new technological systems must be in accordance with principles of sustainable development, to ensure the possibilities for development and to correspond with existing reality.

This Study aims to highlight, by comparison, the effectiveness of two technological systems: the classic and no-till system.

MATERIAL AND METHOD

The researches were done on base of production dates obtained on a cambic cernosiom, near Arad. The experiments are 2x2 type, with plots subdivided in 4 repetitions (48 plots). The surface of a plot is of 36 m^2 (4x9) the total surface of the experimental field being of 2500 m^2.

Following the energetical transformations made on equivalent basis from table 1, there was a report calculation between invested and obtained energy in agrosistem. Having a report between energy found in the main agricultural product – output – and energy invested in the ecosistem – input – determine energetic cost of every calory witin this product or conversion efficiency of energy invested.

Table 1

Transformation coefficients of diferent from of energy

Crops	U.M.	Energetic equivalent Kwh
Maize s.u.	kg	5.30
Diesel oil	l	11.756
Nytrogen	kg	25.800
Phosphor	kg	5.650
Potassiu	kg	4.125
Pesticides	kg	30.0

RESULTS AND DISCUSSIONS

The analyzed soil has an acid reaction (5,9 – 6,8) in the first 80 cm of the soil profile, neutral between 80- 125 cm and low alkaline between 125 – 200 cm depth.

The mobile phosphorus content (P) in the worked soil (Ap) has medium values (35,0 ppm) at the limit of alert threshold (concerning the nutrition lack) the mobile potassium supply (K) having medium values (153 ppm), values which are lower on with the profile (table 3).

The humus reserve in the first 50 cm is high, and the natrium index (I.N.) has medium values in the worked layer (Ap) and also in the 0 – 45 cm layer.

Soil's texture, a very stable physical feature, is medium clay on the whole profile. The Apparent Density (DA) has medium values in the worked layer from the classic system, high in the first 10 cm in no-till system and very high in the middling third of the soil profile in the two systems (table 3).

Table 2

Energetic equivalent (kwh) of consumed energy for agrotechnical works and used materials in vegetable yield

Agriculture work	No-till	Classic
Planghin	-	329.16
Preparing germinated lay	-	246.87
Seed + Sowing	148,32	148.32
Erbicided	47,63	47.63
Fertilizer chimic + administer	2846	2846
Harvest+ transport	329,68	329.68
TOTAL	3371,63	3947,66

Table 3

Chemical properties of Chernozeum mezocalcaric medium loamy/medium loamy from Arad

Horizonts	UM	Ap	Atp	Am	A/B	Bv	B/C	Cca	Ck	Ck	Ck
Deepness	cm	21	33	45	59	80	96	125	155	175	200
pH in water		5.95	6.10	6.20	6.55	6.70	7.10	7.70	8.20	8.25	8.15
Carbonates ($CaCO_3$)	%							12.10	6.85	3.55	2.60
Humus	%	3.40	2.10	2.10	1.70	1.60	1.25	1.20	1.00	0.90	0.70
Nitrogen index (IN)		3.06	1.91	1.95							
Humus reserve (50 cm)	to/ha	191.0									
P mobile	ppm	35.0	23.0	5.0	4.0	4.0	7.0	11.0	7.0	5.0	4.0
K mobile	ppm	153	128	128	123	113	136	113	98	113	113
Exchanging bases (SB)	me/100	35.6	31.2	26.8							
Exchange H (SH)	me/100	12.0	10.0	7.9							
Saturation in base degree (V)	%	90	91	93							
Mobile aluminium	me/100	0.10	0.05	0.05							

After the experiment made in 2008-2009, it showed that the classical fertilized with $N_{80}P_{80}K_{80,}$ has obtained a production of 5445 kg and the alternative no-till at the same fertilizer production was 5358 kg. of $N_{80}P_{80}K_{80,}$ and difference of 87 kg / ha.

In Table are shown 2 Energy consumption for maintenance and materials used in technology.

Largest amount of energy was invested in the classic system (3947.66), against from no-till system (3371.63)

Energy Efficiency calculated as the ratio between energy input and the amount of energy outputs (Table 3) shows that the highest energy efficiency was against no-till system (8.42) compared to the classical system (7.31)

Table 3

Energetic balance and energetic efficiency to studied yields.

Culture	No-till	Classic
Energetic balance Energetic randament	25025,37 8,42	24910,34 7,31

CONCLUSIONS

After the report accomplishment between energetic impust and output it has been shown that some energy units can be obtained for a consumed energy unit.

A high percentage from invested energy in agrosystem is represented by mineral fertiliser and user seeds used for crops establishment.

Fertilization system contributes greatly to the improving the nutrient balance of soil, which change with the time, depending on weather conditions and applied technologies.

Introduction and expansion of the agriculture in no-till system has a positive effect on the prevention of soil degradation, soil degraded by conventional technologies, reducing energy consumption, increasing the productive potential of soils, increase water use efficiency.

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